SIRI 2.0-TfNSW SIRI Implementation Specification

(Using SIRI at TfNSW)

Version 1.1

Issued: 30 July 2021

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Specification Governance

Document details

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Version History

Version	Author	Issued	Changes
0.3	Unity Project Team	Not issued	This version contains the following SIRI services: • PT - Production Timetable • ET – Estimated Timetable • VM – Vehicle Monitoring
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0.41	Unity Project Team	06/06/2017	• Corrected references to Sydney Metro
0.5	Unity Project Team	12/11/2017	• Changes to document and table formats • Updates to conceptual diagrams • Enrichments to SX and FM Use Cases and messaging sequences
0.6	Unity Project Team	15/11/2017	• Updates to Figure 14
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1.0	Unity Project Team	21/11/2017	• Version 1.0 Release approved by OTASC

1.0.1	Colin Kelly / Duncan Gadd
	
	PT Real-Time Working Group
		26/06/2018	• Bring Release 1.0 to WCAG (Web Content Accessibility Guidelines) compliance
			• 7.2.4 Clarification to align the TfNSW Master Data process with the TransXChange Implementation Specification.
			• SIRI SX updates:
			  – Grouping corrected
			  – TfNSW Comments added

1.0.2	Rowena Larkins, David Ling	15/03/2019	• VM pub/sub, TXC usage, reference data refinements, SX elaboration
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1.0.4	PTMS Project Team	24/10/2019	• TfNSW Specification aligned with the XSD standard used by the international community (see https://www.vdv.de/siri.aspx). • Restructuring of document.
1.0.5	PTMS Project Team	13/12/2019	• Identification and resolution of differences between standard CEN specification and standard VDV XSD. • New extensions to support enumerations missing from VDV XSD.
1.1	PTMS Project Team	30/07/2021	• Inclusion of SIRI FM specification • Incorporation of changes from *TfNSW SIRI Implementation Specification v1.0.5 Addendum v2.0* • Clarity for interpretation of optional and mandatory fields

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Distribution List

Program	Group	Business Unit	Responsibility
PT Real-time Working Group	PT Real-time Working Group Members	TfNSW	Governance
Sydney Metro Project Team	Metro Product and Integration	Sydney Metro Delivery Office	Review and distribution to Project teams
Sydney CBD & South East Light Rail Project Team	Rail Systems	Sydney Light Rail Delivery Office	Review and distribution to Project teams
Newcastle Light Rail Project Team	Infrastructure & Services	Newcastle Transport Program	Review and distribution to Project teams
Parramatta Light Rail Project Team	Infrastructure & Services	Parramatta Light Rail Program	Review and distribution to Project teams
Sydney Trains	`	Sydney Trains	Review and distribution to Project teams
NSW TrainsLink	`	NSW TrainsLink	Review and distribution to Project teams
Sydney Ferries	`	Sydney Ferries	Review and distribution to Project teams

Table of Contents

Table of Figures

Table of Tables

1 Introduction

1.1 Document Purpose

This document provides information to implement the SIRI protocol in compliance with TfNSW requirements to supply and interpret real time data to and from the TfNSW SIRI Message Broker.

Using the SIRI protocol will allow Operating Agencies and Private Operators of Automatic Vehicle Monitoring systems (AVMs) across all transport modes, and other data publishers / subscribers, to share consistent and accurate real time information throughout the TfNSW SIRI community and for customer information.

1.2 Why is a TfNSW Specification Needed?

The TfNSW SIRI Implementation Specification is required to:

- Localise use of the international SIRI specification to TfNSW needs
- Define TfNSW-specific extensions to the standard SIRI schema
- Reduce the complexity and risk of divergent implementations
- Ensure a consistent interpretation of the international SIRI schema
- Describe relevant TfNSW business rules that are needed to supplement the SIRI schema
- Define SIRI information sharing rules
- Define common terminology.

1.3 Intended Audience

The intended audience of this document are technical resources of TfNSW, Operating Agencies and Private Operators as well as System Integrators who will be responsible for the design and implementation of the AVM and scheduling systems. This includes:

- Data Architects for the accurate mapping of elements used in delivering the solution;
- Solution Designers for the detailed implementation framework of the AVM and scheduling systems;
- Developers for the configuration and delivery of the technical solution; and
- Testers for ensuring the solution meets the requirements of TfNSW as specified.

SIRI Use Cases have been defined to assist new TfNSW SIRI Community members in their understanding of SIRI data sets and guide consistent implementation. See the Document Reference section for the details of the associated Use Case document.

The TfNSW SIRI Community is a business-to-business (B2B), not business-to-customer (B2C) interaction model. While the TfNSW SIRI Community will communicate customer facing data utilising the SIRI protocol, publication of real-time information to TfNSW Customers will be via the General Transit Feed Specification Real-Time (GTFS-R) protocol, via the TfNSW OpenData website, as well as other dedicated Application Programming Interfaces (APIs) targeting specific uses, such as feeding Transit Stop Display predictions at interconnection nodes.

This demarcation is chosen to enable a maximal uptake of third-party application developers within the transport community.

1.4 Assumed Knowledge

Readers responsible for implementing SIRI must be familiar with:

- SIRI standards
- Real-time public transport data
- Communication protocols
- TfNSW wayfinding and network terminology
- The TfNSW TransXChange specification
- The Transmodel abstract relationship framework

1.5 Document Scope

This document explains how to use SIRI within the TfNSW network. It describes:

- Required data content
- Setup and communication protocols
- Reference data
- Technical implementation

1.6 Document References

1.6.1 SIRI Artefacts

The primary SIRI artefacts are illustrated below. The most generic of these, pictured at left, are the international standards defined in the SIRI Schema Guide, and underpinned by the SIRI XML Schema Definition (XSD).
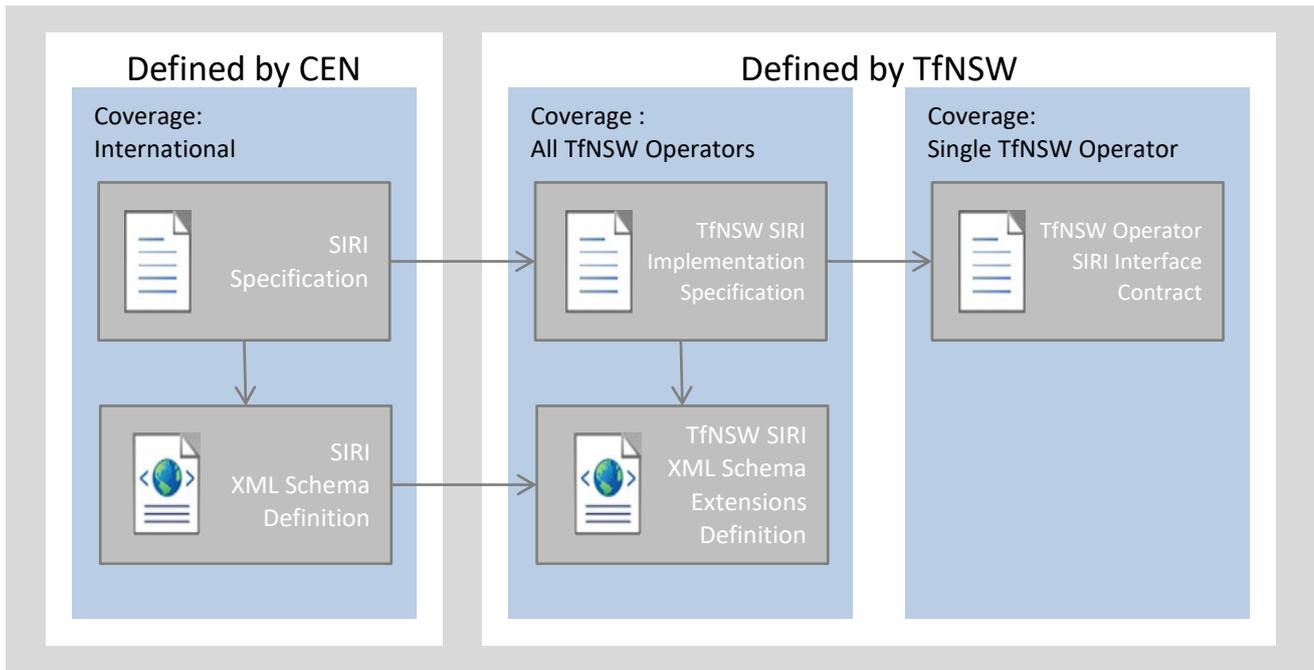
Figure 1- Inter-Relationship between SIRI Artefacts

The SIRI Implementation Specification (i.e. this document) focuses on the data needs of TfNSW and, as such, has a more limited scope than the international schema. TfNSW has adopted the SIRI standard, but has extended its adoption using the XSD extensions structure, these additional structures are defined in additional XSD extension files.

The SIRI Interface Contracts issued by TfNSW are operator-specific and provide additional guidance on SIRI usage, tailored to the Operator in question.

Table 1 – SIRI Document References

Document Name	Network Location or Documentation Link
SIRI standard specification	http://www.transmodel-cen.eu/standards/siri/ https://www.vdv.de/siri.aspx Additional information about standard SIRI is included in section "About SIRI Standard Specification"
SIRI XSD Schema for TfNSW extensions	Available upon request.
TfNSW SIRI Use cases	Available upon request.
TfNSW SIRI sample XML	Available upon request.

1.6.2 References to Other Standards

1.6.2.1 TransXChange

TfNSW provides this document in conjunction with the TfNSW TransXChange Implementation Specification as a specification group to describe the inter-operation between planned services and the real-time monitoring of services.

Table 2- TransXChange Document Locations

TransXChange Schema Guide	Available from: https://www.gov.uk/government/collections/transxchange
TfNSW TransXChange Implementation Specification	Available upon request.

1.6.2.2 TransModel

The overlay of TransXChange and SIRI atop the TransModel 6.0 conceptual data model is intended to maximise the range of available application vendors providing software support for public transport. TfNSW seeks to guide within the above standards, localising minimally.

Table 3 - TransModel Document Location

Document Name	Network Location or Documentation Link
Transmodel CEN v6	CEN V6 http://transmodel-cen.eu/

1.6.3 Inconsistencies in SIRI standard specification

Discrepancies have been identified between the referenced SIRI (CEN) standard specification document, and the associated SIRI (VDV) XML schema definition, examples include:

- PTSituationElement version, identified as SituationVersion by the CEN Specification, and identified as Version by VDV XSD.
- PTSituationElement source method, identified as SourceMethodType by the CEN Specification, and identified as SourceMethod by the VDV XSD.

This TfNSW specification has been aligned with the VDV XSD in all instances that have been identified. If future discrepancies are identified, the VDV XSD should be considered the 'in-principle' authority (to ensure successful system validation), but Transport for NSW should be informed and consulted for final determination.

1.7 Security Classification

This document is unclassified.

1.8 Change Management

The TfNSW Operational Systems Public Transport (PT) Real-Time Working Group will continue using and maintaining this document once published. Where a change is necessary across Operating Agencies and Private Operators supplying SIRI messages to TfNSW, each impacted supplier will be engaged for change management.

1.9 Document Version

The file naming convention (e.g. 1.0.1) has three elements separated by full stops in the form:

TfNSW-SIRI-Implementation-Specification v<version>.<release>.<modification>

The significance of the elements is as follows:

Table 4 – Document Versions

Element	Meaning
Version	A major planned revision to the specification
Release	An enhancement to the specification that **is not** compatible with the previous revision
Modification	An enhancement to the specification that **is** compatible with the previous revision. For example, the addition of an optional attribute to an element – existing files would pass validation against the revised schema definition, thus data providers would not need to modify their systems at the same time as receiving systems, unless they wished to make use of the new features.

2 NSW Consistent Language Glossary

This chapter lists common TfNSW terms and their meaning, with the aim of encouraging a common language between data producers and data consumers.

Table 5 – TfNSW Consistent Language Glossary

Terms	Alias/Alternative (acceptable usage)	Terms not to be used	Definition and Usage
Asset	-	-	An asset is any public transport vehicle, place, or facility used to facilitate transportation services to the Customers of TfNSW.
AVM system	-	-	Automatic Vehicle Monitoring system allows an Operator to produce and consume real-time information in the SIRI protocol about the public transport services it has been contracted to perform.
Consumer	-	-	An entity that receives notification messages or data from a Producer as a result of a previous subscription made to a service or a request for data.
Customer	-	-	A user of the state public transport network or timetable services.
Customer Journey	-	Trip	This is a TfNSW OPAL and Customer centric concept, included here for completeness. One or more Customer trips on eligible services where transfers between services occur within allowable transfer times.
Dated Vehicle Journey	Trip (acceptable when referring to vehicles rather than Customers), or Service	-	A particular journey of a vehicle on a particular day.
Facility	-	-	Facility is equipment or service that provides a specific convenience or service to a Customer. E.g. Ticket machines, elevators, mechanical stairs (escalators), toilets. A facility may be equipment, a service, a personal device or a reserved area.
Flexible Service	-	-	Operates between catchment areas that can be made up of both spatial zones, and lists of fixed stops, allowing combinations of area-to-fixed stop, area-to-area, fixed stop-to fixed stop. When operating in a spatial zone, there might be no fixed or marked stop, but the service will call on demand.
Frequency Based Service	Headway Service	-	A frequent service whose time of departure is normally shown to the public as 'every n minutes' rather than a fixed time. For example 'every 5 minutes' or 'every 15 minutes'.
Frequent Service	-	-	A Frequency Based Service which meets a regulatory/statutory requirement. Note: This is a London Transport legal concept, and is not currently applicable for TfNSW
Hail and Ride Area	-	Hail and Ride	A catchment zone for a hail and ride service, implemented as a named zone visited by a particular mode of transport and may be designated by a start point and end point on the road.

Terms	Alias/Alternative (acceptable usage)	Terms not to be used	Definition and Usage
Hail and Ride Service	-	Hail and Ride	A service that stops anywhere on designated parts of the route, if flagged down by passengers where it is safe to do so.
Incident	-	-	An unforeseen event affecting, usually to the detriment of, the operation of the Transport network.
Journey Pattern	-	-	An ordered list of Scheduled 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.
Line	-	-	A group of Journey Patterns (Routes) which is generally known to the public by a similar name or number.
Loop Service	Loop	-	A type of Service, conducted on a Journey Pattern that forms a circle or loop. The first and last TSNs are the same.
Monitored Vehicle Journey	-	-	A journey that is monitored as being operated by a logical vehicle. A Monitored Vehicle Journey relates to a single Dated Vehicle Journey.
Mode	-	-	A means of transport, such as bus, train, ferry, light rail.
Network	-	-	A named grouping of Lines under which a transport network is known.
OpenData	-	-	TFNSW OpenData hub https://opendata.transport.nsw.gov.au/
Operator	-	-	A company providing public transport services under the authority of TfNSW.
Passenger	-	-	Is frequently used, however the preferred term is customer.
Passenger Information Display (PID)	-	-	A customer display showing transport information e.g. vehicle, platform and wharf timetable indicator boards.
Preview Interval	-	-	The AVM system in charge shall provide a prediction for all trips that run within the prediction window. This includes every trip for which any scheduled or real-time arrival and departure time at a stop of the trip is between now and preview interval in the future.
Publisher	-	-	An entity that processes events in the data feeds and sends Notification messages to a Producer for brokering and distribution to Consumers. Note: The Producer may carry out additional mediation such as filtering or data transformation. The use of a Notification Producer is transparent in SIRI.
Reference Data	-	-	Data external to the Operational Data Exchange which operational systems use such as specific positions, vehicle attributes, or facilities. E.g. Details of TSNs that we refer to in SIRI messages is reference data.
Requestor	-	-	General Software Term - an entity that makes a Request to a Service to ask it to perform an action or send a reply.

Terms	Alias/Alternative (acceptable usage)	Terms not to be used	Definition and Usage
Route	-	-	An ordered list of points (stops/timing) defining one single path through the road or rail network. The physical path taken by a vehicle on the service as a set of route links. (Note: A GTFS *Route* is a Transmodel *Line*)
Stop Point	Scheduled Stop Point	Stop Place Stop	A point where passengers can board or alight from vehicles.
Subscriber	-	-	An entity that acts as a Service Requestor, sending a Subscription Request on behalf of a Consumer to a Notification Producer Note: The Consumer entity will usually be the same entity as the Subscriber, but may also be a separate entity.
Transfer (of a Customer)	-	-	*This is a TfNSW OPAL and Customer centric concept, included here for completeness.* A transfer occurs at the end of a single trip. It is a change of transport mode or route, to another service or route, to continue a journey. Transfers made within a standard transfer time combine trips into a single journey.
Trip (for a Vehicle)	Dated Vehicle Journey	Journey	A particular journey of a vehicle on a particular operating day. Note: This document does not use 'trip' to refer to a Customer trip.
Trip-id	-	-	A unique identifier for Dated Vehicle Journey.
Vehicle	-	-	A public transport vehicle used for carrying passengers.
Vehicle Journey	-	-	The planned movement of a public transport vehicle on a day from the start point to the end point of a Journey Pattern on a specified Route. (i.e. a scheduled journey in a timetable)

Legend note: The use of dash in the table above indicates inapplicable.

3 Global SIRI Concepts

The purpose of this chapter is to familiarise readers with key concepts and terminology embodied within the international SIRI standard.

3.1 What is SIRI?

The **S**ervice **I**nterface for **R**eal-time **I**nformation or SIRI is an [XML](#) protocol to allow distributed computers to exchange [real time](#) information about [public transport](#) services and vehicles.

The protocol is a [CEN](#) technical specification, developed with initial participation by France, Germany ([Verband Deutscher Verkehrsunternehmen](#)), Scandinavia, and the UK ([RTIG](#)).

SIRI is based on the [Transmodel](#) abstract model for public transport information, and comprises a general purpose model, and an XML schema for public transport information.

SIRI allows pairs of server computers to exchange structured real-time information about schedules, vehicles, and connections, together with general informational messages related to the operation of the services.

The information can be used for many different purposes, for example to:

- Exchange planned and real-time timetable updates,
- Provide real time-departure information for display on stops, internet and mobile delivery systems,
- Provide real-time progress information about individual vehicles,
- Manage the movement of vehicles roaming between areas covered by different Operators,
- Manage the synchronisation of guaranteed connections between fetcher and feeder services,
- Distribute status messages about the operation of the services,
- Provide performance information to operational history and other management systems.

SIRI includes a number of optional capabilities. Different countries may specify a country profile of the subset of SIRI capabilities that they wish to adopt.

3.1.1 SIRI Information Access

TfNSW SIRI implementation allows SIRI messages to be publically available to the SIRI Community if permissions are provided by the TfNSW administrator, i.e. other defined AVMs. Therefore, it is important that any AVM that makes information available ensures that the data content is suitable for the community's use. Within the SIRI community, all information published will be available to any of the authorised AVM systems via a subscription.

> *Note:* This information will not be available to the public directly, and will always pass through TfNSW customer information platforms and systems. However, for avoidance of doubt, it is the responsibility of the individual AVM system to ensure operationally sensitive information is not published via a SIRI message service.

3.1.2 SIRI Functional Model

SIRI is built using the Transmodel abstract public transport reference data model and provides 10 message exchange services. These are listed in the below table:

Message	Description	Utilised by TfNSW
Production Timetable (PT)	Representation of short-term (i.e. tomorrow) timetable	Yes, limited*
Estimated Timetable (ET)	Real-time prediction against today's timetable and control actions affecting the Timetable (cancellations, additional journeys and detours)	Yes
Vehicle Monitoring (VM)	Individual real-time position	Yes
Situation Exchange (SX)	Exchange of operational incident messaging	Yes
Facilities Monitoring (FM)	Real-time facilities status reporting	Yes

Connection Timetable (CT)	Representation of today's intermodal connected timetables	No
Connection Monitoring (CM)	Real-time prediction against today's intermodal connections	No
Stop Timetable (ST)	Transit stop view of today's timetable	No
Stop Monitoring (SM)	Transit stop view of the real-time prediction against today's timetable	No
General Message (GM)	General message format that provides a structured way to exchange arbitrary informative messages between participants.	No

* Long-term underlying timetable will be provided by Producers using TransXChange. The SIRI broker can use this information to produce short-term PT. PT can be submitted by Producers if necessary, see Operator Interface Contract for details.

3.2 Documentation Conventions

3.2.1 Referential Integrity (Reference fields)

By convention, the names of attributes within an element which represent foreign keys to attributes in another element have a suffix of "Ref". For example, the **RouteSectionRef** in the *Route* element signifies that the attribute is a foreign key, i.e. its value must equal the **id** for one of the TfNSW *RouteSection* elements.

3.3 Data Exchange Patterns

What is it about? A SIRI Data Consumer has to interact with a SIRI Data Producer to get the current data and future updates on this data. SIRI offers different interaction patterns for the exchange of this data.

What does the SIRI Spec say?

> 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. (CEN TS 15531-1, S.8)

What does that mean? The "Data Exchange Patterns of Interaction" defines the interaction process that must be undertaken by the Consumer and the Provider to specify the desired payload and to deliver this payload. SIRI offers two main patterns of interaction for data exchange: Request/Response and Publish/Subscribe. The patterns are complementary.

According to the SIRI specification, implementations may support both or only one pattern. Using the Request/Response pattern the Consumer is able to request a single data delivery which contains all the currently available data. The data delivery itself can be a Direct or a Fetched delivery. The request message may include parameters that indicate the Requestor's specific interests.

