Transport for NSW

GTFS & GTFS R - TfNSW Implementation Specification

Using GTFS & GTFS R at TfNSW

***Version**: 1.0*

Confidentiality

This document is copyright of Transport for NSW, and is intended for internal use only. This document may contain information of a commercially sensitive nature and should not be made available to any individual or organisation outside of Transport for NSW without the written authority of the Director & Group Chief Information Officer.

Date:	25 June 2019
Version:	1.0
Reference:	
Division:	Customer Services Division
Review date:	

Contents

Document Control

Revision History

Version	Author	Issue Date	Changes
0.6	Donald Garlick	31 October 2017	Initial draft
0.7	Beth Beveridge	15 Aug 2018	Edits to clarify cancelled trip handling & other minor changes based on GTFS working group feedback.
1.0	Beth Beveridge David Ling	25 June 2019	Add in scenarios and business rules. Add sample GTFS/GTFS-R messages to demonstrate scenarios Promoting to major version 1.0

Distribution List

Name	Title	Business Unit	Responsibility
Beth Beveridge	Customer Information Data Manager	Customer Services Division	
David Phillips	Manager, App Portfolio Products	Customer Services Division	App product and Open Data
Additional distribution to be confirmed	GTFS/R working groups		

References

Document Name	Network Location or Documentation Link
GTFS Developers guide	https://developers.google.com/transit/gtfs/

Signatories

Name	Title	Signature	Date
Beth Beveridge	Customer Information Data Manager		
Additional signatories to be confirmed			

1   Overview

1.1   Overview

The GTFS (general transit feed specification) feed provides static timetabling information about a transit network, including stops, routes, trip schedules and other information like a trip's geometry and information about the transit agency running the trips. This data is suitable for planning trips as well as presenting trip information to a customer via a graphical user interface. The feed also contains real time information about the transit network, including which trips are currently running on the network, the position of each of the vehicles completing the trips, which of the scheduled stops have been made, the difference between the scheduled and actual departure times as well as the actual and scheduled arrival times.

The GTFS bundle feed is composed of a number of CSV files which are all contained within a single zip file. Each of the files contains scheduled information about a different aspect of the NSW trains transit network. For example stops_times.txt contains information about the scheduled time and order of stops for different trips.

This document specifies the files which are included in the GTFS bundle feed as well as the GTFS real-time feed. Each of the fields in the files are also documented and their meanings are explained.

The bundle and real time components of the feed both conform to the GTFS. There are some fields which are not requirements of the specification but are permissible extensions.

The GTFS real time portion of the feed has two component files a trip update file and a vehicle position file. Both files are protocol buffers. Protocol buffers are a mechanism developed by google for serialising data. Both protocol buffers contain trip descriptors which specify the scheduled trips that are running and are detailed with real time information.

The trip update file provides information about which stops have been completed by the running trip. It also contains information about the deviation between the actual arrival and scheduled arrival times as well as the actual and scheduled departure times for each of the stops.

The vehicle position file contains positional information for each of the currently running trips. The positional information includes a longitude, latitude and bearing.

1.2   Why a TfNSW GTFS and GTFS R Implementation Specification is Needed

The TfNSW GTFS and GTFS R Implementation Specification is required to:
1. Localise the GTFS and GTFS R specification to TfNSW needs
2. Reduce the complexity and risk of implementation e.g. If there are multiple ways of doing the same thing then this specification 'localises' each implementation to a single way, based on best practise, communications and processing efficiency, and requirements.
3. Ensure consistent interpretation of the GTFS and GTFS R specification
4. Describe relevant TfNSW business rules that are necessarily absent from the GTFS and GTFS R specification
5. Define GTFS and GTFS R information sharing rules
6. Define common terminology.

1.3   Data Feed Distribution and Access

The GTFS and GTFS R feed data will be distributed to TfNSW Customers and the wider community via the TfNSW OpenData program website.

Subscribers to the GTFS and GTFS R feed via TfNSW OpenData program will accessed the feed by sending a HTTP GET request to the appropriate URL. The appropriate URL depends on which of GTFS files need to be accessed.

These URLs and associated accounts can be provided via registration to the Transport for NSW Open Data program

https://opendata.transport.nsw.gov.au/site/en_us/home.html

2 Timetable Data Feed – General Requirements

2.1 Scope

- Data providers are to provide timetable data for all services to TfNSW **21 days in advance of a change**. This includes major and minor updates to service timetables.
- GTFS data provisioned to TfNSW must adhere to specific standards and business rules (as detailed in this document) to ensure the required level of data richness and consistency is delivered to downstream systems (e.g. the Transport.info website, mobile and web applications).

2.2 Files

- Timetable data is to be provided to TfNSW in accordance with the **General Transit Feed Specification (GTFS)** standards as well as the TfNSW specific business rules detailed in this document. For published GTFS standards refer to the reference guide available at https://developers.google.com/transit/gtfs/reference.
- GTFS file-set bundle requirements:
    - A GTFS feed is to be provided by in the form of a single file set bundle in .zip format.
    - The zip file is to be named in the format **"<Provider>_GTFS_<date/time of file generation in YYYYMMDDHHMMSS>"** e.g. **"NSWTrains_GTFS_20150813094500.zip".**

    Note, this is not an exhaustive list and the following is provided as an example. Specific details of the GTFS bundle to be provided is set out in the provider's Interface Contract with TfNSW.

Data Provider	File Naming
City Ferries	SydneyFerries_GTFS_YYYYMMDDHHMMSS.zip
Light Rail	IWLR_GTFS_YYYYMMDDHHMMSS.zip Newcastle_GTFS_YYYYMMDDHHMMSS.zip SydneyLightRail_GTFS_YYYYMMDDHHMMSS.zip
Major Event Buses	MajorEvent_GTFS_YYYYMMDDHHMMSS.zip
Nightride Buses	Nightride_GTFS_YYYMMDDHHMMSS.zip
NSW Trains	nswtrains_GTFS_YYYYMMDDHHMMSS.zip
Sydney Trains	SydneyTrains_GTFS_YYYYMMDDHHMMSS.zip
Bus Operators (SMBSC, OSMBSC,NISC)	BUS_GTFS_YYYYMMDDHHMMSS.zip (full global file) SMBSC001_GTFS_YYYYMMDDHHMMSS.zip (for each contract)

Regional Bus Operators	FarWest_GTFS_YYYYMMDDHHMMSS.zip (Region file)
Sydney Metro North West	SydneyMetro_GTFS_YYYYMMDDHHMMSS.zip

- o The zip file must not exceed 20mb in size.
- o The .zip file must contain the following files and named as follows:

Filename	Required by TfNSW	Defines
agency.txt	**Yes**	One or more transit agencies that provide the data in this feed.
stops.txt	**Yes**	Individual locations where vehicles pick up or drop off passengers.
routes.txt	**Yes**	Transit routes. A route is a group of trips that are displayed to riders as a single service.
trips.txt	**Yes**	Trips for each route. A trip is a sequence of two or more stops that occurs at specific time.
stop_times.txt	**Yes**	Times that a vehicle arrives at and departs from individual stops for each trip.
calendar.txt	**Yes**	Dates for service IDs using a weekly schedule. Specify when service starts and ends, as well as days of the week where service is available.
calendar_dates.txt	**Yes**	Exceptions for the service IDs defined in the calendar.txt file. If calendar_dates.txt includes ALL dates of service, this file may be specified instead of calendar.txt.
shapes.txt	**Yes**	Rules for drawing lines on a map to represent a transit organization's routes.
notes.txt	**Yes**	**TfNSW Extension** to the GTFS standard used for providing descriptive information about trips and stops.
fare_attributes.txt	**No**	Fare information for a transit organization's routes.
fare_rules.txt	**No**	Rules for applying fare information for a transit organization's routes.
frequencies.txt	**No**	Headway (time between trips) for routes with variable frequency of service.
transfers.txt	**No**	Rules for making connections at transfer points between

		routes.
feed_info.txt	**No**	Additional information about the feed itself, including publisher, version, and expiration information.