3.4 Formatting Standards

3.4.1 Durations

A **Duration** data type is used by a number of elements to specify a relative time in minutes and seconds. It uses a standard W3C duration type. The details below have been reproduced from http://www.w3.org/TR/xmlschema-2/#duration.

> "The lexical representation for duration is the [ISO 8601] extended format PnYn MnDTnH nMnS, where nY represents the number of years, nM the number of months, nD the number of days, 'T' is the date/time separator, nH the number of hours, nM the number of minutes and nS the number of seconds. The number of seconds can include decimal digits to arbitrary precision."

For example, to indicate a duration of 1 year, 2 months, 3 days, 10 hours, and 30 minutes, one would write: P1Y2M3DT10H30M.

Reduced precision and truncated representations of this format are allowed provided they conform to the following:

- If the number of years, months, days, hours, minutes, or seconds in any expression equals zero, the number and its corresponding designator ·may· be omitted. However, at least one number and its designator must· be present.
- The seconds part ·may· have a decimal fraction.
- The designator 'T' must be absent if and only if all of the time items are absent.
- The designator 'P' must always be present.

For example, P1347Y, P1347M and P1Y2MT2H are all allowed; P0Y1347M and P0Y1347M0D are allowed. P1Y2MT is not allowed."

3.4.2 URLs in Messages

Where URLs (hyperlinks) are provided in a message attributes, these links should be fully qualified links that are accessible via a public internet connection. Relative links (e.g. "/update/332") are not to be used, and non-publically accessible links such as intranets are not permitted.

4 TfNSW SIRI Implementation Approach

This section introduces the data elements and relationships that can be described by a TfNSW SIRI document.

4.1 Community Member Responsibilities

Each member of the TfNSW SIRI Community is required to connect to the TfNSW SIRI Message Broker in order to subscribe to, and publish to their appropriate real-time sources and recipients, respectively. This is typically achieved by a provider of public transport services when implementing a server referred to as an Automatic Vehicle Monitor (AVM). This AVM is part of the Community Member's real time environment and must meet the TfNSW requirements for latency, security, availability, and data quality criteria.

There are commercial offerings available to handle a SIRI AVM implementation, none of which are mandated by TfNSW; however, each of these is necessarily dependent on the quality of the Community Members data (e.g. an accurate standard working timetable), and other TfNSW specified reference data (e.g. TSN data) to operate in a manner acceptable to TfNSW.

The responsibilities of an AVM are to manage SIRI Service interactions from the SIRI Community member which present information of consequence to TfNSW Public Transport Customers, covering at least:

1. Receipt and acceptance of Subscriptions from TfNSW SIRI Community Members, as administrated by TfNSW on the TfNSW SIRI Message Broker for all relevant message types (as defined in Operator-specific Interface Contracts), e.g. PT, ET, VM, SX.
2. Transmission of the timetable that reflects accurately the planned trips to be delivered during the next and subsequent working days.
3. As each service commences and proceeds along its prescribed Journey Pattern, calculate Predicted Arrival times at each Transit Stop further along the Journey Pattern, and prepare and publish any change or updates as per the Subscribers' specification.
4. Notify SIRI Community members of events that take the form of unplanned incidents. These may ultimately be passed along to the public, or rephrased by TfNSW administration, and may be referenced in the final message issued to the public.
5. Notify the SIRI Community of service cancellations, added services, in real time.
6. Other real time applicable use-cases. Refer to Use-case documentation.

Listed below are the primary steps involved in a successful implementation of a new SIRI/TransXChange community member to TfNSW.

1. Operators register the accreditation id and contract data with TfNSW
2. TfNSW provide means for master reference data transmission and update.
3. Operators submit long-term schedule timetable information using TransXChange documents.
4. TfNSW validates the provided timetable TransXChange information.
5. TfNSW sends validated TransXChange XML file to Data Consumers.
6. Operators generate and transmit real-time SIRI messages.

Each member of the TfNSW SIRI Community is required to submit to (and maintain with) the broker TransXChange timetable information to a minimum of 90 days in advance.

Each member of the TfNSW SIRI Community is required to submit to the broker, every TSN visit's sequenced actual arrival, wait and departure times, for every service published in TransXChange, or subsequently added in ET. This will be utilised in subsequent analysis across the TfNSW SIRI Community for KPI determination, schedule adherence, prediction performance, AVM data consistency verifications, AVM SIRI format compliance, and provides granular data for TfNSW service modelling and future integrated timetabling.

4.2 SIRI Version

Transport for NSW has adopted the SIRI standard version 2.0; and the Transport for NSW SIRI Specification has been developed on the foundation of this version. The version of the associated XML schema is Schema (o) for SIRI V2.0. Producers (e.g. transport operators) need to comply with these specifications and also the following:

1. A number of TfNSW-defined XSD extensions

2. A number of TfNSW-specific business rules.

These TfNSW-defined extensions and the TfNSW-specific business rules have been defined in this document, these may be extended or elaborated further in Operator Interface Contracts.

4.3 SIRI Services

All TfNSW services are implemented using XML.

4.3.1 SIRI General Capabilities

The following table lists the general capabilities that shall be implemented by participants for TfNSW.

Table 6 – SIRI General Capabilities

Feature	Capability Name	Sub-capability	Notes
Management	Versioning	RequestChecking	Both parties have to check SIRI version provided and throw an error if an unsupported version is used
-	Capability	CapabilityChecking	Not implemented, because capability is specified within this document.
Interaction	InteractionPattern	SIRI VM: DirectRequest SIRI PT, ET, VM: Publish/Subscribe	As per 3.3 Data Exchange Patterns
-	Mediation	GetCurrent	As per CEN Specification Part 2, 5.2.5
-	-	GetLastUpdate	As per CEN Specification Part 2, 5.3.2
-	SubscriptionFilter	MultipleFilters	As per CEN Specification Part 2, 5.3.3
Delivery	DeliveryMethod	DirectDelivery	As per 4.4 Delivery Patterns
-	ConfirmDelivery	-	As per CEN Specification Part 2, 5.2.7
-	VisitCountIsOrder	-	As per CEN Specification Part 1, 5.10.2: Visit count is also order
ServiceStatus	CheckStatus	-	As per 7.1.3.3 Status Check and Heartbeat
-	Heartbeat	-	As per 7.1.3.3 Status Check and Heartbeat
Message Transport	Message Transport	HttpPost	As per 9.1 Transport of SIRI Messages
-	Addresses	Implicit	As per Part 2, 10.1

Feature	Capability Name	Sub-capability	Notes
-	Compression	gzip	All HTTP data blocks should be gzip compressed.

4.4 Protocol security

SIRI services are communicated via HTTP, all references to this protocol in this document are made as 'HTTP', however it may in fact be HTTPS that is used for implementation, depending on communication security classification. In the case of direct connection between parties, HTTP may suffice, whilst connection made via the internet may require HTTPS. Specific requirements will be specified in Operator Interface Contracts.

4.5 Delivery Patterns

What is it about? SIRI offers the possibility to directly deliver updates to real-time data directly or to notify Consumers about updates such that Consumers can request the data at a later time.

What does the SIRI Spec say?

In real-time applications, it is important to be able to optimise systems to ensure rapid delivery, and SIRI supports two different message pattern variations for making a delivery[...]: these are; (i) Direct Delivery, and; (ii) Fetched Delivery. (CEN TS 15531-2, S.11)

What does that mean? Both the Request/Response and the Publish/Subscribe data exchange pattern allow for the use of two different delivery patterns: "Direct Delivery" and "Fetched Delivery". Nevertheless, the implementation of both methods is not mandatory:

The choice of delivery patterns may be pre-configured, or if the implementation supports both methods, be specified as a parameter on the request. For systems that support dynamic choice, if the SIRI implementation does not support the requested delivery method for a specific service type, an error message will be returned. (CEN TS 15531-2, S.11)

Available Options:

- **Direct Delivery pattern:** The payload data is sent directly to the Consumer as soon as the Provider has it available.
- **Fetched Delivery pattern:** The fetched delivery is a two-step process: The Provider does not send the payload data directly to the Consumer but sends a notification message instead. The Consumer fetches the payload later using a dedicated Data Supply request.

At TfNSW, Direct Delivery is used.
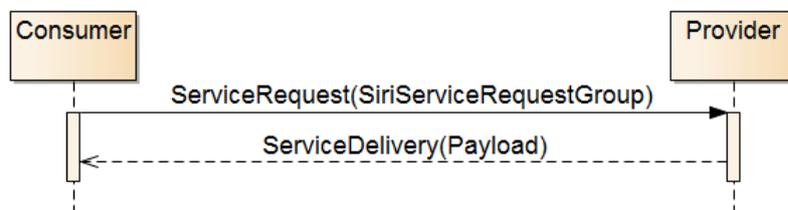
Figure 2: Request / Response Patterns

Using the Publish/Subscribe pattern the Consumer is able to tell the Provider that they are not only interested in a single data delivery but also wish to be notified whenever the data changes in the future.

The main interaction steps are:

- **Subscription setup:** The Consumer sends a message to the Provider to create a subscription. The message may include parameters that indicate his specific interests and a predefined expiry time

- **Notification/Delivery:** The Provider notifies the Consumer that new data is available ("Fetched Delivery") or he sends the data directly ("Direct Delivery").
- **Subscription termination:** The Consumer sends a message to the Provider to terminate the subscription before their predefined expiry time
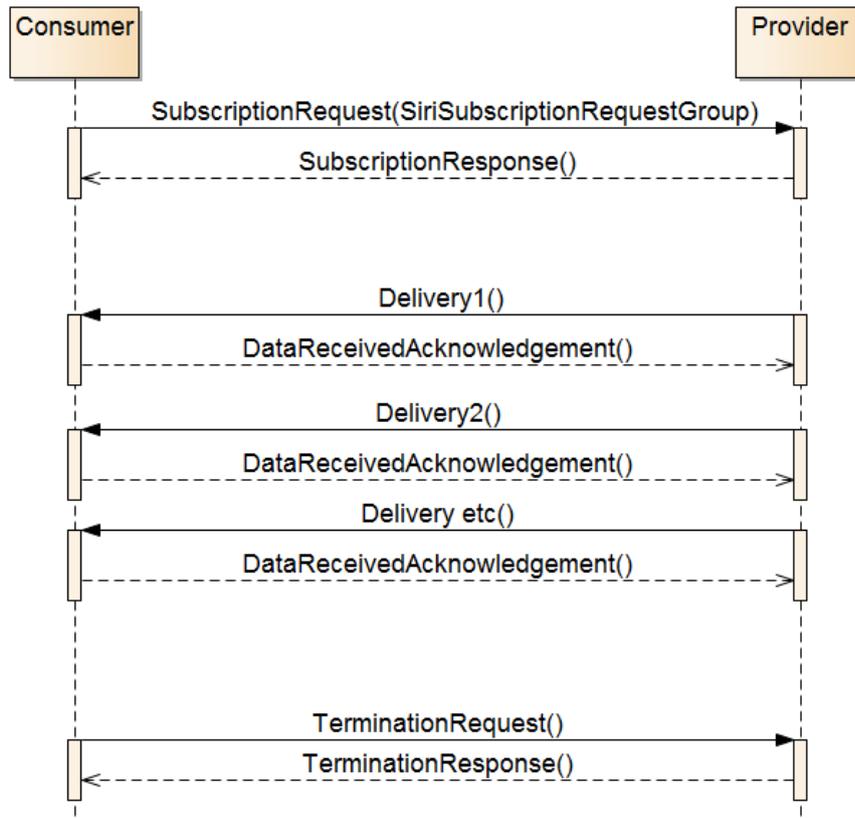
Figure 3: Publish / Subscribe Pattern (with Direct Delivery)

Data Exchange Patterns of Interaction at TfNSW

VM: TfNSW will make Request/Response available for VM, as required.

PT/ET/SX/FM/VM: TfNSW will use Publish/Subscribe for all services.

4.6 Predictions

As prediction is the forecast of the on-time status of a trip in the future, for stops in the future. This includes a comparison to the scheduled status of the trip at future stops. Accurate and consistent application of predictions is crucial to the success of operations using real time data.

The prediction is calculated and provided by the AVM system which monitors the trip. The prediction algorithm is an exact algorithm. It calculates predictions based on facts.

> "*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.*

Pre-conditions for calculation of a prediction are provided in the table below.

Table 7 – Preconditions for calculation of a prediction

Reference material – for information only

Pre-condition	Description
The AVM (Automatic Vehicle Monitoring system) has scheduled data for every monitored trip.	This includes scheduled departure and arrival time at every stop of the scheduled stop sequence. Scheduled data can come from either a scheduled timetable (e.g. through TransXChange) or from changing the schedule during the day of operation. For the prediction algorithm it does not make any difference where the scheduled data is coming from as long as it is complete and reasonable.
Trip scheduled data meets quality expectation	The quality of the scheduled data is a key driver of the quality of the outcome of the prediction algorithm. Regular review of schedule data against actual times shall be undertaken by the Operator in order to correct schedule data with TfNSW Contract Management.
Trip scheduled data provides information on waiting times at each stop	The scheduled data provided includes: ● wait time at each stop; and ● percentage of wait time at each stop that can be used to reduce delay (if applicable) Note: Guaranteed connections via integrated planning or otherwise are not within the current scope of this document.
Trip scheduled data identifies wait time for connecting trips	Trip scheduled data identifies wait time included for the purpose of guaranteed connection (waiting for another trip).
Trips are monitored by an AVM	The trip for which a prediction is calculated is monitored by an AVM system.
The current location of vehicle is known	The current location of the vehicle is available. The vehicle is providing the current location to the AVM system. For the purposes of defining real-time data provision, the end to end time between the real world event occurring at a vehicle or geographical point and that data being provided to TfNSW in a published SIRI data element must meet the following: ● Planned Value of less than 5 seconds ● Contract Threshold of less than 15 seconds Where the Planned Value is the actual intended requirement, the contractor should aim to meet this. However if this has not been achieved, the Contract Threshold is the acceptable value to meet this contractual requirement for real-time data, and be considered acceptable under the TfNSW Data Quality standard. The default minimum frequency for sending of vehicle location messages is 15 seconds, but may be overridden by the value specified in Operator Interface Contracts.
Scheduled data has information on expected position between two stop points. The prediction algorithm takes current position of vehicle into account.	The expected position between two stop points can be provided by an expected speed profile along the GIS path between two stop points. By comparing the current position with the expected current position the prediction algorithm of the AVM system is able to provide up to date delays at any time of the trip. *For example:* This information is important: ● If the distance between two stop points is long (e.g. 60 minutes) and no updates are calculated between the two stop points the real-time information provided is of low quality. ● If a bus is in a major congestion the prediction algorithm of the AVM shall update the prediction on the fly without being at a stop point.
The Prediction algorithm has access to operator decisions	The prediction algorithm has access to "in-trip" decisions made by the transport operator. *For example:* The transport operator adds wait time at a stop because: ● A guaranteed connection is in place with a trip that is running late ● There is known congestion ahead (gridlock) and current position is preferred until further information about the network is known ● Other operational issues

4.6.1 The Prediction Algorithm

The prediction algorithm calculates an estimated arrival and departure time for all future stops of a trip. The algorithm shall take into account:

- Scheduled departure and arrival time, possible compensation of waiting time, scheduled current position of vehicle
- Current position of vehicle and scheduled current position. The latter can be achieved e.g. from speed profiles of the GIS path
- Additional information like road congestion
- Transport operator decisions on holding back the trip
- TfNSW requires that the predicted delay is calculated against the schedule, for all future stops. Refer to Hysteresis for presentation rules

4.6.2 Timing Points

Some operators use timing points for scheduled data. Arrival and departure times for stops that are non-timing points are interpolated from the timing points, and usually represent a lower level of accuracy.

For all data provided either as scheduled data to the AVM systems for the prediction algorithm or with SIRI PT/ ET, all stops are timing points. The level of accuracy for scheduled arrival and departure time shall be the same for all stop points along a route.

4.7 Real-time not available

The SIRI server should provide real-time information for all trips within a subscription. If the SIRI server is not able to provide real-time information for a trip this should be flagged to the SIRI client using the SIRI field Monitored in SIRI PT and ET.

Please note that the field Monitored in SIRI PT and SIRI ET is mandatory for the TfNSW implementation of SIRI.

SIRI PT: The expectation is that for all trips within the SIRI PT subscription the flag Monitored is set to true which indicates that SIRI ET data will be available for this trip. The SIRI server can provide Monitored=false for a trip. This is reasonable if for example the AVM knows 24 hours in advance that the vehicle used does not have an OBU (on board unit) or the scheduled OBU is broken.

SIRI ET: The expectation is that for all trips within the SIRI subscription the flag Monitored is set to true which indicates that real-time information is available for this trip.

The following combinations represent possible scenarios concerning the use of the Monitored flag:

1. The trip is flagged as monitored in SIRI PT and SIRI ET. This is the expectation for most trips.
2. The trip is flagged as monitored in SIRI PT, but real-time information is not available (e.g. OBU in the bus is broken).
3. The trip is flagged as not monitored in SIRI PT and it is not monitored. No message for this trip will be sent in SIRI ET.
4. The trip is flagged as not monitored in SIRI PT but it is monitored (e.g. because the vehicle used was changed). In this case, the SIRI server should delete the trip before it kicks into the prediction window in SIRI ET, and create a new trip at the same time in SIRI ET.

Please note that for the last use case the data provided might not be consistent if the SIRI server provides real-time information in SIRI ET for the trip flagged as not monitored in SIRI PT. If the trip is running late the SIRI client will use the data from SIRI PT until it receives the first message on that trip.

If the availability of real-time information for a trip changes while the trip is running it is up to the SIRI server to make sure the SIRI client has consistent information. As soon as real-time information is not available (e.g. OBU broken, vehicle out of mobile coverage etc.) the SIRI server shall tell the SIRI client that real-time information is not available (set Monitored to false in SIRI ET for that trip). The SIRI client will forget all real-time information for that trip provided so far and switch back to scheduled data only.

As soon as real-time data is available again the SIRI server shall provide the real-time information to the SIRI client.

It is up to the SIRI client to decide how to do passenger communication for these four cases. It is up to the SIRI server to provide the information for each trip to the SIRI client.

4.8 Headway Services

Within TfNSW all real-time data provided shall have reference to a schedule, this includes headway services.

SIRI Real-time information for a trip operating as a headway service is provided in the same way as for scheduled services and all implementation details throughout this document are to be applied in the same way..

4.9 Preview Intervals

The preview interval as defined in the SIRI specification (see DefaultPreviewInterval) has no impact on the prediction algorithm. The preview interval defines the look-ahead window of real-time data to be provided with the SIRI service. The preview interval is aimed at increasing the accuracy of the predictions as predicted times which are closer are more accurate than those which are further in the future.

The default preview interval at TfNSW is mode dependent and listed in the following table:

Table 8 – Preview Intervals by Mode

Trains	Light Rail	Metro	Ferry	Bus
120 minutes	60 minutes	60 minutes	60 minutes	60 minutes

The AVM system in charge shall provide a prediction for all trips that run within the prediction window. That is every trip for which any scheduled or real-time arrival and departure time at a stop of the trip is between now and preview interval in the future.

The illustration below shows a set of trips (scheduled or real-time) that are all running within the DefaultPreviewInterval:
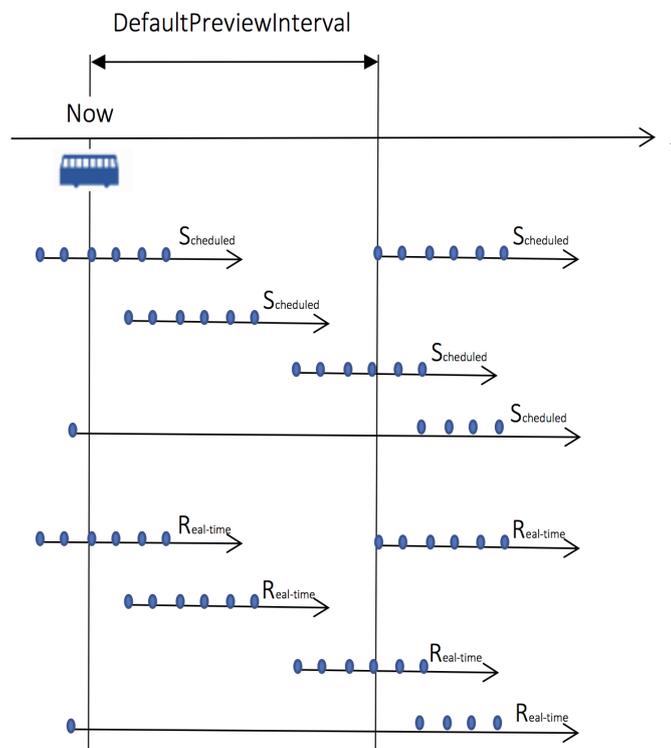
Figure 4: Use of DefaultPreviewInterval

- For every transmitted trip, predicted times shall be reported from the first, up to the last stop, even if the trip finishes after the prediction window.
- A new ET message shall be sent each time the estimate changes, for example, the prediction changes at a single stop, or a new predicted time at the origin falls behind the prediction window:
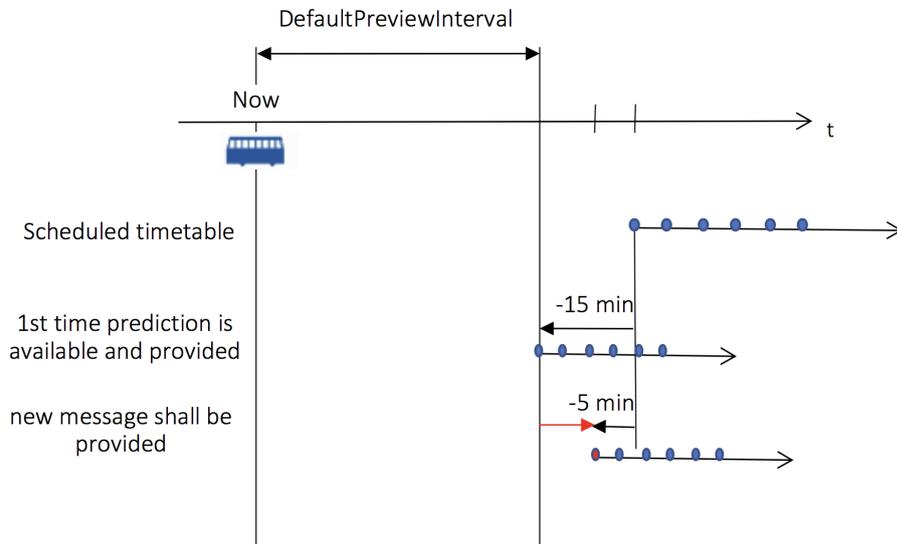
Figure 5: Impact of DefaultPreviewInterval on changes to prediction

- Real-time information should not be provided for trips outside the preview interval
- Scheduled information should be provided as soon as the information is available, for example an added trips or cancelled trip

It is expected that added or cancelled trips will be advised before the preview interval.