2.3   General file standards

- All values contained in files within the GTFS bundle must be surrounded by double quotations i.e. **"<data>"**. This includes null or empty values e.g. **""**

2.4   Validity period and timetable projection

- Service timetables must be forward looking by a minimum **100 days in advance**.
- Timetable projections are to be defined by utilising the **calendar.txt** (Section 3.4) and **calendar_dates.txt** (Section3.5) files.

3 Timetable Data Feed – File and Field Specific Requirements

3.1 Agency.txt

The Agency file identifies all providers whose timetable data has been included in the GTFS file-set generated.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **agency.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
agency_id	**Yes**	The **agency_id** field is an ID that uniquely identifies a transit agency. A transit feed may represent data from more than one agency. The agency_id is dataset unique. This field is mandatory and must be populated for transit feeds	• This is the operator's agency id, allocated by TfNSW. • For Example: "LR". Refer to Appendix for list of Assigned Agencies.
agency_name	**Yes**	The **agency_name** field contains the full name of the transit agency. Google Maps will display this name.	• The Operator's 'Customer Facing Name'. Note that this is not necessarily the same as the legal entity name. Refer to the **Appendix** for approved agency names. • Must be formatted in TITLE CAPS. • For Example: "Sydney Metro". Refer to Appendix for list of Assigned Agencies.
agency_url	**Yes**	The **agency_url** field contains the URL of the transit agency. The value must be a fully qualified URL that includes http:// or https://, and any special characters in the URL must be correctly escaped. See http://www.w3.org/Addressing/URL/4_URI_Recommentations.html for a description of how to create fully qualified URL values.	• Must always be a fixed static value of **"http://transportnsw.info"** • Must be formatted in LOWERCASE

Field	Required	Description	Notes
agency_time zone	**Yes**	The **agency_timezone** field contains the timezone where the transit agency is located. Timezone names never contain the space character but may contain an underscore. Please refer tohttp://en.wikipedia.org/wiki/List_of_tz_zones for a list of valid values. If multiple agencies are specified in the feed, each must have the same agency_timezone.	• Must always be a fixed static value of **"Australia/Sydney"** • Must be formatted in TITLE CAPS.
agency_lang	**Yes**	The **agency_lang** field contains a two-letter ISO 639-1 code for the primary language used by this transit agency. The language code is case-insensitive (both en and EN are accepted). This setting defines capitalization rules and other language-specific settings for all text contained in this transit agency's feed. Please refer to http://www.loc.gov/standards/iso639-2/php/code_list.php for a list of valid values.	• Must always be a fixed static value of **"EN"** • Must be formatted in TITLE CAPS.
agency_pho ne	**Yes**	The **agency_phone** field contains a single voice telephone number for the specified agency. This field is a string value that presents the telephone number as typical for the agency's service area. It can and should contain punctuation marks to group the digits of the number. Dialable text (for example, TriMet's "503-238-RIDE") is permitted, but the field must not contain any other descriptive text.	• Must always be a fixed static value of "**131500**"
agency_fare _url	**No**	The **agency_fare_url** specifies the URL of a web page that allows a rider to purchase tickets or other fare instruments for that agency online. The value must be a fully qualified URL that includes http:// orhttps://, and any special characters in the URL must be correctly escaped. Seehttp://www.w3.org/Addressing/URL/4_URI_Recommentati ons.html for a description of how to create fully qualified URL values.	
agency_ema il	**No**	The **agency_email** field contains a single valid email address actively monitored by the agency's customer service department. This email address will be considered a direct contact point where transit riders can reach a customer service representative at the agency.	

3.2   Routes.txt

The Routes file identifies all the routes for a single contract included in the GTFS file-set generated.

The data provided must reflect a customer view of the timetable, with the grouping of trips in logical routes. It must reflect a customer journey and not split trips at non-revenue stops or city circle loop.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **routes.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
route_id		The **route_id** field contains an ID that uniquely identifies a route. The route_id is dataset unique.	• Unique identifier for a route independently generated by the data provider • The route_id is to be unique within the GTFS file set provided. • For Example: *no example – system generated*
agency_id	**Yes**	The **agency_id** field defines an agency for the specified route. This value is referenced from the agency.txt file. Use this field when you are providing data for routes from more than one agency.	• This is the operator's agency id, allocated by TfNSW. • For Example: "LR"

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
route_short_name	**Yes**	The **route_short_name** contains the short name of a route. This will often be a short, abstract identifier like "32", "100X", or "Green" that riders use to identify a route, but which doesn't give any indication of what places the route serves. At least one of route_short_name or route_long_name must be specified, or potentially both if appropriate. If the route does not have a short name, please specify a route_long_name and use an empty string as the value for this field.	• The short code identifying the Route to the public. Refer to Appendix for approved route short names. • This field is CASE SENSITIVE • For Example: "L1" • Should be no longer than 4-characters • Must be registered in Route Services • Refer to TfNSW Wayfinding Route Numbering & Naming Standard
route_long_name	**Yes**	The **route_long_name** contains the full name of a route. This name is generally more descriptive than the route_short_name and will often include the route's destination or stop. At least one of route_short_name or route_long_name must be specified, or potentially both if appropriate. If the route does not have a long name, please specify a route_short_name and use an empty string as the value for this field.	• The long name identifying the Route to the public. Refer to **Appendix** for approved route long names. • This field is CASE SENSITIVE • For Example: "Dulwich Hill Line" • Must be registered in Route Services • Refer to TfNSW Wayfinding Route Numbering & Naming Standard
route_desc	**Yes**	The **route_desc** field contains a description of a route. Please provide useful, quality information. Do not simply duplicate the name of the route. For example, "A trains operate between Inwood-207 St, Manhattan and Far Rockaway-Mott Avenue, Queens at all times. Also from about 6AM until about midnight, additional A trains operate between Inwood-207 St and Lefferts Boulevard (trains typically alternate between Lefferts Blvd and Far Rockaway)."	• Indicates the Network that the Route belongs to as defined by TfNSW Wayfinding. Refer to Appendix for approved network names. • For Example: "Sydney Light Rail Network" • Must be registered in TfNSW Route Services

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
route_type	**Yes**	The **route_type** field describes the type of transportation used on a route. Valid values for this field are: 0 - Tram, Streetcar, Light rail. Any light rail or street level system within a metropolitan area. 1 - Subway, Metro. Any underground rail system within a metropolitan area. 2 - Rail. Used for intercity or long-distance travel. 3 - Bus. Used for short- and long-distance bus routes. 4 - Ferry. Used for short- and long-distance boat service. 5 - Cable car. Used for street-level cable cars where the cable runs beneath the car. 6 - Gondola, Suspended cable car. Typically used for aerial cable cars where the car is suspended from the cable. 7 - Funicular. Any rail system designed for steep inclines.	• Route type is defined by TfNSW Wayfinding. Refer to **Appendix** for approved route types. • For Example: **"1"**
route_color	**Yes**	In systems that have colors assigned to routes, the route_color field defines a color that corresponds to a route. The color must be provided as a six-character hexadecimal number, for example, 00FFFF. If no color is specified, the default route color is white (FFFFFF). The color difference between route_color and route_text_color should provide sufficient contrast when viewed on a black and white screen. The W3C Techniques for Accessibility Evaluation And Repair Tools document offers a useful algorithm for evaluating color contrast. There are also helpful online tools for choosing contrasting colors, including the snook.ca Color Contrast Check application.	• Must always be a fixed static value of **"EE343F"** • Must use the TfNSW approved colours see Appendix for TfNSW approved colours

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
route_text_color	**Yes**	The route_text_color field can be used to specify a legible color to use for text drawn against a background of route_color. The color must be provided as a six-character hexadecimal number, for example, FFD700. If no color is specified, the default text color is black (000000). The color difference between route_color and route_text_color should provide sufficient contrast when viewed on a black and white screen.	• Must always be a fixed static value of **"FFFFFF"**
route_url	**No**	The route_url field contains the URL of a web page about that particular route. This should be different from the agency_url. The value must be a fully qualified URL that includes http:// or https://, and any special characters in the URL must be correctly escaped. Seehttp://www.w3.org/Addressing/URL/4_URI_Recommentations.html for a description of how to create fully qualified URL values.	• Where provided, this should refer to the TfNSW website and/or designated /URL and not that of the operator