4.10 Sensitivity Thresholds

The sensitivity threshold (also known as hysteresis) is defined in the CEN SIRI Specification Part 3, Section 6.6.5. Within TfNSW there is a standardized sensitivity threshold of 20 seconds. This value cannot be changed per data (e.g. per route) or within a subscription.

4.11 Passed Stops

All actual arrival and departure times shall be retained by TfNSW. SIRI ET will be used to provide these times by every AVM system / SIRI server (when the SIRI server is a producer).

At the end of every monitored trip a message shall be sent that has all the actual arriving and departing times for all stops upon that monitored trip.

The SIRI ET service has the element RecordedCall to provide information on passed stops. For efficiency reasons RecordedCall should not be used with every SIRI ET message provided by the SIRI server.

TfNSW Rules:

- No new message should be sent if the vehicle has arrived or left a stop unless the prediction changes within the sensitivity threshold i.e. hysteresis.
- The AVM system / SIRI server shall however send one final SIRI ET message at the time the trip has ended. This final message is mandatory.

- The final message is only required to have actual times in RecordedCalls. EstimatedCalls are not required (except when an already commenced trip is cancelled) because the vehicle has completed the trip.

4.12 Maintenance of trip definition and state in real-time

Timetables submitted by operators are used for definition and reference of trips tracked in real-time using SIRI messages. These trip definitions should be considered immutable in the context of SIRI messaging. SIRI does support real-time changes to these trip definitions, including stop and path changes, but also trip cancellation and the addition of new trips.

The TfNSW implementation of SIRI requires that any messages subsequent to the change, and relating to the trip, continue to communicate the real-time state changes.

This behaviour can be illustrated with the following specific example of a real-time path change.

If a trip originally described in the timetable feed contains ten stops, but in real-time stop number seven is cancelled, and replaced with a different transit stop; all subsequent messages relating to that trip, must include the originally cancelled transit stop, and include the added transit stop. Failure to include this original trip definition and state, will result in the trip no longer being recognised by the broker in real-time, and trip updates will fail.

In the case of multiple sets of changes to a trip, all intermediate states need not be communicated, only the original definition and the final (or latest) state.

4.13 Sequencing of messages and message interdependency

When an event described by a SIRI service requires a related dependent message to also be sent from another SIRI service (e.g. ET message communicating a trip long delay followed by a dependent SX message for the same trip), the dependent message should not be sent until the initial message has been successfully received and acknowledged by the broker.

4.14 SIRI Document Validation

4.14.1 Consistency Rules

A SIRI client assumes that all information provided in SIRI is consistent. Inconsistent data will result in incorrect passenger information. It is up to the SIRI server to make sure that the data provided is consistent, including consistent use of master data, reference data, enumerations, schedule information (TXC) and server generated reference fields. It is important to understand that this does not only include the data provided by the last message but also all previous messages for any object.

4.14.2 Data Validation Steps

All SIRI XML documents submitted to TfNSW will be validated as follows:

4.14.2.1 Schema Conformance Checks

Upon submission, documents will first be parsed and validated against the XSD, including all the integrity constraints coded within the schema such as for keys, key references and enumerations.

4.14.2.2 Transit Stop Number Validation

The StopPointRef for each transit stop included in the SIRI document will be checked against the TfNSW master data to ensure that the transit stop number is valid.

4.14.2.3 Additional Data Integrity Checks

Documents must satisfy additional business rules and constraints to ensure that consumers can interpret the data correctly, an example would be using **Direction** identically across all *RouteLink* elements that make up a *Route*.

TfNSW Business rules that are not implicit in the SIRI standard schema but must be adhered to, are marked throughout this document with the text "TfNSW Rule" (formatted bold and underlined), for example:

TfNSW Rule(s):
This field must contain a value, if the vehicle has no
on-board unit then it will be false, otherwise value
should be true.

4.14.3 Error Notifications

The Operator will be supplied with a comprehensive list of data validation errors and warnings.

5 Reference Data Management

"The exchange of data between two systems requires that both systems can refer to data instances unambiguously. In SIRI, this involves the use of a number of concrete DATA REFERENCE systems to specify the scope and nature of the identifiers of the different types of entity that appear as elements in interfaces, for example LINES, Vehicle STOP POINTS, DIRECTIONs and Vehicle Features."

CEN SIRI Specification Part 1, Section 5.1

Reference data is at the basis for the interface agreement between two partners using SIRI for data exchange. Some of the reference data attributes will be mastered by TfNSW; others will be maintained and provided by the individual Operator.

5.1 TfNSW Master Data

The table below lists the primary TfNSW master data concepts and attributes that may be included in SIRI services. The attribute values themselves will be detailed in each Operator's Interface Contract with TfNSW.

Table 9 - Master Data Attributes Provided by TfNSW

Subject Area	SIRI Attribute Name	Corresponding TfNSW Business Name
Licensed Operator	• OperatorRef • OperatorName	• Operator accreditation number • Operator short name
Stop Point	• StopPointRef • StopPointName	• Transit stop number • Transit stop name
Service	• LineRef • ServiceFeatureRef • PublishedLineName • NetworkRef • NetworkName • ProductCategoryRef	• Line identifier • Line type • Line name • Network identifier • Network name • Mode
Vehicle Features	• VehicleFeatureRef	• Vehicle Feature
Direction	• DirectionRef	• Direction

Note: TfNSW master data values may change over time. Communication regarding changing master data will be specified in the Operator Interface Contract.

5.1.1 Operators

Each Operator is an accredited transport provider. Some of the TfNSW Operators will have a direct contract with TfNSW; others will sub-contract to Operators with TfNSW contracts. Each Operator is uniquely defined via their operator accreditation number, and this number should be supplied in TransXChange documents, and also referred to from SIRI documents using OperatorRef.

Because all TfNSW Operators are licensed, the *LicensedOperator* element - rather than the *Operator* element – is used when supplying Operator details to TfNSW in a TransXChange document.

References to an Operator in SIRI messages must match the LicensedOperator supplied in TransXChange documents.

5.1.2 StopPoints

Transit stops (referred to as "stop points" in the TransXChange and SIRI schemas) are the public access points to public transport and enable the public to change between routes and modes of transport. Transit stops are essential for customers to plan and to describe a public transport journey. Transit stops are frequently serviced by different operators and/or different modes of transport making it critical to apply a standard approach to describe a transit stop.

TfNSW has developed the Transit Stop Management (TSM) application, which is the single source of information on the location, numbering, accessibility, naming and other transit stop attributes of each public transport access point.

There is a TfNSW transit stop naming and numbering standard that provides a consistent and systematic way to identify individual transit stops. A unique number, called the transit stop number (TSN), is automatically assigned to each transit stop when created by the TSM application. The TSN is made up of the post code of the suburb where the transit stop is located and the next available sequential number within that suburb e.g. 2011341, 2011342. Transit stop numbers do not change even if there is a subsequent change in the relevant postcode.
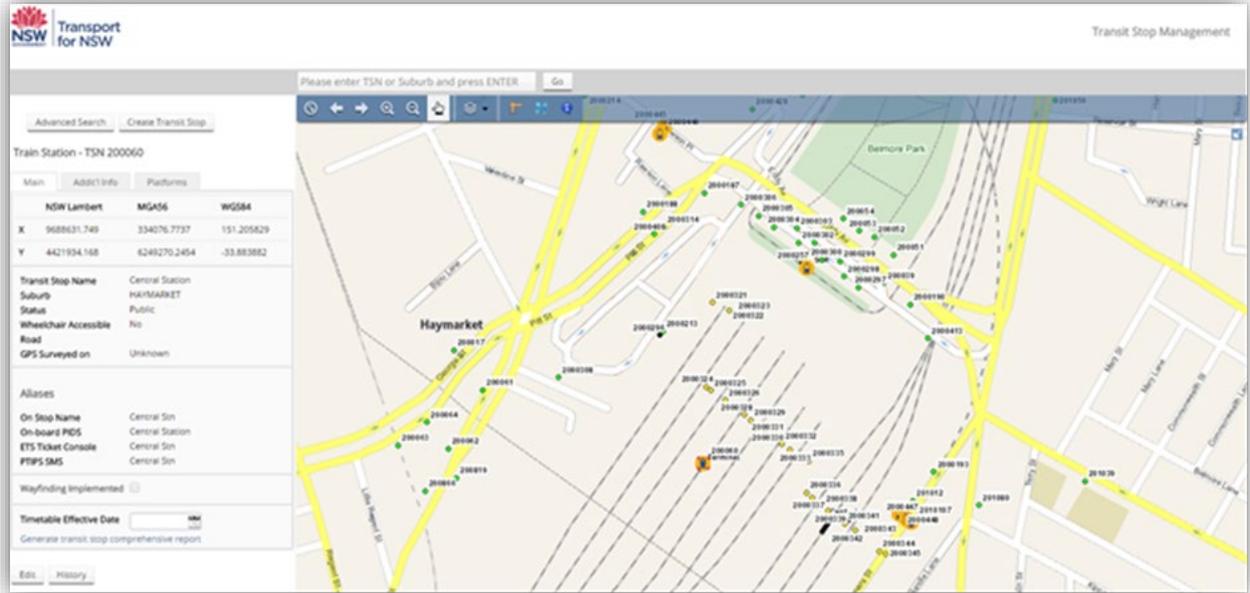
Figure 6 - Transit Stop Data Maintained by the TfNSW TSM Application

5.1.3 Parent StopPoints (Stop Places)

Within TfNSW there can be a parent/child relationship between two Stop Points where one Stop Point is considered as a parent to another Stop Point. Such examples include, but are not limited to, one Stop Point being an entire train or metro station while another Stop Point is one of the platforms within the station. Furthermore, under the parent Stop Point it is possible to have multiple Stop Points each being used for a particular mode of transport. An example would be Circular Quay or Central stations where one Stop Point exists at the station level but under it, multiple Stop Points exist, some for buses or trains or ferries. Below screenshots demonstrate how this is modelled in TfNSW.
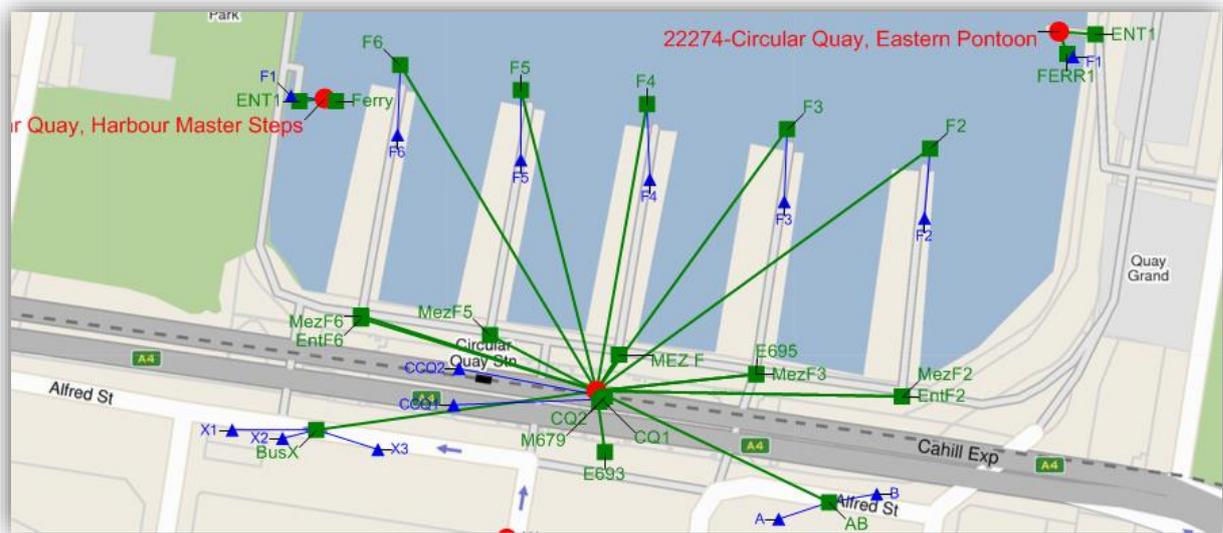
Figure 7: Parent-Child Stop Points at Circular Quay

In the above diagram, Circular Quay collectively is one Stop Point, the red dot at the centre bottom of the picture. This Stop Point, identified using a TSN, then has multiple child Stop Points each with a unique TSN for the various modes of transport they support, shown as the blue triangles. As an example the ferry wharves under Circular Quay are F6, F5, F4, F3, F2, bus stops indicated by X1, X2, X3 and train stops indicated by CCQ1 and CCQ2.
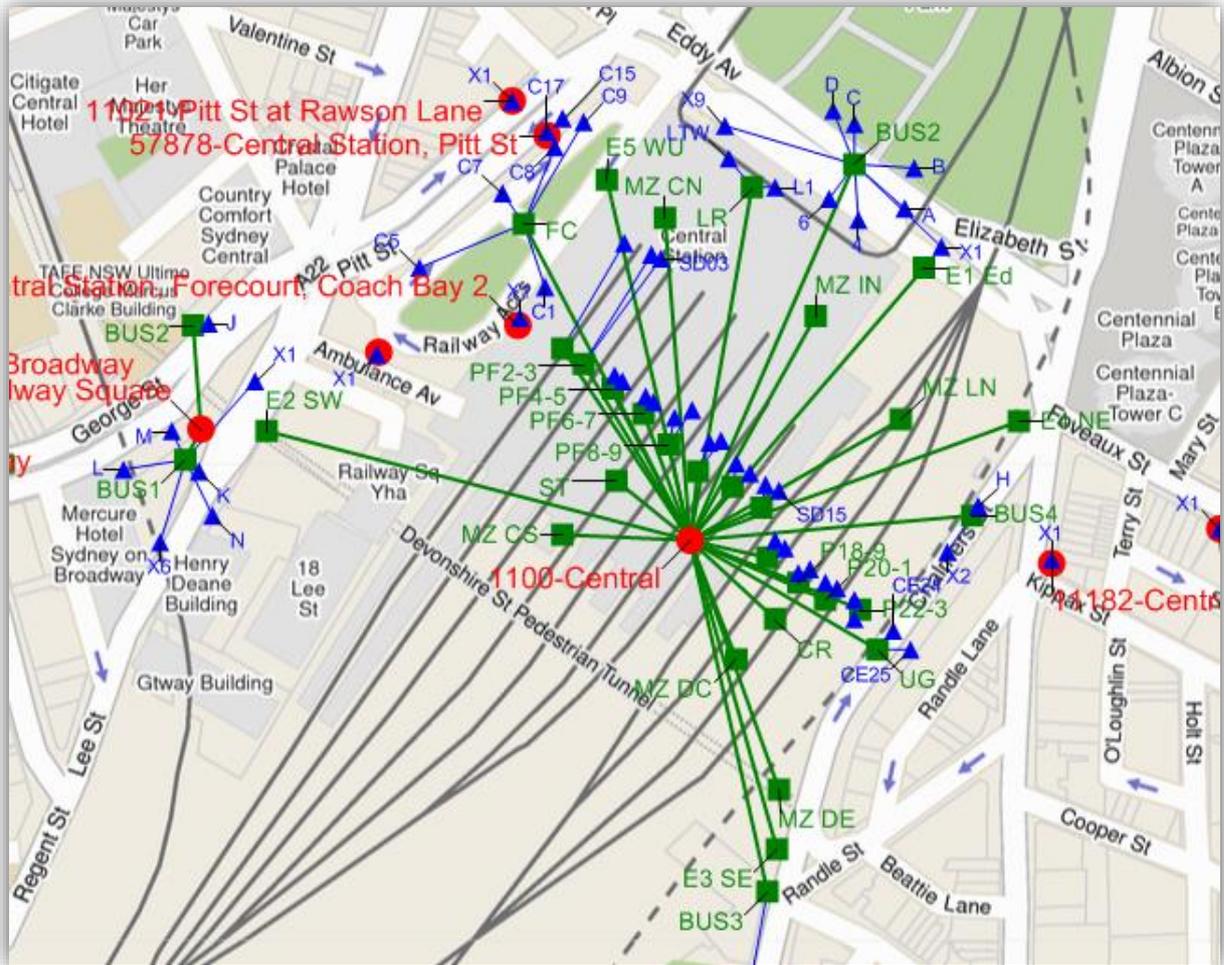
Figure 8: Parent-Child Stop Points at Central

In the above diagram, Central collectively is one Stop Point, represented as the red dot in the centre and the individual train platforms and bus stops are represented as the blue triangles surrounding it.

At TfNSW these parent stop points can be considered to map to the Stop Place concept in the SIRI specification.

5.1.4 Services

A *Service* is a group of journeys that have common properties. Each service can be made up of *StandardService* and *FlexibleService* components. A standard service describes a fixed route and must include one or more journey patterns. Each service has an *OperatingPeriod*, defining its overall start and end dates, as well as an *OperatingProfile*, describing the default operational days for journeys running the service.

5.1.4.1 Service Lines

A *Line* is a group of routes which is generally known to the public by a similar name or number (as per the example below). The same line name may be used on services with different journey patterns. One or more line instances may be associated with a service.

Figure 9- Sydney Trains' Lines as at February 2019

5.1.4.2 Service Journey Patterns

A *JourneyPattern* is an ordered collection of *JourneyPatternTimingLink* elements and represents the pattern of working for vehicles of the service. Note that the order of journey pattern timing links for a journey pattern must follow the order in which they appear in the *Route* element. TransXChange vehicle journeys following a journey pattern must run over the exact route, but need not stop at all stop points identified within the journey pattern. Thus the journey pattern provides the ordered set of stops of which all or some may be served by the related vehicle journeys.

5.2 Operator Assigned Unique Identifiers

The SIRI data elements listed below are identified by values assigned by data providers or their systems. Some of these values will be established first in TransXChange documents, and referenced subsequently by the SIRI AVM, and in SIRI messages.

Table 10 - Unique Identifiers Assigned by Operator

Element	TransXChange Attribute Name	SIRI Attribute Name
RouteSection	id	Section
Route	id	RouteRef
JourneyPattern	id	JourneyPatternRef
VehicleJourney	VehicleJourneyCode	DatedVehicleJourneyRef

5.2.1 RouteSections

RouteSection elements define a portion of a *Route*. Route sections are, in turn, made up of *RouteLink* elements, which define a "from" and "to" stop point (each with a TfNSW transit stop number reference).

On each route link, the travel path of the vehicle is described using a *Track*. Track detail should be of sufficient granularity to unambiguously plot the route on an Open Street Map (as per the example below). Hence there is a TfNSW requirement to capture: each road deviation of more than 10 degrees compass bearing; roundabouts every 15 meters, at a location accuracy to 1 metre resolution.
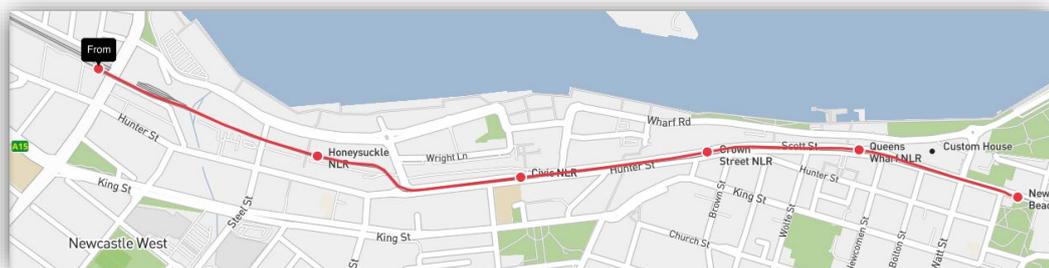
Figure 10 – Example of Transport OperatorTracks Overlaid on an Open Street Map

Track instructions may be included to guide drivers in accordance with the transport operator's own safe operation of vehicle standards.