3.3   Trips.txt

The Trips file provides information on all the trips for a contract whose timetable data has been included in the GTFS file-set generated.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **trips.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
route_id	**Yes**	The **route_id** field contains an ID that uniquely identifies a route. This value is referenced from the routes.txt file.	• Unique identifier for a route independently generated by Data Provider. • For Example: *no example – system generated*
service_id	**Yes**	The **service_id** contains an ID that uniquely identifies a set of dates when service is available for one or more routes. This value is referenced from the calendar.txt or calendar_dates.txt file.	• Unique identifier for a route independently generated by Data Provider that identifies a set of dates when a service is available for one or more routes. • For Example: *no example – system generated*
trip_id	**Yes**	The **trip_id** field contains an ID that identifies a trip. The trip_id is dataset unique.	• Unique identifier for a trip independently generated by Data Provider. • The trip_id is to be unique within the GTFS file set provided. • trip_id is the primary reference identifier for matching static timetables with real time data feeds (GTFS-R) • For Example: *no example – system generated*
trip_headsign	**Yes**	The **trip_headsign** field contains the text that appears on a sign that identifies the trip's destination to passengers. Use this field to distinguish between different patterns of service in the same route. If the headsign changes during a trip, you can override the trip_headsign by specifying values for the stop_headsign field in stop_times.txt.	• The trip_headsign field is to contain the text that appears on a sign that identifies the trip's destination to passengers. • The destination stop for the strip is to be applied • For Example: **"Central Station"**

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
trip_short_name	No	The **trip_short_name** field contains the text that appears in schedules and sign boards to identify the trip to passengers, for example, to identify train numbers for commuter rail trips. If riders do not commonly rely on trip names, please leave this field blank. A trip_short_name value, if provided, should uniquely identify a trip within a service day; it should not be used for destination names or limited/express designations.	• The trip_short_name is the service number • For Example: "L1"

direction_id	Yes	The **direction_id** field contains a binary value that indicates the direction of travel for a trip. Use this field to distinguish between bi-directional trips with the same route_id. This field is not used in routing; it provides a way to separate trips by direction when publishing time tables. You can specify names for each direction with the trip_headsign field.
		
		• 0 - travel in one direction (e.g. outbound travel)
		• 1 - travel in the opposite direction (e.g. inbound travel)
		
		For example, you could use the trip_headsign and direction_id fields together to assign a name to travel in each direction for a set of trips. A trips.txt file could contain these rows for use in time tables:
		
		trip_id,...,trip_headsign,direction_id
		1234,...,to Airport,0
		1505,...,to Downtown,1
			• Indicates the direction (outgoing, inbound) of the Trip.
			• 'Loop' services will be indicated as '1 – Inbound' so the possible values will be:
			  ○ 1 – Inbound
			  ○ 0 – Outbound
			  ○ 1 – Loop (becomes Inbound)
			• Trip stopping pattern direction Id should be different to the stopping pattern in the opposite direction
			• For Example: "1"

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
block_id	**Yes**	The **block_id** field identifies the block to which the trip belongs. A block consists of two or more sequential trips made using the same vehicle, where a passenger can transfer from one trip to the next just by staying in the vehicle. The block_id must be referenced by two or more trips in trips.txt.	• Unique identifier for a block independently generated by data provider
shape_id	**Yes**	The **shape_id** field contains an ID that defines a shape for the trip. This value is referenced from the shapes.txt file. The shapes.txt file allows you to define how a line should be drawn on the map to represent a trip.	• Unique identifier for a shape independently generated by data provider • For Example: *no example – system generated*
wheelchair_ accessible	**Yes**	• ~~0 (or empty) - indicates that there is no accessibility information for the trip~~ • 1 - indicates that the vehicle being used on this particular trip can accommodate at least one rider in a wheelchair • 2 - indicates that no riders in wheelchairs can be accommodated on this trip	• A value of either "1" or "2" must be provided
bikes_allow ed	**Yes**	• 0 (or empty) - indicates that there is no bike information for the trip • 1 - indicates that the vehicle being used on this particular trip can accommodate at least one bicycle • 2 - indicates that no bicycles are allowed on this trip	• A value of either "1" or "2" must be provided

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
trip_note	**Yes**	**TfNSW Extension** • Trip notes are provided by operators for each trip to provide further information to customers.	• Reference key to the notes.txt file (a TfNSW extension to the standard GTFS – refer to **Section 3.9 Notes.txt**) where trip notes can be defined. • Unique identifier for a note independently generated by Light Rail. • For trips without a trip note this field can be left blank e.g. **""** • For Example: *no example – system generated*
route_direction	**Yes**	**TfNSW Extension** • Route directions are provided by Operators for each trip and are to be made available to Customers.	• The customer facing description of the route direction as approved by TfNSW (refer to **Section 4.1.4 Service Direction Name**). • For Example: **"Central to Gordon"**

3.4   Calendar.txt

The Calendar file provides a set of dates when service is available for one or more routes.

TfNSW require that timetable data provided is projected forward so that customers are able to view service timetables at least 100 days in advance. This means:

- The **start_date** should be <today> i.e. the day the GTFS file set was generated. This represents the effective start date of the GTFS file-set bundle.

- The **end_date** should be **100 days** from <today> and represents the effective end date of the GTFS file-set bundle provided.

- For the time periods where services have not been officially scheduled **a timetable projection is required**. The projected portion of the timetable should be based on a **"standard timetable"** which can be any historical timetable the Data Provider deems suitable for each of the **7 day types (Monday through to Sunday)**. For example:

- o If the timetable for **Monday the 22nd of February 2016** is considered "standard" then that timetable can be used as the projected timetable for all Mondays in the GTFS file-set where a projection is required. This process can be repeated for all remaining day types (Tuesday through to Sunday).
- o Exceptions:
    - ▪ Consideration should be given **for public holidays** and special events that are expected to occur within the projection period

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **calendar.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
service_id	**Yes**	The **service_id** contains an ID that uniquely identifies a set of dates when service is available for one or more routes. Each service_id value can appear at most once in a calendar.txt file. This value is dataset unique. It is referenced by the trips.txt file.	• Unique identifier for a route independently generated by Data Provider that identifies a set of dates when a service is available for one or more routes. • For Example: *no example – system generated*
monday	**Yes**	The **monday** field contains a binary value that indicates whether the service is valid for all Mondays. • A value of 1 indicates that service is available for all Mondays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Mondays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"1"**

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
tuesday	**Yes**	The **tuesday** field contains a binary value that indicates whether the service is valid for all Tuesdays. • A value of 1 indicates that service is available for all Tuesdays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Tuesdays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"0"**
wednesday	**Yes**	The **wednesday** field contains a binary value that indicates whether the service is valid for all Wednesdays. • A value of 1 indicates that service is available for all Wednesdays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Wednesdays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"1"**
thursday	**Yes**	The **thursday** field contains a binary value that indicates whether the service is valid for all Thursdays. • A value of 1 indicates that service is available for all Thursdays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Thursdays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"0"**

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
friday	**Yes**	The **friday** field contains a binary value that indicates whether the service is valid for all Fridays. • A value of 1 indicates that service is available for all Fridays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Fridays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"1"**
saturday	**Yes**	The **saturday** field contains a binary value that indicates whether the service is valid for all Saturdays. • A value of 1 indicates that service is available for all Saturdays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Saturdays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"0"**
sunday	**Yes**	The **sunday** field contains a binary value that indicates whether the service is valid for all Sundays. • A value of 1 indicates that service is available for all Sundays in the date range. (The date range is specified using the start_date and end_date fields.) • A value of 0 indicates that service is not available on Sundays in the date range. Note: You may list exceptions for particular dates, such as holidays, in the calendar_dates.txt file.	• For Example: **"1"**

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
start_date	**Yes**	The **start_date** field contains the start date for the service. The start_date field's value should be in YYYYMMDD format.	• For Example: **" 20160101"**
end_date	**Yes**	The **end_date** field contains the end date for the service. This date is included in the service interval. The end_date field's value should be in YYYYMMDD format.	• For Example: **" 20160409"**