5.2.2 Routes

The *Route* element is an operator-defined grouping of *RouteLinks* within which services are presented to the public in timetables and journey planners. There must be sufficient coverage of route link elements for the route to be unambiguously described from the start to the end point.

A Route is an internal construct to the JourneyPattern and, if reused on multiple Lines, has a descriptive name such as "Route pattern from Central Station Eddy Avenue Stand 2 to Redfern".

5.2.3 JourneyPatternSections

A *JourneyPattern* represents the pattern of working for vehicles of the service, and is composed of an ordered collection of *JourneyPatternSection* instances, each containing an ordered collection of *JourneyPatternTimingLink* instances, together defining a specific sequence of timing links.

Journey pattern sections are reusable, i.e. the same journey pattern section may be included in many different journey patterns.

5.2.4 Vehicle Journeys

A *VehicleJourney* is the traversal of a series of *JourneyPatterns* at a specific time, modelled as a sequence of timing links connecting transit stops. Each vehicle journey has an absolute start time (e.g. 13:02); this can be combined with the timing information from each timing link to derive the departure and arrival time at each timing point. The link sequence for a vehicle journey must exactly correspond to the link sequence of the underlying journey pattern.

The public identifier for a vehicle journey is given by a line. Hence a vehicle journey must reference one of its service's lines. Journeys with the same Operator, line and journey pattern should be in the same service.

5.2.5 Vehicles

It is intended that the *VehicleRef* be constructed such that the vehicle does not coincide with other provider vehicle identities. Details of *VehicleRef* will be defined in Operator Interface Contracts. As an example *VehicleRef* could be a compound key, separated by dashes, comprising of:-

- the SIRI Provider/Subscriber Reference
- the pertinent unique VehicleId, as tracked by the SIRI Automatic Vehicle Monitor.

5.2.6 Service Features

Definitions of Vehicle and Service Features, including why and when the attributes should be used detail will be present in the Operator Interface Contracts.

5.2.7 Product Categories

Definitions of how Product Category will be present in the Operator Interface Contracts.

6 Extensions to SIRI Schema

TfNSW has specified additional data structures to the standard SIRI schema using the Extensions model. These structures cover four subjects:

- Occupancy
- Public Information Display (PID)
- Audience (PTSituation)
- StopPointType (AffectedStopPoint)

The Extension data structures have been clearly identified in *Section 7 TfNSW SIRI Schema* using a yellow header.

6.1.1 Vehicle (Carriage) Occupancy

Carriage-specific detail data has been included for TfNSW as an extension, named EstimatedOccupancyModel. This model accommodates the requirement to supply occupancy levels for both the entire vehicle, plus individual carriages where multi-carriage vehicles are in use.

This extension is applied to both ET and VM, however for VM actual Occupancy levels will be provided for the current JourneySection only, whilst for ET estimated Occupancy levels will be provided for all JourneySections.

Hysteresis will be based on occupancy level changes. Hence if the level before a stop was "standingRoom" and the level after leaving a stop is "standingRoom" no delta would occur. Conversely, if the level before a stop was "standingRoom" and the level after leaving a stop is "crushLevel" a delta would be sent for this journey only.

6.1.2 Public Information Display (PID)

The extension PID, is intended to support the transmitting of short situation-related messages to customers via on-place and on-vehicle information displays; along with short messages the inclusion of binary (sound) files is also supported.

Further information regarding use of this structure may be provided in Operator Interface Contracts.

6.1.3 Audience (PT Situation)

The SIRI CEN Specification supports the ability to specify the intended audience for SX PT Situation messages, and provides an associated range of values. The values provided by the SIRI CEN Specification are not all present in the VDV XSD, including a value required by TfNSW. To support the required values, a TfNSW version of the Audience element has been created for inclusion as an extension to the PTSituationElement.

6.1.4 StopPointType (AffectedStopPoint)

The SIRI CEN Specification supports the ability to specify affected Stop Points, as part of the Consequences of an SX PT Situation message. The SIRI CEN Specification provides an associated range of values for the affected StopPointType, however these values are not all present in the VDV XSD, some of which are required by TfNSW. To support the required values, a TfNSW version of the StopPointType element has been created for inclusion as an extension to the AffectedStopPoint element.

7 TfNSW SIRI Schema

This chapter details the attributes in the TfNSW SIRI schema. When describing sub-elements, the notation "Element / Sub-element" is used.

The elements in this specification are marked as either 'm' (mandatory) or 'o' (optional), these are to be interpreted in the following manner:

- **m (mandatory)**
  If marked as mandatory this element has to be present, and contain a valid value, with every message. In most cases this will be mandated by the underlying XSD.
- **o (optional)**
  If marked as optional, one of the two following cases may apply:
  - A rule is present in the *comment* column, under the title *TfNSW Rule*
    This attribute/group/container need only be provided with a valid value according to the condition specified by the rule.
  - No rule is present in the *comment* column, under the title *TfNSW Rule*
    The attribute/group/container is not required to be provided, but if the producing system can deliver this information, it is generally recommended to be supplied in the interest of an enriched data feed.

Notes

- When an element is marked as mandatory, a valid attribute value must be supplied, it is not sufficient to provide the element tags without a correct data value.
- In some cases an element will be marked as optional, but is mandated by the underlying XSD, in this case a value will also need to be provided.

7.1 SIRI Data Request and Delivery

This sections details the generic data request and delivery schema objects for TfNSW; elements for each message type (e.g. PT, ET, VM, and SX) can be found in the dedicated section for each of these message types.

7.1.1 Subscription

7.1.1.1 Subscription Request

- Request is sent from Subscriber to Producer to initiate a subscription.
- Answered with a SubscriptionResponse.

Table 11 - SubscriptionRequest Specification

Path	Field	NSW: m/o	Comment
	RequestTimestamp	m	Timestamp of request
RequestorEndpointGroup	RequestorRef	m	Reference to a requestor - Participant Code (will be defined in Operator Interface Contract).
RequestorEndpointGroup	MessageIdentifier	m	UUID of the message **TfNSW Rule:** Mandatory
SubscriberEndpointGroup	ConsumerAddress	o	Address to which data is to be sent. This may also be determined from RequestorRef and preconfigured data.
SiriSubscriptionRequestGroup	*	m	Defined per service, see section dedicated to each message type.

7.1.1.2 Subscription Response

- Response is sent from Producer to Consumer to inform whether subscriptions have been created.
- Answers a previous SubscriptionRequest

Table 12 - SubscriptionResponse Specification

Path	Field	NSW: m/o	Comment
	ResponseTimestamp	m	Timestamp of response
ResponseEndpointGroup	ResponderRef	m	Reference to a responder - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
ResponseEndpointGroup	RequestMessageRef	m	Reference to MessageIdentifier of SubscriptionRequest. **TfNSW Rule:** Mandatory.
SubscriptionResponsePayloadGroup ResponseStatus	ResponseTimestamp	m	Timestamp response elements were created
SubscriptionResponsePayloadGroup ResponseStatus SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	m	Reference to a service subscription: unique within Service and Subscriber. **TfNSW Rule:** Mandatory.
SubscriptionResponsePayloadGroup ResponseStatus ErrorCondition		o	

7.1.2 Data Delivery

7.1.2.1 ServiceRequests

- Request from Consumer to Producer for immediate delivery of data.
- Answered with a ServiceDelivery.

Note: Only used for SIRI VM at TfNSW.

Table 13 – ServiceRequest Specification

Path	Field	NSW: m/o	Comment
	RequestTimestamp	m	Timestamp of request
RequestorEndpointGroup	RequestorRef	m	Reference to a requestor - Participant Code (will be defined in Operator Interface Contract).
RequestorEndpointGroup	MessageIdentifier	m	UUID of the message **TfNSW Rule:** Mandatory.
SiriServiceRequestGroup	*	m	Defined per service, see section dedicated to each message type.

7.1.2.2 ServiceDelivery

- Message from Producer to Consumer to deliver payload data.
- Answers:
  - o a direct ServiceRequest; or
  - o satisfies a subscription asynchronously.

Table 14 – ServiceDelivery Specification

Path	Field	NSW: m/o	Comment
	ResponseTimestamp	m	Timestamp of response
ProducerResponseEndpointGroup	ProducerRef	m	Reference to a producer - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
ProducerResponseEndpointGroup	RequestMessageRef	m	UUID of the message - Reference to an arbitrary unique identifier associated with the request which gave rise to this response. **TfNSW Rule:** Mandatory.
SiriDeliveryBodyGroup ServiceDeliveryRequestStatusGroup	ErrorCondition	o	Description of any error or warning conditions that apply to the overall request. More Specific error conditions should be included on each request that fails. Mandatory where there is an Error Condition.
SiriDeliveryBodyGroup SiriServiceDeliveryGroup	*	m	Defined per service, see section dedicated to each message type.

7.1.2.3 DataReceivedAcknowledgement

- Response from Consumer to Producer to acknowledge that data has been received. Used as optional extra step if reliable delivery is needed.
- Answers a ServiceDelivery.

Table 15 - DataReceivedAcknowledgement Specification

Path	Field	NSW: m/o	Comment
	ResponseTimestamp	m	Timestamp of response
ConsumerResponseEndpointGroup	ConsumerRef	m	Reference to the requestor - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
DataReceivedPayloadGroup	Status	m	True if successful
DataReceivedPayloadGroup	ErrorCondition	o	Description of any error or warning condition Mandatory where there is an Error Condition.

7.1.3 Termination

7.1.3.1 TerminateSubscriptionRequest

- Request from Subscriber to Subscription Manager to terminate a subscription.
- Answered with a TerminateSubscriptionResponse

Table 16 - TerminateSubscriptionRequest Specification

Path	Field	NSW: m/o	Comment
	RequestTimestamp	m	Timestamp of request
RequestorEndpointGroup	RequestorRef	m	Reference to the requestor - Participant Code (will be defined in Operator Interface Contract).
RequestorEndpointGroup	MessageIdentifier	m	UUID of the message. **TfNSW Rule:** Mandatory.
TerminateSubscriptionTopicGroup	All or SubscriptionRef	m	Terminate all subscriptions for this requestor. A choice must be made between *All* and provision of a *SubscriptionRef*.

7.1.3.2 TerminateSubscriptionResponse

- Request from Subscriber to Subscription Manager to terminate a subscription.
- Answered with a TerminateSubscriptionResponse.

Table 17 - TerminateSubscriptionResponse Specification

Path	Field	NSW: m/o	Comment
TerminateSubscriptionResponse	ResponseTimestamp	m	Timestamp of response
ResponseEndpointGroup	ResponderRef	m	Reference to the responder - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
ResponseEndpointGroup	RequestMessageRef	m	Reference to an arbitrary unique reference associated with the request which gave rise to this response. **TfNSW Rule:** Mandatory.
TerminationStatusGroup TerminationResponseStatus SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	o	Reference to a service subscription. Unique within service and subscriber. Mandatory if not all subscriptions are terminated.
TerminationStatusGroup TerminationResponseStatus	Status	m	Whether the request was processed successfully
TerminationStatusGroup TerminationResponseStatus	ErrorCondition	o	Description of any error or warning condition Mandatory where there is an Error Condition.

7.1.3.3 Status Check and Heartbeat

7.1.3.3.1   CheckStatusRequest

- Request from Consumer to Producer to check whether services is working.
- Answered by a CheckStatusResponse.

Table 18 - CheckStatusRequest Specification

Path	Field	NSW: m/o	Comment
	RequestTimestamp	m	Timestamp of request
RequestorEndpointGroup	RequestorRef	m	Reference to the requestor - Participant Code (will be defined in Operator Interface Contract).
RequestorEndpointGroup	MessageIdentifier	m	UUID of the message **TfNSW Rule:** Mandatory.

7.1.3.3.2   CheckStatusResponse

- Response from Producer to Consumer to inform whether the service is working.
- Answers a CheckStatusRequest.

Table 19 - CheckStatusResponse Specification

Path	Field	NSW: m/o	Comment
	ResponseTimestamp	m	Timestamp of response
ProducerResponseEndpointGroup	ProducerRef	m	Reference to the producer - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
ProducerResponseEndpointGroup	RequestMessageRef	m	UUID of the message **TfNSW Rule:** Mandatory.
CheckStatusPayloadGroup	Status	m	Whether the request was processed successfully **TfNSW Rule:** Mandatory.
CheckStatusPayloadGroup	ServiceStartedTime	m	Time at what current instantiation of service started **TfNSW Rule:** Mandatory.

7.1.3.4 HeartbeatNotification

- Notification from Producer to Consumer to indicate that the service is running normally.
- Heartbeat notifications shall be answered with HTTP Status Code 200 - "OK".
- There is no SIRI response required

Table 20 - HeartbeatNotification Specification

Grouping	Fields	NSW: m/o	Comment
HeartbeatNotification	RequestTimestamp	m	Timestamp of request
ProducerRequestEndpointGroup	ProducerRef	m	Reference to the producer - Participant Code (will be defined in Operator Interface Contract). **TfNSW Rule:** Mandatory.
CheckStatusPayloadGroup	Status	o	
CheckStatusPayloadGroup	ServiceStartedTime	m	Time at which current installation of service started **TfNSW Rule:** Mandatory.

Reference material – for information only

7.2 SIRI PT

Note that there is overlap between SIRI PT functionality and TXC functionality, it is expected that TXC will be the primary mechanism for exchanging base Time Table data with PT used in a limited way. Detailed usage will be documented on a per-operator basis in Operator Interface Contracts.

7.2.1 Data Requests

7.2.1.1 Via Query

Not supported.

7.2.1.2 Via Subscription

Note: Using OperatorRefs and LineRefs in the same subscription is not recommended. If required, set up two different subscriptions, one for operators and one for lines.

Table 21 – ProductionTimetableSubscriptionRequest Specification

Path	Field	NSW: m/o	Comment
SubscriptionIdentityGroup	SubscriptionIdentifier	m	Identifier to be given to Subscription. Unique within Service and subscriber
	InitialTerminationTime	m	Requested end time for subscription. Subscription will expire at this time, and not provide any data for trips that run after that time.
ProductionTimetableRequest	RequestTimestamp	m	Timestamp of request
ProductionTimetableRequest ProductionTimetableTopicGroup ValidityPeriod	StartTime	m	The (inclusive) start date and time. **TfNSW Rule:** mandatory
ProductionTimetableRequest ProductionTimetableTopicGroup ValidityPeriod	EndTime	m	The (inclusive) end date and time. **TfNSW Rule:** mandatory
ProductionTimetableRequest ProductionTimetableTopicGroup	OperatorRef	o	Filter the results to include scheduled services for only the specified Operators (described in *Section 5.1 TfNSW Master Data*).
ProductionTimetableRequest ProductionTimetableTopicGroup	Lines	o	Filter the results to include only scheduled services along the given LINEs (described in *Section 5.1 TfNSW Master Data*).
ProductionTimetableSubscriptionPolicyGroup	IncrementalUpdates	o	**TfNSW Rule:** If set, should be set to False (if not set will default to False). Is expected that Producers (for all Subscriptions) will always transmit full timetable.

7.2.2 Data Delivery

All journeys for the requested operators and lines have to be delivered with complete trip information; therefore all planned calls have to be included.

Table 22 – ProductionTimetableDelivery Specification

Path	Field	TfNSW m/o	Description
	ResponseTimestamp	m	Time individual response element was created.

Path	Field	TfNSW m/o	Description
SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	m	Reference to a service. Unique within service and subscription.
DeliveryStatusGroup	ErrorCondition	o	Description of any error or warning condition Mandatory if there is an error.
Start - ProductionTimetablePayloadGroup			
Start - DatedTimetableVersionFrame			
	RecordedAtTime	m	Time at which data was recorded.
LineIdentityGroup	LineRef	m	Reference to a line (described in *Section 5.1 TfNSW Master Data*).
LineIdentityGroup	DirectionRef	m	Reference to a direction (described in *Section 5.1 TfNSW Master Data*).
Start - ServiceInfoGroup			
BasicServiceInfoGroup	OperatorRef	o	The TFNSW accreditation identifier for the Operator of the vehicle journey. **TfNSW Rule:** Mandatory for an additional trip.
BasicServiceInfoGroup	ProductCategoryRef	o	Classification of product (described in Section 5.1 TfNSW Master Data). For TfNSW, Product classification will be populated with values that represent transport **mode**. **TfNSW Rule:** Mandatory for an additional trip.
BasicServiceInfoGroup	ServiceFeatureRef	o	Classification of service (described in Section 5.1 TfNSW Master Data). For TfNSW, Service classification will be populated with values that represent transport **line type**. **TfNSW Rule:** Mandatory for an additional trip.
	VehicleFeatureRef	o	Features of the vehicle (described in *Section 5.1 TfNSW Master Data*). **TfNSW Rule:** Mandatory for an additional trip.
End – ServiceInfoGroup			
TimetableRealtimeInfoGroup	HeadwayService	o	Whether this is a HEADWAY INTERVAL Service, that is one shown to the public as operating at a prescribed interval rather than to a fixed timetable. **TfNSW Rule:** However for TfNSW all services (including Headway services) must be modelled as timetabled services, i.e. a timetable must be submitted.

Path	Field	TfNSW m/o	Description
TimetableRealtimeInfoGroup	Monitored	m	Whether there will be real-time information available for journey, default is true. **TfNSW Rule:** This field must contain a value, if the vehicle has no on-board unit then it will be false, otherwise value should be true.
DatedVehicleJourney TimetableAlterationGroup FramedVehicleJourneyRef	DataFrameRef	m	An identifier of the data frame within participant service. Used to ensure that the reference to a DatedVehicleJourney is unique within the data horizon of the service. **TfNSW Rule:** Mandatory. Must be populated with the operating date of the journey in the format YYYY-MM-DD.
DatedVehicleJourney TimetableAlterationGroup FramedVehicleJourneyRef	DatedVehicleJourneyRef	m	A reference to the VehicleJourney, i.e. the Vehicle Journey code from the timetable source system. **TfNSW Rule:** Mandatory. In the case of an extra journey, this will carry a new unique Vehicle Journey code.
DatedVehicleJourney ServiceInfoGroup	VehicleFeatureRef	o	Features of VEHICLE providing journey. Only used if different for this VEHICLE JOURNEY to default. Fully replaces all features for service.
DatedVehicleJourney TimetableRealtimeInfoGroup	Monitored	o	Whether VEHICLE JOURNEY is monitored. Only used if different for this VEHICLE JOURNEY to the value of Monitored for the DatedTimetableVersionFrame.
Start – DatedVehicleJourney\DatedCalls			
DatedCall StopPointInSequenceGroup	StopPointRef	m	Reference to a scheduled stop point also known as TSN (described in *Section 5.1 TfNSW Master Data*).
DatedCall StopPointInSequenceGroup	VisitNumber	m	Sequence of visit to SCHEDULED STOP POINT within VEHICLE JOURNEY. Increases monotonically, but not necessarily sequentially.
DatedCall AimedCallGroup AimedVehicleArrivalGroup	AimedArrivalTime	o	Target arrival time of VEHICLE at stop according to latest working timetable. **TfNSW Rule:** Mandatory for all vehicle journey stops except the first stop.
DatedCall AimedCallGroup AimedVehicleDeparturelGroup	AimedDepartureTime	o	Target departure time of VEHICLE from stop according to latest working timetable. **TfNSW Rule:** Mandatory for all vehicle journey stops except the last stop.
End – DatedVehicleJourney\DatedCalls			
End - DatedTimetableVersionFrame			
End - ProductionTimetablePayloadGroup			

7.3 SIRI ET

7.3.1 Data Requests

7.3.1.1 Via Query

Not supported.

7.3.1.2 Via Subscription

Table 23 - EstimatedTimetableSubscriptionRequest Specification

Path	Field	TfNSW m/o	Description
SubscriptionIdentityGroup	SubscriptionIdentifier	m	Identifier to be given to Subscription. Unique within Service and subscriber
	InitialTerminationTime	m	Requested end time for subscription. Subscription will not provide any data for trips that run after that time. Termination will terminated by server at that time.
EstimatedTimetableRequest	RequestTimestamp	m	Timestamp of request
EstimatedTimetableRequest EstimatedTimetableTopicGroup	PreviewInterval	o	Forward duration for which journeys should be included. For subscriptions, this duration is a continuously rolling window from the present time. For immediate requests, this duration is measured from the time of the request.
EstimatedTimetableRequest EstimatedTimetableTopicGroup	OperatorRef	o	The TFNSW accreditation identifier for the Operator. Filter the results to include journeys for only the specified OPERATORs (described in *Section 5.1 TfNSW Master Data*).
EstimatedTimetableRequest EstimatedTimetableTopicGroup	Lines	o	Filter the results to include only VEHICLEs along the given LINEs (described in *Section 5.1 TfNSW Master Data*).
EstimatedTimetableSubscriptionPolicyGroup	IncrementalUpdates	o	**TfNSW Rule:** If set, should be set to True (if not set will default to True). Is expected that Producers (for all Subscriptions) will always transmit timetable updates only.
EstimatedTimetableSubscriptionPolicyGroup	ChangesBeforeUpdates	m	**TfNSW Rule:** 20 seconds, for all Producers (for all Subscriptions).

7.3.2 Data Delivery

Table 24 - EstimatedTimetableDelivery Specification

Path	Field	TfNSW m/o	Comment
	ResponseTimestamp	m	Time individual response element was created.
SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	m	Reference to a service. Unique within service and subscription.
DeliveryStatusGroup	ErrorCondition	o	Description of any error or warning condition. Mandatory where there is an Error Condition.