3.5   Calendar_dates.txt

The Calendar dates file provides the ability to define service exceptions for one or more of the provided routes. This mechanism is commonly used to override standard timetables defined in the Calendar.txt file e.g. when a particular service will not be running on a specific day for a limited period of time.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **calendar_dates.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
service_id	**Yes**	The **service_id** contains an ID that uniquely identifies a set of dates when a service exception is available for one or more routes. Each (service_id, date) pair can only appear once in calendar_dates.txt. If the service_id value appears in both the calendar.txt and calendar_dates.txt files, the information in calendar_dates.txt modifies the service information specified in calendar.txt. This field is referenced by the trips.txt file.	• Unique identifier for a route independently generated by the data provider that identifies a set of dates when a service is available for one or more routes. • For Example: ***no example – system generated***

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
date	**Yes**	The **date field** specifies a particular date when service availability is different than the norm. You can use the exception_type field to indicate whether service is available on the specified date. The date field's value should be in YYYYMMDD format.	• For Example: **"20160214"**
exception_ type	**Yes**	The **exception_type** indicates whether service is available on the date specified in the date field. • A value of 1 indicates that service has been added for the specified date. • A value of 2 indicates that service has been removed for the specified date. For example, suppose a route has one set of trips available on holidays and another set of trips available on all other days. You could have one service_id that corresponds to the regular service schedule and another service_id that corresponds to the holiday schedule. For a particular holiday, you would use the calendar_dates.txt file to add the holiday to the holiday service_id and to remove the holiday from the regular service_id schedule.	• For Example: **"1"**

3.6   Shapes.txt

The Shapes file contains data to enable visual representation of a trip's path based on the route paths points.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **shapes.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
shape_id	**Yes**	The **shape_id** field contains an ID that uniquely identifies a shape.	• Unique identifier for a shape independently generated by Data Provider. • Unique identifier generated by the Data Provider timetable system that identifies the shape in question. • For Example: *no example – system generated*
shape_pt_lat	**Yes**	The **shape_pt_lat** field associates a shape point's latitude with a shape ID. The field value must be a valid WGS 84 latitude. Each row in shapes.txt represents a shape point in your shape definition. For example, if the shape "A_shp" has three points in its definition, the shapes.txt file might contain these rows to define the shape: A_shp,37.61956,-122.48161,0 A_shp,37.64430,-122.41070,6 A_shp,37.65863,-122.30839,11	• For Example: **"-33.882421992"** • Formatted to at least 6 decimal places
shape_pt_lon	**Yes**	The **shape_pt_lon** field associates a shape point's longitude with a shape ID. The field value must be a valid WGS 84 longitude value from -180 to 180. Each row in shapes.txt represents a shape point in your shape definition. For example, if the shape "A_shp" has three points in its definition, the shapes.txt file might contain these rows to define the shape: A_shp,37.61956,-122.48161,0 A_shp,37.64430,-122.41070,6 A_shp,37.65863,-122.30839,11	• For Example: **"151.20668605"** • Formatted to at least 6 decimal places

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
shape_pt_ sequence	**Yes**	The **shape_pt_sequence** field associates the latitude and longitude of a shape point with its sequence order along the shape. The values for shape_pt_sequence must be non-negative integers, and they must increase along the trip. For example, if the shape "A_shp" has three points in its definition, the shapes.txt file might contain these rows to define the shape: A_shp,37.61956,-122.48161,0 A_shp,37.64430,-122.41070,6 A_shp,37.65863,-122.30839,11	• For Example: **"32"**
shape_dist _traveled	**Yes**	When used in the shapes.txt file, the **shape_dist_traveled** field positions a shape point as a distance traveled along a shape from the first shape point. The shape_dist_traveled field represents a real distance traveled along the route in units such as feet or kilometers. This information allows the trip planner to determine how much of the shape to draw when showing part of a trip on the map. The values used for shape_dist_traveled must increase along with shape_pt_sequence: they cannot be used to show reverse travel along a route. The units used for shape_dist_traveled in the shapes.txt file must match the units that are used for this field in the stop_times.txt file. For example, if a bus travels along the three points defined above for A_shp, the additional shape_dist_traveled values (shown here in kilometers) would look like this: A_shp,37.61956,-122.48161,0,0 A_shp,37.64430,-122.41070,6,6.8310 A_shp,37.65863,-122.30839,11,15.8765	• For Example: **"216.24"**