Path	Field	TfNSW m/o	Comment
Start - EstimatedTimetablePayloadGroup			
Start - EstimatedJourneyVersionFrame			
	RecordedAtTime	m	Time at which data was recorded
Start – EstimatedVehicleJourney			
LineIdentityGroup	LineRef	m	Reference to a line (described in *Section 5.1 TfNSW Master Data*).
LineIdentityGroup	DirectionRef	m	Reference to a direction (described in *Section 5.1 TfNSW Master Data*).
Start – EstimatedTimetableAlterationGroup			
FramedVehicleJourneyRef	DataFrameRef	o	Qualifier for the DatedVehicleJourneyRef to ensure that the trip is unique within the data horizon of the service. **TfNSW Rule:** Mandatory when FramedVehicleJourneyRef is used, i.e. when not the first message of an added trip. To be populated with the operating-day date in format *YYYY-MM-DD*.
FramedVehicleJourneyRef	DatedVehicleJourneyRef	o	A reference to the dated Vehicle Journey that the vehicle is making, i.e. the Vehicle Journey code from the timetable source system, or the DatedVehicleJourneyRef defined in PT, or the EstimatedVehicleJourneyCode defined in ET (in the first message, in the case of an extra journey). **TfNSW Rule:** Mandatory when FramedVehicleJourneyRef is used, i.e. when not the first message of an added trip.
Start – DatedVehicleJourneyIndirectRef (Optional - only provided when FramedVehicleJourneyRef and EstimatedVehicleJourneyCode are not used).			
DatedVehicleJourneyIndirectRef	OriginRef	o	The origin (stop-point) is used to help identify the VEHICLE JOURNEY.
DatedVehicleJourneyIndirectRef	AimedDepartureTime	o	Departure time from origin SCHEDULED STOP POINT.

Path	Field	TfNSW m/o	Comment
DatedVehicleJourneyIndirectRef	DestinationRef	o	The destination (stop-point) is used to help identify the VEHICLE JOURNEY.
DatedVehicleJourneyIndirectRef	AimedArrivalTime	o	Arrival time at destination SCHEDULED STOP POINT.
End – DatedVehicleJourneyIndirectRef			
	EstimatedVehicleJourneyCode	o	A new and unique Vehicle Journey code, for an extra unplanned journey defined in ET. **TfNSW Rule:** Must be provided in the first message of an ExtraJourney. Each subsequent message will use FramedVehicleJourneyRef and refer to this code.
	ExtraJourney or Cancellation	o	If specifying a choice must be made between *ExtraJourney* and *Cancellation* *ExtraJourney* describes whether this VEHICLE JOURNEY is an addition to the planning data already sent. Default is 'false': i.e. not an additional journey. *Cancellation* describes whether this VEHICLE JOURNEY is a deletion of a previous scheduled journey. Default is 'false': this is not a VEHICLE JOURNEY that has been cancelled. An Extra Journey may be deleted.
End – EstimatedTimetableAlterationGroup			
Start – JourneyPatternInfoGroup			
	PublishedLineName	m	Name or number by which the line is known to the public.
	DirectionName	m	Description of the direction.
End – JourneyPatternInfoGroup			
Start – JourneyEndNamesGroup			
	OriginRef	m	Reference to the origin scheduled stop point of the journey.

Path	Field	TfNSW m/o	Comment
	OriginName	m	Name of the origin of the journey.
	DestinationRef	m	Reference to the destination scheduled stop point of the journey.
	DestinationName	m	Description of the destination stop.
End – JourneyEndNamesGroup			
Start - ServiceInfoGroup			
BasicServiceInfoGroup	OperatorRef	o	The TfNSW accreditation identifier for the Operator of the vehicle journey. **TfNSW Rule:** Mandatory for an additional trip.
BasicServiceInfoGroup	ProductCategoryRef	o	Classification of product (described in Section 5.1 TfNSW Master Data). For TfNSW, Product classification will be populated with values that represent transport **mode**. **TfNSW Rule:** Mandatory for an additional trip.
BasicServiceInfoGroup	ServiceFeatureRef	o	Classification of service (described in Section 5.1 TfNSW Master Data). For TfNSW, Service classification will be populated with values that represent transport **line type**. **TfNSW Rule:** Mandatory for an additional trip.
	VehicleFeatureRef	o	Features of the vehicle (described in Section 5.1 TfNSW Master Data). **TfNSW Rule:** Mandatory for an additional trip.
End – ServiceInfoGroup			
Start - JourneyProgressGroup			
	Monitored	m	Whether there is real-time information available for journey. **TfNSW Rule:** Mandatory.

Path	Field	TfNSW m/o	Comment
	MonitoringError	o	Reason value if Monitored is false, i.e. GPS, Radio, etc.
ProgressDataGroup	Occupancy	m	How full the vehicle is. Prediction for the complete trip. **TfNSW Rule:** Mandatory.
End – JourneyProgressGroup			
Start – TrainOperationalInfoGroup			
OperationalInfoGroup	VehicleRef	m	Reference to a vehicle
End – TrainOperationalInfoGroup			
Start – RecordedCalls **TfNSW Rule:** Mandatory for <u>final ET message per trip</u> only, there must be a RecordedCall for each call on a trip.			
RecordedCall StopPointInSequenceGroup	StopPointRef	m	Reference to a scheduled stop point also known as TSN (described in *Section 5.1 TfNSW Master Data*).
RecordedCall StopPointInSequenceGroup	VisitNumber	m	Sequence of visit to scheduled stop point within vehicle journey. Increases monotonically, but not necessarily sequentially **TfNSW Rule:** mandatory
RecordedCall	ExtraCall or Cancellation	o	If provided a choice must be made between *ExtraCall* and *Cancellation*. *ExtraCall*: This call is additional and unplanned. *Cancellation*: This call is a cancellation of a previously announced call.
RecordedCall RecordedCallGroup	ActualArrivalTime	o	Actual arrival time at stop. **TfNSW Rule:** Mandatory for all vehicle journey stops except the first stop.
RecordedCall RecordedCallGroup	ActualDepartureTime	o	Actual departure time at stop. **TfNSW Rule:** Mandatory for all vehicle journey stops except the last stop.
End – RecordedCalls			
Start – EstimatedCalls **TfNSW Rule:** Mandatory for all ET messages <u>except the final message per trip</u>. There is an exception to this rule, i.e. in the case of a cancelled trip which has already commenced, both EstimatedCalls and RecordedCalls will appear in the same message.			

Reference material – for information only

Path	Field	TfNSW m/o	Comment
EstimatedCall StopPointInSequenceGroup	StopPointRef	m	Reference to a scheduled stop point also known as TSN (described in *Section 5.1 TfNSW Master Data*).
EstimatedCall StopPointInSequenceGroup	VisitNumber	m	Sequence of visit to scheduled stop point within vehicle journey. Increases monotonically, but not necessarily sequentially

TfNSW Rule: Mandatory |
| EstimatedCall | ExtraCall or Cancellation | o | If provided a choice must be made between *ExtraCall* and *Cancellation*.

ExtraCall: This call is additional and unplanned.

Cancellation: This call is a cancellation of a previously announced call. |
| EstimatedCall CallRealTimeInfoGroup | Occupancy | o | How full the vehicle is. Prediction for vehicle leaving this call.

TfNSW Rule: Must be supplied if this differs from the occupancy at the trip level. |
| EstimatedCall DisruptionGroup FacilityConditionElement | * | o | Real-time data on facility condition.

If used, this will be addressed in Operator Interface Contracts. |
| EstimatedCall DisruptionGroup FacilityChangeElement | * | o | Real-time data on facility change.

If used, this will be addressed in Operator Interface Contracts. |
| EstimatedCall OnwardsCallGroup OnwardVehiclesArrivalTimesGroup | AimedArrivalTime | o | Target arrival time of vehicle according to latest working timetable.

TfNSW Rule: Mandatory for all vehicle journey stops except the first stop. |

Path	Field	TfNSW m/o	Comment
EstimatedCall OnwardsCallGroup OnwardVehiclesArrivalTimesGroup	ExpectedArrivalTime	o	Expected time of arrival taking prediction into account. **TfNSW Rule:** Mandatory for all vehicle journey stops except: • The first stop • All stops outside the prediction window.
EstimatedCall OnwardsCallGroup OnwardVehiclesArrivalTimesGroup ExpectedArrivalPredictionQuality	PredictionLevel	o	Default to 'veryReliable' until profile of actuals has been completed with operator to define a more dynamic Prediction Quality Level. (Described in *Section 8.1.3 Prediction Quality*) **TfNSW Rule:** Mandatory for all vehicle journey stops except: • The first stop • All stops outside the prediction window.
EstimatedCall OnwardsCallGroup OnwardVehiclesArrivalTimesGroup	ExpectedArrivalPredictionQuality	o	Default to 'veryReliable' until profile of actuals has been completed with operator to define a more dynamic Prediction Quality Level. (Described in Section 8.1.3 Prediction Quality) **TfNSW Rule:** Mandatory for all vehicle journey stops except: • The first stop • All stops outside the prediction window.
EstimatedCall OnwardsCallGroup OnwardVehiclesDepartureTimesGroup	AimedDepartureTime	o	Target departure time of vehicle according to latest working timetable. **TfNSW Rule:** Mandatory for all vehicle journey stops except the first stop.

Path	Field	TfNSW m/o	Comment
EstimatedCall OnwardsCallGroup OnwardVehiclesDepartureTimesGroup	ExpectedDepartureTime	m	Expected departure time taking prediction into account. **TfNSW Rule:** Mandatory for all vehicle journey stops except the last stop.
EstimatedCall OnwardsCallGroup OnwardVehiclesDepartureTimesGroup	ExpectedDeparturePredictionQuality	o	Default to 'veryReliable' until profile of actuals has been completed with operator to define a more dynamic Prediction Quality Level. (Described in *Section 8.1.3 Prediction Quality*). **TfNSW Rule:** Mandatory for all vehicle journey stops except: • The last stop • All stops outside the prediction window.
End – EstimatedCalls			
End – EstimatedVehicleJourney/EstimatedCalls container			
Start – EstimatedVehicleJourney/Extensions **TfNSW Rule:** Although this extension is mandatory for each message, the final message of each trip (sent with *RecordedCall*) should also contain this extension with actual occupancy values for each *JourneySection*.			
EstimatedOccupancyModel OccupancyJourneySection Section	StartStopPointRef	m	First stop point for this section; Mandatory if extension is present. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection Section	EndStopPointRef	m	Last stop point for this section. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	VehicleRef	m	Unique ID of vehicle for this occupancy data set. Mandatory if extension is present **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyValue	m	Estimate of occupancy value. **TfNSW Rule:** Mandatory.

Path	Field	TfNSW m/o	Comment
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyLevel	m	Level of occupancy enumeration (described in *Section 8.1.2 Occupancy*). If the vehicle is not capable of providing real time occupancy data, value should be set to "UNKNOWN". If changed a new ET will be emitted. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy OccupancyCapacity	Seating	m	Number of seats in carriage. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy OccupancyCapacity	Standing	m	Number of standing spaces in carriage. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyQuality	m	Quality of occupancy level/value "reliable" or "unreliable". **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy TravelGroup	Available	m	Indicator of availability of travel group (i.e. carriage closed). **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy TravelGroup	Name	m	Name of travel group, for multi-carriage vehicles, this should contain an identifier of the carriage. **TfNSW Rule:** Mandatory
End – EstimatedVehicleJourney/Extensions			

Path	Field	TfNSW m/o	Comment
EstimatedVehicleJourney	IsCompleteStopSequence	m	"true" or "false". Whether the above call sequence is complete, i.e. represents every CALL of the SERVICE PATTERN. This field cannot be used alone to replace a previous call sequence; TfNSW makes uses of *ExtraCall* and *Cancellation* to communicate a path-change. "true" for first and last message of any trip including added trips. **TfNSW Rule:** Mandatory
End – EstimatedVehicleJourney			
End – EstimatedJourneyVersionFrame			
End – EstimatedTimetablePayloadGroup			

7.4 SIRI VM

This section of the document describes the SIRI VM fields needed to request and to deliver SIRI VM data.

7.4.1 Data Requests

7.4.1.1 Via Query

Table 25 - VehicleMonitoringRequest Specification

Path	Field	TfNSW m/o	Description
	RequestTimestamp	m	Timestamp of request
VehicleMonitoringTopicGroup	VehicleRef or LineRef	o	If specifying a filter a choice must be made between *VehicleRef* and *LineRef* *VehicleRef* means results should be filtered to a specific vehicle about which data is requested (described in *Section 5.1 TfNSW Master Data*). *LineRef* means results should be filtered to include only VEHICLEs for the specific LINE (described in *Section 5.1 TfNSW Master Data*).

7.4.1.2 Via Subscription

Table 26 - VehicleMonitoringSubscriptionRequest Specification

Description	Field	TfNSW m/o	Description
SubscriptionIdentityGroup	SubscriptionIdentifier	m	Identifier to be given to Subscription. Unique within Service and subscriber

Description	Field	TfNSW m/o	Description
	InitialTerminationTime	m	Requested end time for subscription. Subscription will not provide any data for trips that run after that time. Termination will terminated by server at that time.
VehicleMonitoringRequest	RequestTimestamp	m	Timestamp of request
VehicleMonitoringRequest VehicleMonitoringTopicGroup	VehicleRef or LineRef	o	If specifying a filter a choice must be made between *VehicleRef* and *LineRef* *VehicleRef* means results should be filtered to a specific vehicle about which data is requested (described in *Section 5.1 TfNSW Master Data*). *LineRef* means results should be filtered to include only VEHICLEs for the specific LINE (described in *Section 5.1 TfNSW Master Data*).
VehicleMonitoringSubscriptionPolicyGroup	IncrementalUpdates	o	Whether the producer should only provide updates to the last data returned, i.e. additions, modifications and deletions, or always return the complete set of current data. Default is 'true', i.e. once the initial transmission has been made, return only incremental updates. If false each subscription response will contain the full information as specified in this request.
VehicleMonitoringSubscriptionPolicyGroup	ChangeBeforeUpdates or UpdateInterval	o	If modifying update thresholds a choice must be made between *ChangeBeforeUpdates* and *UpdateInterval*. *ChangeBeforeUpdates:* The amount of change to the arrival or departure time that can happen before an update is sent (i.e. if ChangeBeforeUpdate is set to 2 min, the subscriber will not be told that a VEHICLE is 30 s delayed – an update will only be sent when the VEHICLE is at least 2 min delayed) *UpdateInterval:* Time interval in seconds in which new data is to be transmitted. If unspecified, default to system configuration.

7.4.2 Data Delivery

7.4.2.1 VehicleMonitoringDelivery Specification

Table 27 - VehicleMonitoringDelivery Specification

Path	Field	TfNSW m/o	Description
	ResponseTimestamp	m	Time individual response element was created. Might be different to ResponseTimestamp of the response message.
SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	m	Reference to a service. Unique within service and subscription.
DeliveryStatusGroup	ErrorCondition	o	Description of any error or warning condition **TfNSW Rule:** Mandatory if there is an Error Condition.

Path	Field	TfNSW m/o	Description
Start - VehicleMonitoringPayloadGroup			
VehicleActivity	RecordedAtTime	m	Time at which data was recorded
VehicleActivity	ValidUntilTime	m	Time until when data is valid
VehicleActivity	VehicleMonitoringRef	m	Unique ID for vehicle. **TfNSW Rule:** Mandatory. In the case of multiple carriages/vehicles travelling as a single vehicle, this field must carry the ID for the first carriage/vehicle in the set.
VehicleActivity ProgressBetweenStops	LinkDistance	m	The total distance in metres between the previous stop and the next stop.
VehicleActivity ProgressBetweenStops	Percentage	m	Percentage along link that vehicle has travelled.
Start – VehicleActivity/MonitoredVehicleJourney/MonitoredJourneyIdentityGroup			
	LineRef	m	Reference to Line of journey (described in *Section 5.1 TfNSW Master Data*). **TfNSW Rule:** Mandatory.
	DirectionRef	m	Reference to a direction (described in *Section 5.1 TfNSW Master Data*). **TfNSW Rule:** Mandatory.
FramedVehicleJourneyRef	DataFrameRef	m	Qualifier for the DatedVehicleJourneyRef to ensure that the trip is unique with the data horizon of the service. **TfNSW Rule:** To be populated with the operating-day date in format *YYYY-MM-DD*.
FramedVehicleJourneyRef	DatedVehicleJourneyRef	m	A reference to the dated Vehicle Journey that the vehicle is making, i.e. the Vehicle Journey code from the timetable source system, or the DatedVehicleJourneyRef defined in PT, or the EstimatedVehicleJourneyCode defined in ET (in the first message, in the case of an extra journey).
End – VehicleActivity/MonitoredVehicleJourney/MonitoredJourneyIdentityGroup			
VehicleActivity MonitoredVehicleJourney JourneyPatternInfoGroup	VehicleMode	m	Mode of transport, e.g. rail, tram, bus.
VehicleActivity MonitoredVehicleJourney JourneyPatternInfoGroup	PublishedLineName	m	Number or name by which the line is known to the public. **TfNSW Rule:** Mandatory.
VehicleActivity MonitoredVehicleJourney JourneyPatternInfoGroup	DirectionName	m	Description of the direction.

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Path	Field	TfNSW m/o	Description
Start − VehicleActivity/MonitoredVehicleJourney/VehicleJourneyInfoGroup			
JourneyEndNamesGroup	OriginRef	m	Reference to the origin scheduled stop point of the journey.
JourneyEndNamesGroup	OriginName	m	Name of the origin of the journey.
JourneyEndNamesGroup	DestinationRef	m	Reference to the destination scheduled stop point of the journey.
JourneyEndNamesGroup	DestinationName	m	Description of the destination stop.
End − VehicleActivity/MonitoredVehicleJourney/ VehicleJourneyInfoGroup			
Start − VehicleActivity/MonitoredVehicleJourney/JourneyProgressGroup			
	Monitored	m	Whether there is real-time information available for journey. **TfNSW Rule:** Mandatory.
	MonitoringError	o	Reason value if Monitored is false, i.e. GPS, Radio, etc.
ProgressDataGroup VehicleLocation	Longitude	m	WGS84 with projection 4326 Longitude from Greenwich Meridian. -180 (West) to +180 (East). Decimal degrees. e.g. 2.356028. No less than 6 and no more than 7 decimal places. **TfNSW Rule:** Mandatory.
ProgressDataGroup VehicleLocation	Latitude	m	WGS84 with projection 4326 Latitude from equator. -90 (South) to +90 (North). Decimal degrees. e.g. 56.356. No less than 6 and no more than 7 decimal places. **TfNSW Rule:** Mandatory.
ProgressDataGroup	LocationRecordedAtTime	o	Time at which location was recorded. If not present assume the RecordedAtTime on the containing delivery.
ProgressDataGroup	Bearing	m	Bearing in compass degrees in which vehicle is running. **TfNSW Rule:** Mandatory.
ProgressDataGroup	ProgressRate	m	Rate of progress of vehicle.
ProgressDataGroup	Velocity	m	Velocity (actual speed) of vehicle in meters per second. **TfNSW Rule:** Mandatory.
ProgressDataGroup	Delay	m	Delay of vehicle against schedule, to a precision in seconds. Early times are shown as negative values.

Path	Field	TfNSW m/o	Description
ProgressDataGroup	VehicleStatus	m	Classification of the progress state of the running of this vehicle journey. **TfNSW Rule:** Mandatory.
End – VehicleActivity/MonitoredVehicleJourney/JourneyProgressGroup			
Start – VehicleActivity/MonitoredVehicleJourney/MonitoredCallingPatternGroup			
MonitoredCall	StopPointRef	m	Reference to a SCHEDULED STOP POINT **TfNSW Rule:** Mandatory.
MonitoredCall	VisitNumber	m	Sequence of visit to SCHEDULED STOP POINT within VEHICLE JOURNEY. **TfNSW Rule:** Mandatory.
MonitoredCall	VehicleAtStop	m	Whether vehicle is currently at stop. **TfNSW Rule:** Mandatory.
End – VehicleActivity/MonitoredVehicleJourney/ MonitoredCallingPatternGroup			
Start – VehicleActivity/Extensions			
EstimatedOccupancyModel OccupancyJourneySection Section	StartStopPointRef	m	First stop point for this section; Mandatory if extension is present. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection Section	EndStopPointRef	m	Last stop point for this section. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	VehicleRef	m	Unique ID of vehicle for this occupancy data set. Mandatory if extension is present **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyValue	m	Estimate of occupancy value. **TfNSW Rule:** Mandatory.
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyLevel	m	Level of occupancy enumeration (described in *Section 8.1.2 Occupancy*). If the vehicle is not capable of providing real time occupancy data, value should be set to "UNKNOWN". If changed a new VM will be emitted. **TfNSW Rule:** Mandatory

Path	Field	TfNSW m/o	Description
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy OccupancyCapacity	Seating	m	Number of seats in carriage. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy OccupancyCapacity	Standing	m	Number of standing spaces in carriage. **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy	OccupancyQuality	m	Quality of occupancy level/value "reliable" or "unreliable". **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy TravelGroup	Available	m	Indicator of availability of travel group (ie carriage closed). **TfNSW Rule:** Mandatory
EstimatedOccupancyModel OccupancyJourneySection VehicleOccupancies Occupancy TravelGroup	Name	m	Name of travel group, for multi-carriage vehicles, this should contain an identifier of the carriage. **TfNSW Rule:** Mandatory
End – VehicleActivity/Extensions			
End - VehicleMonitoringPayloadGroup			

7.5 SIRI SX

7.5.1 Introduction

SIRI SX is not intended to be used to provide updates to the progress of a specific vehicle journey, the SIRI Estimated Timetable (ET) service should be used for this purpose. Rather SIRI SX is to be used to describe situations that have a wider impact. As an example, a 5 mins late Tangara would result in emission of a new ET, a tree on the tracks would result in emission of an SX.

Further examples of circumstances under which an SX would be emitted include the following:

- Problems at a stop place affecting some or all journeys for some or all modes;
- Problems affecting a whole line or a section of a line between two stop places;
- Problems affecting an interchange;
- Problems affecting a whole network;
- Disruption (e.g. partial blockage) or degradation (e.g. crowding) of normal travel; and
- Problems affecting particular classes of users, e.g. those with impaired mobility.

It is intended that TfNSW SIRI SX will be used to pass notifications about incidents between systems, it is not intended that TfNSW SIRI SX will be used for incident management. Multiple participants (TMC and other non-TMC participants) may send SX messages relating to the same Situation.

SIRI SX covers two high-level types of situations:

- PtSituation
- RoadSituation

This specification covers use of PtSituation, Road Situations will not be managed using SIRI in the short-term, but an alternative protocol.

7.5.1.1 ET and VM References

Where an SX incident relates to timetable details of a public transport vehicle, it will be referenced in the ET field *EstimatedVehicleJourney/DisruptionGroup/SituationRef*.

Where an SX relates to vehicle location details of a public transport vehicle, it will be referenced in the VM field *MonitoredVehicleJourney/DisruptionGroup/SituationRef*.

7.5.2 Concepts

7.5.2.1 Update/Causal Chains

When producing SIRI SX messages careful consideration must be given by the producing system in referencing existing situations, the causal chain between situations, and order of delivery of versions of a situation, e.g. situation versions must be in sequence and references to related situations must be accurate.

A more complete description is given in the CEN SIRI Specification Part 5 Section 5.3.4.

7.5.2.2 Categorising and Classifying Information

SIRI SX provides rich scope for describing, categorising and classifying Situations, including the Affects and Consequences elements, along with the Classifier and Description groups of elements. For the sake of consumers, these should be most fully exploited by producers to provide the most granular level of descriptive detail possible.

Examples could include:

- A message pertaining to a subsection of a Route should be targeted to the relevant Route Section or Stop Point(s) and not the entire Route.
- Lift outages affecting only one platform (TSN) should be targeted to the specific TSN rather than at a station level.

7.5.2.3 Reason Codes

Reason code and SubReason code is used to categorise the type of Situation and distinguish the cause of the Situation, whether it is for instance a work strike or a train derailment.

As described in the CEN Specification Part 5, 6.2.4, SIRI SX supports a two-level classification system for PT Situation Reasons, consisting of a Reason type and a Reason sub-type. The collection of supported enumeration values is a union of two sets of TPEG (Transport Protocols Expert Group) Reason codes, plus some additional reasons. The list of possible Reason and subReason values can be determined by consulation of the CEN standard specification and the standard VDV XSD.

7.5.2.4 ScopeType

ScopeType describes the nature of the Situation. It is an enumerated set of values that can be used to filter or route the distribution to interested parties and to construct descriptions. This information can provide an idea of the size or scope of the Situation's impact. Effort should be made to map the correct ScopeType value to the Situation that is occurring. A Situation about an entire network is different to a Situation to one stop place on a line, and ScopeType should be used accurately in this respect, it is a mandatory field for all Situations.

Where possible, the AffectsScope section of the Situation should match ScopeType, the following table identified the mapping between ScopeType and AffectsScope.

Table 28 - SIRI SX Mapping ScopeType to AffectsScope

SIRI-SX ScopeType	Description	SIRI-SX AffectsScope
general	Situation has a general scope.	-
operator	Situation scope is a specific Operator.	AffectedOperator
network	Situation scope is whole Network.	AffectedNetwork
line	Situation scope is a specific Line.	AffectedLine
route	Situation scope is a specific Route.	AffectedRoute
stopPlace	Situation scope is a specific Stop Place.	AffectedStopPlace
stopPlaceComponent	Situation scope is a specific Stop Place Component.	AffectedComponent
stopPoint	Situation scope is a specific Stop Point.	AffectedStopPoint

7.5.2.5 AffectsScope

The AffectsScope of the Situation highlights at what "level" the Situation is occurring, this element can be embedded at the Situation level or at the Consequence level.

For any given Situation, it may be necessary to communicate through a combination of parent Stop Point level, child Stop Point level and at mode level. All of the following use cases are valid and can be represented using the AffectedStopPoint structure. As mentioned previously, this hierarchical relationship needs to be stored in reference data. AVMs need to refer to this so it can be used by the operators when creating SIRI messages.

Table 29 - Use Cases of AffectedStopPoint

Situation Description	AffectedStopPoint
A Situation affecting the whole of Circular Quay	- Specify the Circular Quay TSN in the *StopPointRef* field - Set *AffectedModes/AllModes*

A Situation affecting only the trains at Central	- Specify the Central TSN in the *StopPointRef* field - Set *AffectedMode* as follows: `<AffectedMode>`
	`    <RailSubmode>allRailServices</RailSubmode>`
	`</AffectedMode>`

A Situation affecting platform 1 of Circular Quay train station	• Specify Circular Quay Platform 1 TSN in the *StopPointRef* field

A Situation affecting all buses and ferries at Circular Quay	• Specify the Circular Quay TSN in the *StopPointRef* field
	• Set AffectedMode as follows:
	
	<AffectedMode>
	    <BusSubmode>bus</BusSubmode>
	    <WaterSubmode>localPassengerFerry</WaterSubmode>
	</AffectedMode>

A Situation affecting an arbitrary set of Stop Points at Central	• Create a list of AffectedStopPoints under a StopPoints element. For each AffectedStopPoint
	  o Set the Stop Point's TSN in the StopPointRef field
	  o Set Central's TSN in the PlaceRef field. This would create the reference point needed to group the subset of Stop Points under Central.

7.5.2.6 Images, Maps, Audio & Other Assets

SX messages may contain attribute values (content) which is large in size, such as images, maps and audio for visually impaired. This SX specification defines possible means of conveying these values as either a reference (link) or a Base64Binary object. Although TfNSW intends to allow use of this capability, further technical considerations must be given to message sizes and access/security to these assets.

7.5.2.7 Message Description and Advice

From the perspective of customer information, customers expect SX messages to explain not only the current situation (i.e. Description element) but also what their expected course of action is, typically referred to as a call to action or next-best/alternative transport option (Advice element).

Possible examples include:
- Cancellation of train services through a station may require advice on the replacement bus trips.
- Removal of accessibility services (such as lifts) may require advice to customers on their next best action.

Advice can be provided both at the Situation level and at the level of each specific Consequence, these should both be used where appropriate/possible, however effort should be made to avoid duplicating the same information across multiple description fields to avoid confusion and to keep the message clear and concise.

7.5.2.8 Temporal Information

Temporal information (Validity, Repetition, Publication Windows etc.) is defined in order to ensure that the scope of messages is as accurate and contextual as possible.

Examples would be:

- Setting validity dates correctly for an SX message with a known timeframe,
- Using SX message repetition and day types to convey repeating messages.

If a Situation will be occurring over a period of time with breaks in between, such as planned maintenance work every weekend for a month, conceptually it can be represented as either four ValidityPeriods with Start and End times covering each weekend (assuming there are four weekends in the month) or one Validity Period covering the entire month but using DayType to specify only weekends are affected.

7.5.2.9 Consequences

The Consequence should list the effect or effects of a Situation on transport services. Given that a Situation may have multiple consequences, each may have a different scope and this should be clearly stated in the Consequence block. All fields and values provided under the Consequence block should solely apply to the Consequence and not the Situation itself.

7.5.3 Data Requests

7.5.3.1 Via Query

Not supported.

7.5.3.2 Via Subscription

Table 30 - SituationExchangeSubscriptionRequest Specification

Description	Field	TfNSW m/o	Description
SubscriptionIdentityGroup	SubscriptionIdentifier	m	Identifier to be given to Subscription. Unique within Service and subscriber
	InitialTerminationTime	m	Requested end time for subscription. Subscription will not provide any data for trips that run after that time. Termination will terminated by server at that time.
SituationExchangeRequest	RequestTimestamp	m	Timestamp of request
SituationExchangeRequest SituationExchangeTopicGroup	*All Fields*	o	Can be used to filter the detail requested in subscriptions
SituationExchangeRequest SituationExchangeRequestPolicyGroup	*All Fields*	o	Can be used to control subscription detail
SituationExchangeSubscriptionPolicyGroup	IncrementalUpdates	o	Whether the producer will return the complete set of current data, or only provide updates to this data, i.e. additions, modifications and deletions. If false or omitted, each subscription response will contain the full information as specified in this request. Default value is False, i.e. Producer will transmit a complete set of current data.

7.5.4 Data Delivery

Table 31 – SituationExchangeDelivery Specification

Path	Field	TfNSW m/o	Description
SituationExchangeDelivery	ResponseTimestamp	m	Time individual response element was created.
SubscriptionIdentifierResourcePropertyGroup	SubscriptionRef	m	Reference to a service. Unique within service and subscription.
DeliveryStatusGroup	ErrorCondition	o	Description of any error or warning condition Used where there is an Error Condition.
Start – SituationExchangePayloadGroup\Situations\PtSituationElement			
	CreationTime	o	Time of creation of Situation
Start – SituationSharedIdentityGroup			
SituationBaseIdentityGroup	ParticipantRef	o	Identifier of participant system that creates Situation: refer to SIRI Provider Reference.

Path	Field	TfNSW m/o	Description
SituationBaseIdentityGroup	SituationNumber	m	SIRI Provider Reference, followed by a unique Identifier of Situation within SIRI Provider Reference e.g. TMC9875431211
SituationUpdateIdentityGroup	Version	m	Version of Update Situation element- set to 0 initially and increment by 1 for each update. This is a mandatory field.
End – SituationSharedIdentityGroup			
Start – SituationInfoGroup\References\RelatedToRef			
References: A reference to another Situation with an indication of the nature of the association, e.g. a cause, a result. Default to "Associated".			
	CreationTime	o	Time of creation of 'related to' association.
SituationSharedIdentityGroup SituationBaseIdentityGroup	ParticipantRef	o	ID of participant system that creates Situation
SituationSharedIdentityGroup SituationBaseIdentityGroup	SituationNumber	m	Identifier of Situation
SituationSharedIdentityGroup SituationUpdateIdentityGroup	UpdateParticipantRef	o	If different to ParticipantRef
SituationSharedIdentityGroup SituationUpdateIdentityGroup	Version	o	Version of update
	RelatedAs	o	Relationship of reference
End – SituationInfoGroup\References			
Start – SituationInfoGroup\Source			
Source: Identifies the source of the Situation information.			
	SourceType	m	Nature of Source communication type.
SituationSourceDetailsGroup	Phone	o	Phone number of Supplier of information.
SituationSourceDetailsGroup	Web	o	Link URL of Supplier of information.
SituationSourceDetailsGroup	Other	o	Other information about source.
	SourceMethod	o	How the source obtained the information.
	Name	o	Name of source.
	TimeOfCommunication	o	Time of communication.
	ExternalCode	o	External system reference to situation
	SourceFile	o	External system reference to situation
End – SituationInfoGroup\Source			
Start – PtSituationBodyGroup			
StatusGroup	Verification	o	Whether the situation has been verified

Path	Field	TfNSW m/o	Description
StatusGroup	Progress	o	Status of Situation. This is mandatory for the first/initial message
StatusGroup	Reality	o	Mandatory on the first message. This field indicates if the situation is real or a test. Furthermore, if the situation is a test, the value should indicate if it is a functional test scenario or if it is a technical test scenario. Refer to *Section 8.1.5 Reality*.
StatusGroup	Likelihood	o	Likelihood to ascribe to future situation. This may be used by Operators when predicting events, e.g. extreme heat, known issues on the network. **TfNSW Rule:** Mandatory for initial/first message See *Section 8.1.10 Likelihood* for values.
ValidityPeriod: One or more Overall inclusive period of applicability of situation			
Start – TemporalGroup			
ValidityPeriod	StartTime	o	The (inclusive) start time stamp.
ValidityPeriod	EndTime	o	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as forever. Unplanned situations such as incidents that are still in progress and does not have a foreseeable end time may omit this value. Planned situations such as track work should publish this value if it is available.
Repetitions: Situation applies only on the repeated day types within the overall **Validity period(s)** listed above. For example Sunday.			
Repetitions	DayType	o	The days within the ValidityPeriod that the Situation is applicable.
Publication Window: Used when a situation is different from validity period. Period during which audience is informed of situation may start before or after situation.			
PublicationWindow	StartTime	o	The (inclusive) start time stamp.

Path	Field	TfNSW m/o	Description
PublicationWindow	EndTime	o	The (inclusive) end time stamp. If omitted, the range end is open-ended, that is, it should be interpreted as forever. Unplanned situations such as incidents that are still in progress and does not have a foreseeable end time may omit this value. Planned situations such as track work should publish this value if it is available.
End – TemporalGroup			
Start – ClassifierGroup			
ReasonGroup TpegReasonGroup	Reason	o	Nature of Situation – Reason Code, see *Section 7.5.2.3 Reason Codes* for details. **TfNSW Rule:** Mandatory for the first/initial message
ReasonGroup TpegSubReasonGroup	SubReason	o	Nature of Situation – SubReason Code, see *Section 7.5.2.3 Reason Codes* for details.
	Severity	o	Severity of Situation. Corresponds to TPEG Pti26 severities. Default is "normal". Refer to *Section 8.1.4 Severity* for list of severity values. **TfNSW Rule:** Mandatory for the first/initial message.
	Audience	o	Intended audience of situation. Refer to *Section 8.1.6 Audience* for list of audience values. If the value **transportOperators** is provided, then the extension Audience field should be used instead of this one. **TfNSW Rule:** One of, this field or the extension Audience field, is mandatory for the first/initial message.
	ScopeType	o	Scope type of situation. Refer to *Section 7.5.2.4 ScopeType* for list of scopetype values. **TfNSW Rule:** Mandatory for the first/initial message.

Path	Field	TfNSW m/o	Description
	Planned	o	Whether the situation was planned (e.g. engineering works) or unplanned (e.g. service alteration). Default is false, i.e. unplanned**.** **TfNSW Rule:** Mandatory for the first/initial message.
End – ClassifierGroup			
Start – DescriptionGroup			
	Summary	o	Summary of situation. If absent should be generated from structure elements / and or by condensing Description. **TfNSW Rule:** This text is mandatory for the first message and has a maximum of 150 characters. It should not contain any HTML tags or other text styling elements. The attribute @xml:lang must also be supplied.
	Description	o	Description of situation. **TfNSW Rule:** Must be supplied if known. Should not repeat any information included in the Summary. Should not contain any HTML tags or other text styling elements. Any URLs in plain text must be a publicly accessible webpage and not be a relative URL or internal URL. The attribute @xml:lang must also be supplied.
	Detail	o	Additional descriptive text**.** **TfNSW Rule:** Must be supplied if known. It may contain basic HTML styling, such as hyperlinks and text bolding. Any links should be full links to a publicly accessible webpage and not relative links or internal links.

Path	Field	TfNSW m/o	Description
	Advice	o	Further advice to passengers. The Advice provided at this level is for the entire Situation and not for a particular Consequence. If Consequence specific advice is needed, then use the Advice field in the Consequence object. The attribute @xml:lang must also be supplied.
	Internal	o	Description of the situation for company (internal).
Images	Image	o	Image for description. Mandatory based on TfNSW request. Using the Image structure in SIRI SX, the user can provide a URL or a binary image file and then specify the type of image that's been attached using the following values map – Image is an approved map relating to the incident or event map logo – Image is an approved logo such as an incident or event icon graphic – Image is miscellaneous graphical attachments
InfoLinks	InfoLink	o	Any link that should be attached to the message. After providing the mandatory URL, the operator can specify the label for the link, any associated images and what type of information is being linked
End – DescriptionGroup			
Start – PtBodyGroup			
Start – PtBodyGroup/Affects			
See *Section 7.5.5.1 Affects* for sub-elements.			
End – PtBodyGroup/Affects			
Start – PtBodyGroup/Consequences/Consequence			
See *Section 7.5.5.11 Consequence* for sub-elements.			
End – PtBodyGroup/Consequences/Consequence			
Start – PtBodyGroup/PublishingActions			
	All fields	o	Distribution actions to disseminate situation. For TfNSW *PublishingActions* should only be provided in the SX feed where channels are explicitly required to be targeted for messages.
Start – Extensions			

Reference material – for information only

Path	Field	TfNSW m/o	Description
PID	SummaryShort	o	Used for digital customer information where display text is limited, such as At Stop PIDs. Should be human readable, relevant and accurate. **TfNSW Rule:** Mandatory for initial/first message. Must not be blank, or contain a single character such as "." or "-".
PID	DescriptionShort	o	Used for digital customer information where display text is limited, such as AtStop PIDs URLs in the text should be full (not relative) links to a publically accessible webpage Should be human readable, relevant and accurate **TfNSW Rule:** Mandatory for initial/first message. Must not be blank, or contain a single character such as "." or "-" Must be plain text and not contain HTML styling.
VoiceFile	VoiceRef or VoiceBinary	o	If provided, a choice must be made between *VoiceRef* and *VoiceBinary*. *VoiceBinary*: Voice file containing audio of the message for customer accessibility and visually impaired customers. *VoiceRef*: URI reference to a voice file.
End – Extensions			
End – PtBodyGroup/PublishingActions			
End – PtBodyGroup			
End – PtSituationBodyGroup			
Start – Extensions			
	Audience	o	Intended audience of situation. Refer to *Section 8.1.6 Audience* for list of audience values. This extension Audience field should only be used if the value **transportOperators** is provided, otherwise the standard Audience field should be used. **TfNSW Rule:** One of, this extension field or the standard Audience field, is mandatory for the first/initial message.

Path	Field	TfNSW m/o	Description
End – Extensions			
End – SituationExchangePayloadGroup\Situations\PtSituationElement			

7.5.5 SX Elements

The below structures (and sub-structures) are re-used at various levels inside the *Affects* and *Consequences* scope; they have been listed here independently of the SX Data Delivery table (above), to prevent having to repeat them at different locations inside the *Affects* and *Consequences* structures.

7.5.5.1 Affects

Scope model identifying parts of transport network affected by situation.

Table 32 - SIRI SX AffectsScope

Path	Field	TfNSW m/o	Description
	AreaOfInterest	o	High-level geographic scope.
Operators	AllOperators or AffectedOperators	o	In the case of Operators being affected, the subsequent choice between *AllOperators* a number of *AffectedOperator*s must be made. For *AffectedOperator* structure see *Section 7.5.5.2 AffectedOperator*
Networks	AffectedNetwork	o	For *AffectedNetwork* structure see *Section 7.5.5.3 AffectedNetwork*
StopPoints	AffectedStopPoint	o	For AffectedStopPoint structure see *Section 7.5.5.4 AffectedStopPoint*
StopPlaces	AffectedStopPlace	o	For AffectedStopPlace structure see *Section 7.5.5.5 AffectedStopPlace*
VehicleJourneys	AffectedVehicleJourney	o	For AffectedVehicleJourney structure see *Section 7.5.5.7 AffectedVehicleJourney*
Roads	AffectedRoad	o	For *AffectedRoad* structure see *Section 7.5.5.8 AffectedRoad*

7.5.5.2 AffectedOperator

This should identify the Operator that is affected by the Situation. The operator must exist in TfNSW's reference data and have a common ID and name. The following table highlights TfNSW's requirements of certain fields in the object. The object should still match the SIRI SX specification.

Table 33 - SIRI SX AffectedOperator

Path	Field	TfNSW m/o	Description
	OperatorRef	m	The TFNSW accreditation identifier for the Operator.
	OperatorName	m	Name of the Operator in reference data.

7.5.5.3 AffectedNetwork

This should identify the Network that is affected by the Situation. The Network must exist in TfNSW's reference data. The following table highlights TfNSW's requirements of certain fields in the object. The object should still match the SIRI SX specification.

Table 34 - SIRI SX AffectedNetwork

Path	Field	TfNSW m/o	Description
	AffectedOperator	m	The Operator(s) on the Network that's been affected. At the time of writing, only one Operator is allowed on a named Network. For *AffectedOperator* structure see *Section 7.5.5.2 AffectedOperator*
	NetworkRef	m	The ID of the Network. *See Section 5.1 TfNSW Master Data*.
	NetworkName	m	Name of the Network. *See Section 5.1 TfNSW Master Data*.
	RoutesAffected	o	A string containing a set of official route names on the Network that have been affected by the Situation. The routes should be comma delimited. Where possible this value should be automatically constructed as opposed to manually entered to avoid errors and for standardisation purposes.
	AllLines, SelectedRoutes or AffectedLine	m	A choice must be made between *AllLines*, *SelectedRoutes* and *AffectedLine*'s. For *AffectedLine* structure see *Section 7.5.5.9 AffectedLine*

7.5.5.4 AffectedStopPoint

This identifies a stop point that's been affected by the Situation. A stop point must exist in TfNSW's reference data and be identifiable using the Transit Stop Number (TSN). The following table highlights TfNSW's requirements of certain fields in the object. The object should still match the SIRI SX specification.

Table 35 - SIRI SX AffectedStopPoint

Path	Field	TfNSW m/o	Description
	StopPointRef	m	The identifier of this also known as TSN (described in *Section 5.1 TfNSW Master Data*).
	StopPointName	m	This is the publicly known name of the stop point contained in the reference data TSN (described in *Section 5.1 TfNSW Master Data*). An example for this would be Tallawong Station, Platform 1
AffectedModes	AllModes or Mode	o	Only populate the *AffectedModes* element if the stop point supports multiple modes of transport and a subset of modes is affected by the Situation. Omission of this element will be interpreted as equivalent to *AllModes*. Refer to *Section 8.1.8 AffectedModes* for list of possible values.
Start – Extensions			
	StopPointType	o	Refer to *Section 8.1.7 StopPointType* for list of possible values.
End – Extensions			

7.5.5.5 AffectedStopPlace

This identified a Stop Place that's been affected by the Situation.

Table 36 - SIRI SX AffectedStopPlace

Path	Field	Mandatory/ Optional	Description
	StopPlaceRef	m	The identifier for the StopPlace (Parent Stop Point). This should be a reference to a TSN, i.e. a StopPointRef (described in *Section 5.1 TfNSW Master Data*).
	PlaceName	o	Name of Stop Place.
AffectedComponents	AffectedComponent	o	For *AffectedComponent* structure see *Section 7.5.5.6 AffectedComponent*

7.5.5.6 AffectedComponent

This identifies a particular component at a particular Stop Place that's affected by the Situation. It may be used to communicate any outages of equipments that may affect the customer's journey such as a lift or access area. The following table highlights TfNSW's requirements of certain fields in the element. The object should still match the SIRI SX specification.

Note: SIRI Facility Monitoring is in scope for future definition and use by TfNSW, reference data for facilities will be established at this time. In the meantime Component identifiers for AffectedComponents will need to be defined by Operators/Producers.

Table 37 - SIRI SX AffectedComponent

Path	Field	Mandatory/ Optional	Description
	ComponentRef	m	The identifier for the component.
	ComponentName	m	The name of the component.
	ComponentType	o	The type of component as per the enumerated list of values in StopPlaceComponentType
	AccessFeatureType	o	The feature type of the component as per the enumerated list of values in StopPlaceAccessFeatureType

7.5.5.7 AffectedVehicleJourney

Table 38 - SIRI SX AffectedVehicleJourney

Path	Field	TfNSW m/o	Description
	FramedVehicleJourneyRef	m	Reference to a Vehicle Journey. TfNSW Rule: If AffectedVehicleJourney is provided, then this field is Mandatory.
	LineRef	m	Refence to a Line. **TfNSW Rule:** If AffectedVehicleJourney is provided, then this field is Mandatory.
	Route	m	Route affected by the Situation.

7.5.5.8 AffectedRoad

Table 39 - SIRI SX AffectedRoad

Path	Field	TfNSW m/o	Description
	Road	o	Roads that are impacted.

7.5.5.9 AffectedLine

This identifies the Line that is affected by the Situation. The Line must exist in TfNSW's reference data, and needs to be agreed and named under a contract with TfNSW. The following table highlights TfNSW's requirements of certain fields in the object.

Table 40 - SIRI SX AffectedLine

Path	Field	TfNSW m/o	Description
LineGroup	LineRef	m	The identifier for the Line (described in *Section 5.1 TfNSW Master Data*).
Destinations	AffectedStopPoint	o	The Stop Point affected by the Situation. For multiple Stop Points, include multiple *Destinations*. For *AffectedStopPoint* structure see *Section 7.5.5.4 AffectedStopPoint* **TfNSW Rule:** If the *Destinations* element is provided then an *AffectedStopPoint* should also be provided.
Routes	AffectedRoute	o	A list of Routes on the Lines affected by the Situation. For *AffectedRoute* structure see *Section 7.5.5.10 AffectedRoute*

7.5.5.10 AffectedRoute

This should identify the Route that is affected by the Situation. Route is an ordered list of stop points and this implies the need to indicate the direction of travel for the vehicle. Direction should follow those specified in described in *Section 5.1 TfNSW Master Data*.

Table 41 - SIRI SX AffectedRoute

Path	Field	TfNSW m/o	Description
	RouteRef	m	Reference to a Route.
Direction	DirectionRef	m	Reference to a direction, i.e. the code used to indicate the direction of travel (described in *Section 5.1 TfNSW Master Data*).
Sections AffectedSection	SectionRef	o	Identifier of Route Section(s) affected by the Situation
StopPoints	AffectedOnly	o	A Boolean value to indicate if the list of stop pointscontain all stop points of the route or only those affected by the Situation, default is false.

Reference material – for information only

Path	Field	TfNSW m/o	Description
StopPoints	AffectedStopPoint	o	For AffectedStopPoint structure see *Section 7.5.5.4 AffectedStopPoint* **TfNSW Rule:** If the StopPoints element is specified then there should be at least one AffectedStopPoint on the Route.

7.5.5.11 Consequence

Model describing a single of many possible consequences of the Situation.

Table 42 - SIRI SX Consequence

Path	Field	TfNSW m/o	Description
Period	StartTime	o	The (inclusive) start time-stamp of period of applicability of Consequence.
Period	EndTime	o	The (inclusive) end time-stamp of period of applicability of Consequence. If omitted, the range end is open-ended, that is, it should be interpreted as "forever"
	Condition	m	The Condition field should be populated in the Consequence block to help inform how the service is affected; for example if the Situation is resulting in a service being Cancelled, i.e. Situation/Condition="cancelled" and a replacement service is invoked, then the Situation/Consequences/Consequence/condition = "replacementService" should be used. See *Section 8.1.9 Service Condition* for full list of values. **TfNSW Rule:** Mandatory.
	Severity	m	Default value is "normal" and should adhere to the values listed in *Section 8.1.4 Severity*. If the Situation is resulting in a severe degradation of service and a replacement service is invoked, the severity of the replacement service should be set to normal and not severe.
	Affects	o	For Affects structure see *Section 7.5.5.1 Affects*
Suitabilities	Suitability	o	Effect on a passenger need
	Advice	o	Advice to passengers
Advice	AdviceRef	o	Identifier of standard Further advice message to passengers.
Advice	Details	o	Further advice to passengers that is specific to this particular Consequence
Start - Blocking			

Reference material – for information only

Path	Field	TfNSW m/o	Description
Blocking: The Blocking element is used to indicate how the disruption should be handled by info systems. This information should always be populated even if it only uses the default values. Where applicable the following values should be set to true to speed up the information flow to customers, such as if a stop point will no longer allow boarding and/or alighting so the customer can make alternative travel arrangements. The Blocking element is used to indicate how the disruption should be handled by info systems. This information should always be populated even if it only uses the default values. Where applicable the following values should be set to true to speed up the information flow to customers, such as if a stop point will no longer allow boarding and/or alighting so the customer can make alternative travel arrangements. **TfNSW Rule:** Mandatory			
	JourneyPlanner	m	Default to false and should not be suppressed/omitted. Setting this value to true will mean parts of the network identified in the Consequence's AffectsScope should be blocked from the Journey Planner.
	RealTime	m	Default to false and should not be suppressed/omitted. Setting this value to true will mean parts of the network identified in the Consequence's AffectsScope should be blocked from real-time departure information.
End - Blocking			
Boarding	ArrivalBoardingActivity	o	Indicates if customers can alight. **TfNSW Rule:** The default value is "alighting" to indicate passengers may alight at a stop point. Otherwise use "noAlighting" to indicate passengers may not alight at a stop point.
Boarding	DepartureBoardingActivity	o	Indicates if customers can board. **TfNSW Rule:** The default value is "boarding" to indicate passengers may board at a stop point. Otherwise use "noBoard" to indicate passengers may not board at a stop point.
Delays	DelayBand	o	Timeband of likely delay length
Delays	DelayType	o	Nature of delay
Delays	Delay	o	Additional Journey time needed to overcome disruption
Casualties	NumberOfDeaths	o	The number of deaths in this Consequence. Omission means there are no deaths. It should be noted that the number of deaths should never be published to the public as the information is operational in nature and sensitive.

Path	Field	TfNSW m/o	Description
Casualties	NumberOfInjured	o	The number of injuries in this Consequence. Omission means there are no injuries. It should be noted that the number of injured should never be published to the public as the information is operational in nature and sensitive. There's currently no way to distinguish between number of staff versus number of passengers injured within one Consequence. If it is necessary to distinguish then use multiple Consequences. There's currently no way to highlight the breakdown in number of injured in terms of severity, i.e. two critically injured and three slightly injured.
Easements: Description of fare exceptions allowed because of disruption.			
Easements	TicketRestriction	o	Ticket restriction conditions in effect. TPEG pti table pti25.
Easements	Easement	o	Description of fare exceptions allowed because of disruption.
Easements	EasementRef	o	Identifier of a fare exceptions code allowed because of the disruption

7.6 SIRI FM

7.6.1 Data Requests

7.6.1.1 Via Query

Not supported.

7.6.1.2 Via Subscription

Table 43 - FacilityManagementSubscriptionRequest Specification

Path	Field	TfNSW m/o	Description
SubscriptionIdentityGroup	SubscriptionIdentifier	m	Identifier to be given to Subscription. Unique within Service and subscriber.
	InitialTerminationTime	m	Requested end time for subscription. Subscription will not provide any data for trips that run after that time. Termination will terminated by server at that time.
FaciliityMonitoringRequest	RequestTimestamp	m	Timestamp of request

Path	Field	TfNSW m/o	Description
FaciliityMonitoringSubscriptionPolicyGroup	IncrementalUpdates	o	Whether the producer will return the complete set of current data, or only provide updates to this data, i.e. additions, modifications and deletions. If false or omitted, each subscription response will contain the full information as specified in this request. Default value is False, i.e. Producer will transmit a complete set of current data.

7.6.2 Data Delivery

Table 44 - FacilityManagementDelivery Specification

Path	Field	TfNSW m/o	Description
ResponseStructure ResponseTimestamp	ResponseTimestamp	m	Time individual response element was created.
	SubscriptionRef	m	Reference to a service subscription: unique within Service and Subscriber.
	ErrorCondition	o	Description of any error or warning condition. **TfNSW Rule:** Mandatory if there is an Error Condition.
Start – FacilityMonitoringDelivery/FacilityMonitoringPayloadGroup			
Start – Facility Condition			
Facility	FacilityCode	m	Identifier for the facility for which the status will be reported.
Facility	Description	m	Description of the facility affected by condition.
Facility	*	o	The facility affected by the condition. All sub-elements optional except *FacilityCode* and *Description*.
FacilityStatus	Status	m	Status of the facility.
FacilityStatus	Description	m	Description of the facility Status
FacilityStatus AccessibilityAssessment	*	o	Accessibility of the Facility.
SituationRef	SituationSimpleRef	o	Reference to a SITUATION associated with the element. **TfNSW Rule:** Mandatory if an associated situation has been raised (using SIRI-SX).
Remedy	RemedyType	o	Setup action to remedy the change of the facility status (if partialy or totaly unavailable). Type of the remedy.

Path	Field	TfNSW m/o	Description
Remedy	Description	o	Description of the set up remedy in natural language. (Unbounded since SIRI 2.0) At least one element from RemedyStructure is mandatory when Remedy element is provided
MonitoringInfo	MonitoringInterval	m	Mean time interval between two measurements.
MonitoringInfo	MonitoringType	m	Type of monitoring, e.g. automatic, manual, etc.
MonitoringInfo MonitoringPeriod	MonitoringPeriod	m	When the monitoring is in effect.
ValidityPeriod	StartTime	m	The (inclusive) start time stamp of the period (duration) of the status change of the facility.
ValidityPeriod	EndTime	o	The (inclusive) end time stamp of the period (duration) of the status change of the facility. **TfNSW Rule:** Mandatory if known.
ValidityPeriod	EndTimeStatus	m	A categorisation of the period (duration) of the status change of the facility.
End – FacilityCondition			
End – FacilityMonitoringDelivery/FacilityMonitoringPayloadGroup			

8 TfNSW Enumerated Values

Where not specified below, enumerated values should match the international SIRI specification. The use of enumerated values may be further constrained via TfNSW Operator Interface Contracts.

8.1 Direction

TfNSW supports a subset of the standard TransXChange direction enumerations. The acceptable domain of values for TfNSW SIRI is as follows:

Value	Comment
inbound	One of two possible linear directions, e.g. stops are passed in the sequence A to Z. The terms 'inbound' and 'outbound' have no significance except to distinguish between each other.
outbound	The second of two possible linear directions, e.g. stops are passed in the sequence Z to A. The terms 'inbound' and 'outbound' have no significance except to distinguish between each other.
circular	Denotes a circular (or complex) stopping pattern, meaning that stops are revisited (… X, Y, Z, A, B, C …), thus the journeys A to Y, and Y to A, are both possible. TfNSW does not currently distinguish between clockwise and anticlockwise loops.

8.1.1 Occupancy

Predicted occupancy shall be provided by a SIRI ET server for the full trip, and it can be overwritten at the call level.

The values provided by the SIRI specification for occupancy are not sufficiently granular for TfNSW; the SIRI standard Occupancy element is a vehicle-level value, whilst TfNSW requires a carriage-level value, consequently an Occupancy extension has been defined for TfNSW, which is used in ET (EstimatedVehicleJourney) and VM (VehicleActivity); the following table provides the list of possible values to be used in these extended occupancy models.

Table 43 – Predicated occupancy for TfNSW

Value	Comment
EMPTY	The vehicle is considered empty by most measures, has few or no passengers on-board, and is accepting passengers.
MANY_SEATS_AVAILABLE	The vehicle has a large percentage of seats available. What percentage of free seats out of the total seats available is large enough to fall into this category is determined by the producer.
FEW_SEATS_AVAILABLE	The vehicle has a small percentage of seats available. What percentage of free seats out of the total seats available is small enough to fall into this category is determined by the producer.
STANDING_ROOM_ONLY	The vehicle can accommodate only standing passengers.
CRUSHED_STANDING_ROOM_ONLY	The vehicle can accommodate only standing passengers but has limited space for them.
FULL	The vehicle is considered full by most measures but may still be allowing passengers to board.
NOT_ACCEPTING_PASSENGERS	The vehicle is not accepting passengers.
UNKNOWN	The operator does not have capability to provide real-time occupancy data.

The values allowed for the standard (non-extension) Occupancy element are provided by the standard XSD, they are more limited than the above list, however are mandatory and must still be provided to estimate total vehicle occupancy.

8.1.2 Prediction Quality

Every predicted time value for a Call (arrival and departure) must be augmented with a prediction quality level. The prediction quality is represented by the enumerated values below.

Table 44 – Prediction Quality

Prediction Quality Level	Lower bound (1/3)	Upper bound (2/3)	Width of interval
veryReliable	no earlier than 10 seconds	no later than 20 seconds	30 seconds
reliable	between 1 minute 50 seconds early and 10 seconds early	between 3 minutes 40 seconds late and 20 seconds late	5min 30 seconds
probablyReliable	between 13 minutes 20 seconds early and 1 minute 50 seconds late	between 26 minutes 40 seconds late and 3 minutes 40 seconds late	40 minutes
unconfirmed	earlier than 13 minutes 20 seconds	later than 26 minutes 40 seconds	> 40 minutes

At this point in time, prediction quality will remain constant for a journey once it has started.

This may be augmented in future, based on either:

- agreed business rules determined through analysis, transport mode specific, OR
- a returned calculated Prediction Quality level from the TfNSW Operational Data Lake, via an API which will provide the Prediction Quality Level to be used for each Vehicle Journey segment, for each VehicleJourney. This will be calculated using statistical techniques based upon provider-supplied ET, compared with the provider-supplied Actual arrival times, by way of explanation.

8.1.3 Vehicle Status

Vehicle status is required by TfNSW as part of a SIRI VM message, the following values are supported by TfNSW.

VehicleStatus value	Description
atOrigin	Service has arrived at the first stop.
inProgress	Service has departed from the first or later stop.
completed	Journey has been completed
cancelled	A vehicle journey that was scheduled to run has been cancelled.

8.1.4 Severity

Severity is used to classify the priority of a Situation with the default value of "normal". While TfNSW supports all enumerated values from the SIRI SX specification in order to cater for all customer information scenarios, it is important for each Operator to define and implement the Severity value to assign for each Situation. Further guidance may be provided in Operator Interface Contracts. Severity is a mandatory field on all Situations.

Table 45 - SIRI SX Severity Values

Severity Value	TfNSW Description/Usage	Injuries	Fatalities	ScopeType

slight	A Situation where it may impact one particular service of a transport mode.	None	None	vehicleJourney
normal	A Situation where there is very little impact to day to day operations. It may be used for planned events such as road works or routine maintenance where the focus is to communicate the message in advance as opposed to providing an estimate of the Situation impact.	None	None	any
severe	A Situation where it may impact to a particular Route or Line. No injuries or fatalities.	One or more	None	stopPoint / StopPlace route line
verySevere	A Situation where it may impact an entire Network or other transport mode networks. Injuries or fatalities involved	One or more	One or more	network operator

8.1.5 Reality

This defines whether a situation is real or an exercise/test.

Table 46 – SIRI SX Reality Enumerated Values

SIRI-SX	Description
real	Situation is real and is used by all transport stakeholders for communication of every day operational and public messages. This should be the default value.
securityExercise	Situation is a real-world security exercise. This should be used in special situations where a security exercise such as those involving emergency services is involved and can be set on a Situation by Situation basis. Situations with this value should not be disregarded or ignored.
technicalExercise	Situation is a real-world technical exercise. This should be used in special situations such as system testing and can be set on a Situation by Situation basis. Situations with this value should not be disregarded or ignored.
test	Situation is not real and is used for testing purposes. Messages with this value does not have material impact on the running of transport services.

8.1.6 Audience

The Audience value is used to route the Situation message to different recipients of the message. Instead of overloading different fields in the DescriptionGroup, effort should be made to use the Audience to determine who should receive a message. The following values are supported by TfNSW.

Table 47 - SIRI SX Audience enumerated values

SIRI-SX	Description
public	The audience of the message is for transport customers in general. In this case the message should be customer friendly and should not contain any jargon or operational information such as number of injuries or fatalities, as an example. Situations with this audience value can be displayed on any digital channels including, but not limited to, apps, websites, PIDs.
transportOperators	The audience of the message is for operational members of the transport network including, but not limited to, TMC, operators of various modes, TfNSW, etc. Situations with this audience value typically contain operational messages and should not be shown to customers.
stationStaff	Situations with this audience value should only be shown to staff located at stations or any other transit stops.

emergencyServices	This value is kept for future proof purposes. At the time of writing, it is not expected for TfNSW and operators to communicate directly with emergency services through SIRI SX.

8.1.7 StopPointType

The StopPointType should be used to indicate the type of stop point that's affected by a Situation. The following values are supported by TfNSW.

Table 48 - SIRI SX StopPointType enumerated values

SIRI-SX	Description
railPlatform	This should be used by all heavy rail operators referring to platforms.
metroPlatform	This should be used by metro operators referring to platforms.
boatQuay	This should be used by ferry operators referring to ferry berths.
busStop	This should be used by bus operators referring to specific bus stops
tramStop	This should be used by tram operators referring to tram stops.
airlineGate	Equivalent to TPEG pti_17_2 or "Terminal Gate". May be used for airline gate related scenarios in the future
setDownPlace	May be used for "Kiss and Ride" locations in the future
taxiStand	May be used for taxi stands locations in the future

8.1.8 AffectedModes

In addition to a StopPointType, it is possible to specify the particular mode of transport that's been affected at a stop point. The AffectedModes are further divided into SubModes and these can be mapped directly back to the mode of transport, similar to StopPointType.

Table 49 - SIRI SX AffectedModes enumerated values

SIRI-SX AffectedModes Submodes	Values within the Submode	Description
BusSubmode	bus, nightBus, shuttlebus, schoolBus, railReplacementBus	These can be used by operators in relation to a stop point that has bus services.
MetroSubmode	metro	This can be used by operators in relation to a stop point that has metro services.
RailSubmode	regionalRail, replacementRailService, suburbanRailway, allRailServices	These can be used by operators in relation to a stop point that has heavy rail services.
TramSubmode	cityTram, localTramService, allTramServices	These can be used by operators in relation to a stop point that has light rail services.
WaterSubmode	internationalCarFerryService, nationalCarFerryService, internationalPassengerFerry, nationalPassengerFerry, localPassengerFerry, allWaterTransportServices	These can be used by operators in relation to a stop point that has ferry services such as a wharf.

8.1.9 Service Condition

The Service Condition is used in the Consequence block to indicate how the Situation has affected the normal operation of a transport mode.

Table 50 - SIRI SX Service Condition enumerated values

SIRI-SX	Description
unknown	When the service condition is not known.
disrupted	When the service has been otherwise reduced due to disruption.
delayed	When a service has been delayed but the pattern otherwise remains unchanged. The length of the delay should be indicated using the DelayBand value.
cancelled	When a service has been cancelled and will not be running at all.
diverted	When a service has been changed and the end point (destination) is different from the timetabled service
altered	When the service is altered from the timetabled service, such as change in pattern or timings - but the end point (destination) is unchanged. Examples of this may be when bus or train stopping patterns are changed or when the running of the service is modified.
additionalService	Used to identify an additional service, such as extra capacity added to a route.
specialService	When services are added in special situations such as event buses.
normalService	Used to identify a normal/typical service. This may be used after a Situation has occurred and services are resuming to normal operations.
shortFormedService	Should be used in situations where only part of the service will be effective in transporting customers. Such a situation will be when only the last six cars of a total of an eight car train can pick up/drop-off customers at Helensburgh train station on the South Coast Line of Sydney Trains.
splittingTrain	Used for dividing and amalgamating services. This currently only applies to trains and trams such as the South Coast Line of Sydney Trains.
replacementService	When additional transport services are used to replace existing modes of transport. This may be used in the case of buses replacing trains in emergency breakdowns.

8.1.10 Likelihood

Likelihood ascribes a certainty level to a future event.

SIRI-SX	Description
certain	Event will definitely happen.
probably	Event is likely/very likely.
riskOf	There is a risk of the even occurring.

9 Technical Considerations

9.1 Transport of SIRI Messages

What is it about? A SIRI payload can be delivered via different transport protocols, one of which has to be chosen.

What does the SIRI Spec say?

The normal way of exchanging SIRI XML messages is via HTTP using the POST method, with an XML document containing the SIRI encoded message as a simple attachment. Messages may also be exchanged by other means, for example within a SOAP envelope. (CEN TS 15531-2, S.66)

What does that mean? SIRI allows for different methods of message transport.

The options are:

- **HttpPost**: SIRI messages are XML encoded and exchanged using HTTP/POST: This is the "normal way" of exchanging SIRI messages.
- **SoapEnvelope**: Messages are wrapped within SOAP envelopes and exchanged using HTTP/SOAP. The binding to the remote objects is usually done by tools automatically. There are different binding styles that can be used which leads to different variants of the SIRI SoapEnvelope transport method

> At TfNSW, HttpPost is used.

9.2 Endpoint addressing: SYNC vs ASYNC

What is it about?

- **SYNC:** when using synchronous http-calls, the sender waits after sending the http-request for the http-response using the same socket.
- **ASYNC:** when using asynchronous http-calls, an http-request is sent and immediately answered by an http-response with empty body. The actual SIRI-response is sent to a predefined or explicitly specified call-back address using a separate http-request.

Message transfer between systems requires knowledge of endpoint addresses. These can be specified in different ways. Systems have to agree in advance which possibilities to use.

What does the SIRI Spec say? *SIRI allows two different capability levels for endpoint addressing:*

- *Implicit Addressing – the endpoint addresses are not exchanged within the SIRI API. The initial endpoint addresses of the service are supplied as part of the configuration. The return address to which the Functional Service should send responses is taken from the http request, i.e. is bound into the transport protocol. Both responses and subscriptions are sent to the same address of the requestor.*
- *Explicit Addressing – return addresses may be specified as part of the request, allowing protocol independent access to the full endpoint properties. If desired, different addresses can be specified for both Consumer and Subscriber. The Functional Service address can be returned by the Universal Discovery Service.* (CEN TS 15531-2, S.66)

What does that mean? The SIRI specification offers broad flexibility concerning endpoint addresses, especially the addresses of the Consumer address to which the Provider has to send the SIRI response and the data deliveries:

1. Return addresses may be taken from the http request. Http requests actually do not carry any return addresses but the underlying TCP/IP packets do.
2. Return addresses may be preconfigured
3. Return addresses may be specified as part of the request
4. A different "Consumer Address" may be specified (The Provider has to determine the address for the response by (1)-(3) but has to deliver the data to this "Consumer Address".
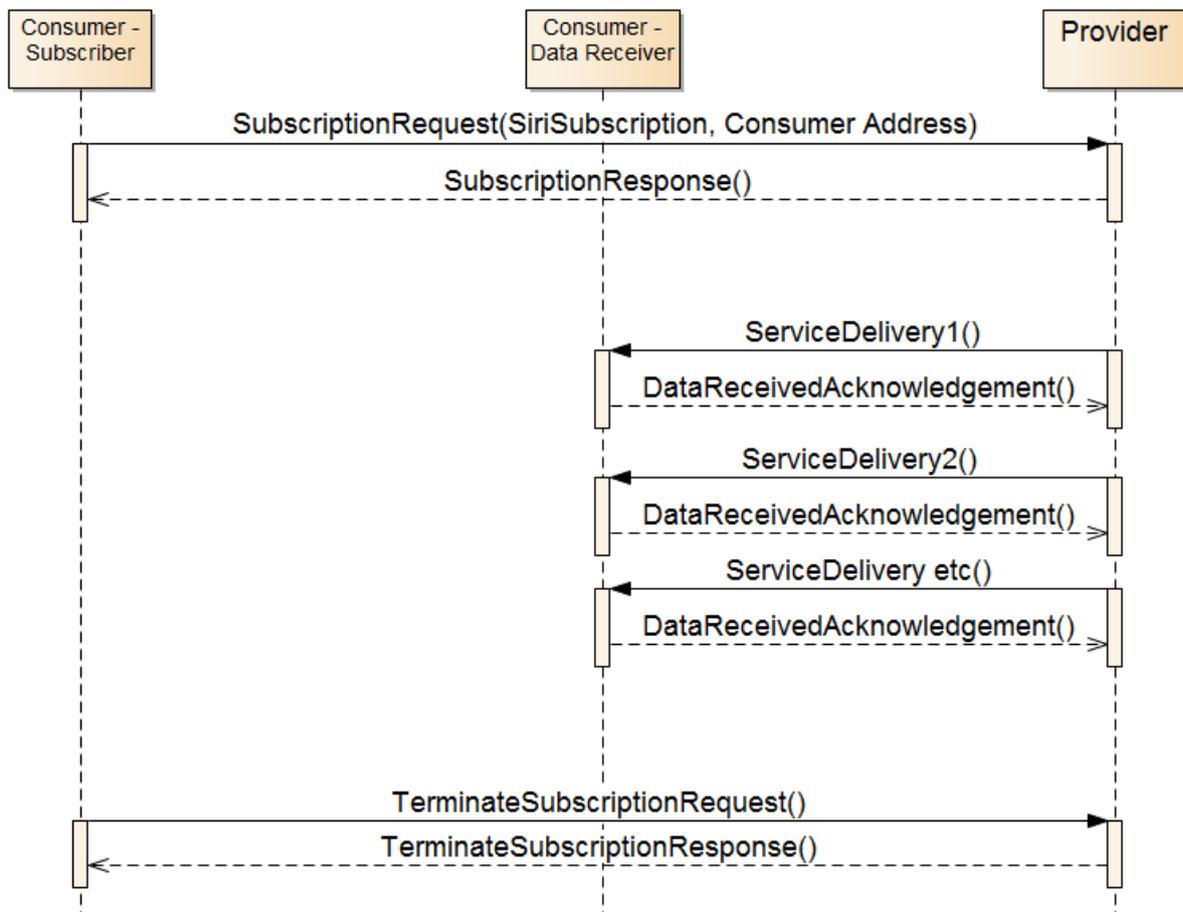
Figure 11: Publish/Subscribe for a single subscription with Subscriber different from Consumer

Note: All sequence diagrams display endpoint addressing with SYNC.

At TfNSW, SYNC is used, but additionally it is allowed to specify a different consumer address in subscription requests. That leads to the following rules concerning endpoint addressing:

- (mandatory) Predefine http endpoint addresses of the Provider for the following SIRI requests: *CheckStatusRequest*, *SubscriptionRequest*, *TerminateSubscriptionRequest*.
- (mandatory) Use a synchronous http response as a container for the following responses: *CheckStatusResponse*, *SubscriptionResponse*, *TerminateSubscriptionResponse*, *DataReceivedAcknowledgement*.
- (mandatory) Predefine http endpoint addresses of the Consumers for the following SIRI requests: *CheckStatusRequest*, *ServiceDelivery*.
- (optional) Use "Consumer Address" specified in SubscriptionRequest for ServiceDeliveries.

9.3 Recovery Considerations

What is it about? If a system stops working, other systems involved in the SIRI-communication need to become aware, this means there has to be a systematic way to restart communication.

What does the SIRI Spec say?

> *Publish/Subscribe is a stateful pattern of interaction, and consideration shall be given to failure of either the Notification Producer, or Consumer systems, or to the communications connection between them. Once created, subscriptions are held by the Notification Producer. In the event of a system failure by the Notification Producer service, SIRI does not require the Notification Producer to recover the subscriptions. Instead it is the responsibility of the Subscriber to recreate new subscriptions to replace the existing ones lost in the failure. Each Consumer knows the Subscriber which submitted its subscriptions (usually these will be the same implementation entity). It is then the Consumer's responsibility to monitor whether the Notification Producer Service and the connection to it are still active, and to inform the Subscriber if the Subscription needs to be renewed. SIRI supports two ways of monitoring the*

Notification Producer (i) Status Polling (a required SIRI capability), and (ii) Heartbeat (an optional SIRI capability, mandatory for TfNSW implementation). (CEN TS 15531-2, S.20f)

What does that mean? When a Consumer has set up one or more subscriptions, they wait for data deliveries. In the case that they do not receive new data deliveries, they cannot decide if this is because the Provider does not have new data or if there is a different reason that might require a re-creation of the subscription(s). Possible other reasons are:

1. The Provider is not available any more (e.g. the Server host is switched off)
2. The Provider lost the subscription (e.g. after reboot)
3. The Server is not able to reach the Consumer

SIRI offers two options for the Consumer to monitor the status of the Provider which enables the Consumer to detect most of these cases: Status Polling and Heartbeat.

- **Status Polling:** The Consumer may send a CheckStatusRequest which is responded with a CheckStatusResponse. The CheckStatusResponse includes a "Status" attribute and a "ServiceStartedTime". This enables the Consumer to detect most cases of (1) and (2) e.g. if the ServiceStartedTime changes to a time after the subscription set up time, the Consumer has to assume that the subscription is lost and has to set up a new one. In this case, the old subscription does not exist on the Provider anymore. All real-time data provided with the old subscription shall be deleted and the Consumer has to go back to scheduled information.
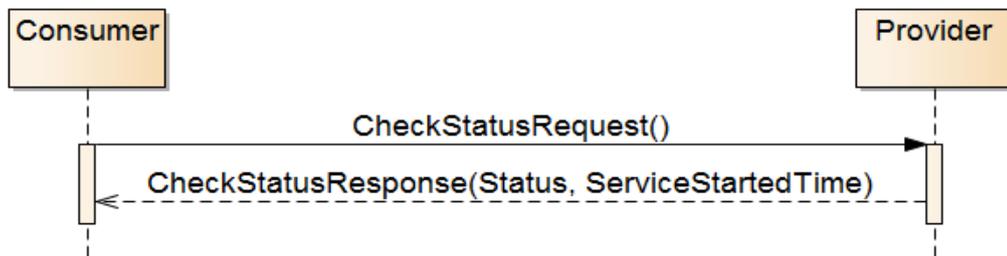

Figure 12: Status Polling with CheckStatusRequest

- **Heartbeat:** The Provider may send a HeartbeatNotification request to the Consumer in regular intervals. The Heartbeat also includes "Status" and "ServiceStartedTime". If the Consumer does not receive any Heartbeats within a predefined interval of one minute, cases (1) or (3) might be the reason. On the Consumer side, this would mean that the Consumer has to react to such a Heartbeat Notification in order to prevent timeouts on the Provider side.
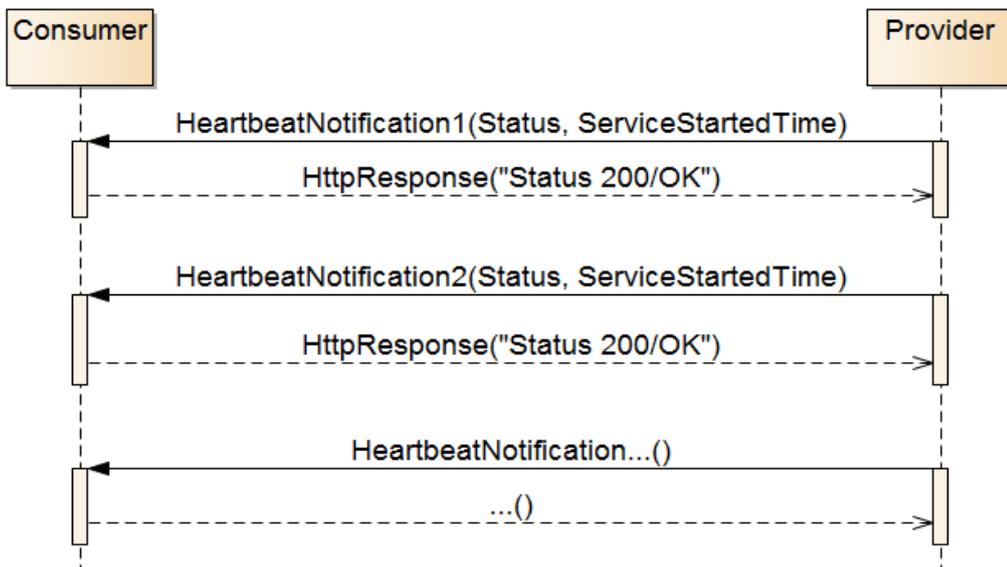

Figure 13: Heartbeat Notification

At TfNSW, CheckStatusRequests are mandatory, whereas HeartbeatRequests may optionally be implemented in addition to CheckStatusRequests.

Response to Heartbeat Notification: Heartbeat notifications should be answered with Http Status Code 200 - "OK". If the SIRI client does not send a HTTP 200 response code the SIRI server has to assume that the client is down or having troubles. The SIRI server shall delete the subscription.

9.4 Delivery in Multiple Parts

What is it about? SIRI allows different techniques to deliver large amount of data.

What does the SIRI Spec say?

If the amount of data to be delivered is large, some implementations allow the Producer to break the data supply step up into multiple messages, which the Consumer can then assemble into a single update (...).

What does that mean? MultipartDispatch is reasonable if systems are setup in a way that messages sizes are limited (e.g. through a firewall) or if the SIRI server cannot create all the message at once due to memory limitations etc.

Implementing MultipartDispatch adds complexity to operations because additional error situations can occur.

At TfNSW, SIRI messages shall not be sent as multipart messages. MultipartDispatch is not supported.

9.5 Delegated Delivery

What is it about? SIRI can be used with direct connections between two parties (supplier and consumer) and with one or more real-time data exchanges, managing connections. Real-time exchange delivery information will:

1. be stored in the configuration of the real-time data exchange(s), this implies the data exchange does not run in a stateless fashion; or
2. received within the message.

What does the SIRI Spec say?

Some configurations wish to proxy client requests from a SIRI consumer via an intermediate aggregating system, using SIRI messages both between (i) the client consumer and aggregator (as producer), and (ii) the aggregator (as consumer) and the actual back end producer service. To facilitate this SIRI requests and responses may be tagged with a DelegatorAddress and a DelegatorRef. These provide tracking information relating to the original requestor that can be echoed back in service responses and used to delegate messages back to the original requestor. This allows the aggregation itself to be stateless.

Delegation may give rise to additional error conditions.

What does that mean? SIRI 2.0 introduces the concept of delegation to cater for stateless data exchanges. The specification only caters for one data exchange in the message data flow. It is not possible to have multiple data exchanges.

SIRI delegation will not be supported. This implies that a SIRI delegator that is handling multiple subscriptions shall run in a stateful way.

9.6 Time Synchronisation

For implementing SIRI and understanding the payload it is important to make sure that all parties share the same current time.

SIRI implementers shall comply with the TfNSW Time Synchronisation standard:

T MU TE 61007 ST Time Synchronisation of Industrial Automation and Control Systems (pdf 156KB) 1.0 28/04/2017.

TfNSW SIRI implementers within Amazon Web Services, for example, must synchronise with the AWS Network Time Protocol (NTP) server pool 'n.amazon.pool.ntp.org'.

Please be aware that syncing the current time with a time server needs to take the deviation of the current time on the server into account. It might be necessary to sync with the time server once every hour or more often. This is a common issue to be solved on servers.

9.7 Time Zones

SIRI in TfNSW will be used in different time zone. The SIRI specification Part 1, 5.2 specifies how to use date and time format:

All timestamps are stated in UTC (Coordinated Universal Time). The use of UTC avoids problems with changeover between summer and winter time zones. Differences from the UTC time zone are coded in accordance with ISO 8601 (e.g.: 2000-04-07T18:39:00+01:00).

In accordance with ISO 8601, if no time difference is given, the time is in UTC; this may be further indicated by the presence of a Z suffix (2002-04-30T12:00:00 corresponds to 2002-04-30T12:00:00Z). In other words, the first 19 characters are obligatory and correspond to local time or UTC.

Time units less than one second are ignored.

<ExpectedDepartureTime>2001-12-17T09:30:47-11:00</ExpectedDepartureTime

9.8 IP Address, Ports, Name Resolution, DNS

A server that provides multiple SIRI services can either:

- have a dedicated IP (address / port) for each service; or
- provide one IP (address / port) for multiple SIRI services and parse each message to identify the service from the first blocks of the payload of the message.

It shall be transparent to the other SIRI party with either of the two approaches to be used.

TfNSW SIRI implementations can use either dedicated ports or IP addresses to provide their SIRI implementation.

DNS names are required for all SIRI implementations in the TfNSW network. The DNS name has to be an officially registered DNS name, which can be resolved by all publicly available DNS servers.

IP addresses are not used in SIRI 2.0-TfNSW

9.9 Request Timeouts

Processing SIRI messages can take some time. It is therefore important to make sure that timeout values are set high enough for all systems in the message chain. This includes the SIRI server, SIRI client and all active network components like firewalls, load balancers, switches etc.

The minimum timeout value to be configured for all components is 300 seconds.

This implies that a SIRI client shall be able to process the SIRI message within the 300 seconds to send the acknowledge message.

9.10 Multiple Subscriptions

Servers implementing SIRI in TfNSW should be implemented to handle a dynamic number of subscriptions.

Note: At the time of writing this document it is not possible to define maximum numbers of parallel subscriptions.

Systems should be designed to be scalable as the number of parallel subscriptions may increase.

9.11 One Trip per Message vs Multiple Trips per Message

The SIRI standards allow information on multiple trips to be provided in a single message. All SIRI servers in TfNSW should use this feature as long as there is minimal delay for providing information for a single trip

Note: Additional delay can happen, for example, if a server is implemented in a way that it only sends a message if there is updated real-time information for at least N (> 1) trips available. If there is real-time information for only N-1 (or less) trips available the server has to wait for further real-time information. The impact is a delay in providing real-time information for the N-1 (or less) trips.

Providing real-time information for multiple trips in a single message reduces the message overhead and simplifies implementation on client side.

Systems should use the possibility to provide information about multiple trips in a single message in order to reduce message overhead. Nevertheless, regularly updated information should be given priority over buffering information in order to reduce the number of messages sent.

10 Error Handling

The SIRI Error handling is part of the SIRI protocol. Any occurring errors are well defined in the field ErrorCondition of each message. It is up to the SIRI Server / Client sending a message to make sure any occurring errors are well coded in the message. See Chapter 5.7 of Part 2 of the SIRI Specification on further details of error conditions.

Using the field ErrorCondition is mandatory for all errors within all SIRI implementations of TfNSW.

Note that in this specification mandatory elements mean that not only should the element be present, it should be populated with a non-blank data item.

10.1 Http response codes

A successful request will result in a response http code 200.

Invalid requests will be responded to by either 400 InvalidRequest or 404 NotFound.

10.2 Subscription request errors

The subscriptionResponse message contains an error element. If the subscription fails ten this error element must be populated with the failure reason, either NoInfoForTopicError or otherError.

10.3 Subscription terminate errors

The below response is from a subscription terminate request that the producer has no knowledge about.

<TerminateSubscriptionResponse>

<ResponseTimestamp>2004-12-17T09:30:47-05:00</ResponseTimestamp>

<ResponderRef>NT</ResponderRef>

<RequestMessageRef>56d88791-17a9-4fc0-aef8-0e6b8b945938</RequestMessageRef>

<TerminationResponseStatus>

<ResponseTimestamp>2004-12-17T09:30:47-05:00</ResponseTimestamp>

<SubscriberRef>TFNSW</SubscriberRef>

<SubscriptionRef>0000457</SubscriptionRef>

<Status>false</Status>

<ErrorCondition>

<**UnknownSubscriptionError**/>

</ErrorCondition>

</TerminationResponseStatus>

</TerminateSubscriptionResponse>

10.4 Data Delivery errors

The following can be populated in the errorCondition element of a DataReceivedAcknowledgement message. Specific details will be provided in interface contracts.

XSD validation errors

These will be included as text in the errorCondition element of a DataReceivedAcknowledgement message, e.g.:

<ErrorCondition>

<Missing EstimatedTimetableDelivery.SubscriptionRef>

</ErrorCondition>

UnknownExtensions

Request contained extensions that were not supported by the producer. A response has been provided but some or all extensions have been ignored.

NotFound

The delivery has posted to a URL that was not found.

InvalidRequest 400

This is returned to the client if the XML fails to validate against SIRI XSD.

10.5 Access errors

The following may be returned from a request to the broker if the client application is not authorised. More details will be found in the interface specifications.

AccessNotAllowed,

Unauthorized,

UnapprovedKey

10.6 Undefined error

Error 500 can be returned on occasion, if there is something really wrong with the server. This caters for things like "out of resources in the OS", "TCP stack issue" and so on.

End of Document

Reference material – for information only