3.7 Stops.txt

The Stops.txt file contains the stops that can be referenced by one or more trips within the GTFS file-set bundle.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **stops.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
stop_id	**Yes**	The **stop_id** field contains an ID that uniquely identifies a stop or station. Multiple routes may use the same stop. The stop_id is dataset unique.	Must be the TfNSW registered stop numbers from the TfNSW Transit Stop Management (TSM) data store, the source of truth for all stops in NSW. The stop numbers must follow the TfNSW stop numbering and Naming standard. For Example: "2000253"
stop_code	**No**	The **stop_code** field contains short text or a number that uniquely identifies the stop for passengers. Stop codes are often used in phone-based transit information systems or printed on stop signage to make it easier for riders to get a stop schedule or real-time arrival information for a particular stop. The stop_code field should only be used for stop codes that are displayed to passengers. For internal codes, use stop_id. This field should be left blank for stops without a code.	NA

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
stop_name	**Yes**	The **stop_name** field contains the name of a stop or station. Please use a name that people will understand in the local and tourist vernacular.	The correct "customer facing" name of the Stop. Stop names must be sourced from the TfNSW Transit Stop Management (TSM) data store, the source of truth of stop names in NSW. The stop names must follow the TfNSW stop numbering and Naming standard. For Example: "Miller St before Blue St"
stop_desc	**No**	The **stop_desc** field contains a description of a stop. Please provide useful, quality information. Do not simply duplicate the name of the stop.	NA
stop_lat	**Yes**	The **stop_lat** field contains the latitude of a stop or station. The field value must be a valid WGS 84 latitude.	For Example: "-33.8792" Formatted to at least 6 decimal places
stop_lon	**Yes**	The **stop_lon** field contains the longitude of a stop or station. The field value must be a valid WGS 84 longitude value from -180 to 180.	For Example: "151.2027" Formatted to at least 6 decimal places
zone_id	**No**	The **zone_id** field defines the fare zone for a stop ID. Zone IDs are required if you want to provide fare information using fare_rules.txt. If this stop ID represents a station, the zone ID is ignored.	NA
stop_url	**No**	The **stop_url** field contains the URL of a web page about a particular stop. This should be different from the agency_url and the route_url fields. The value must be a fully qualified URL that includes http:// or https://, and any special characters in the URL must be correctly escaped. Seehttp://www.w3.org/Addressing/URL/4_URI_Recommentations.html for a description of how to create fully qualified URL values	NA

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
location_type	**Yes**	The **location_type** field identifies whether this stop ID represents a stop or station. If no location type is specified, or the location_type is blank, stop IDs are treated as stops. Stations may have different properties from stops when they are represented on a map or used in trip planning. The location type field can have the following values: • 0 or blank - Stop. A location where passengers board or disembark from a transit vehicle. • 1 - Station. A physical structure or area that contains one or more stop.	Indicates that the stop is a 'Stop' (stopping point) as opposed to a 'Station' (stop group).

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
parent_station	**Yes**	For stops that are physically located inside stations, the **parent_station** field identifies the station associated with the stop. To use this field, stops.txt must also contain a row where this stop ID is assigned location type=1.	Parent stations as supplied by TfNSW from the TfNSW Transit Stop Management (TSM) data store. For Example: Central Station Light Rail stop is (location_type) "",(parent_station) "200060" for Central station

This stop ID represents...	This entry's location type...	This entry's parent_station field contains...
A stop located inside a station.	0 or blank	The stop ID of the station where this stop is located. The stop referenced by parent_station must have location_type=1.
A stop located outside a station.	0 or blank	A blank value. The parent_station field doesn't apply to this stop.
A station.	1	A blank value. Stations can't contain other stations.

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
stop_timezone	**No**	The **stop_timezone** field contains the timezone in which this stop or station is located. Please refer to Wikipedia List of Timezones for a list of valid values. If omitted, the stop should be assumed to be located in the timezone specified by agency_timezone in agency.txt.	NA
		When a stop has a parent station, the stop is considered to be in the timezone specified by the parent station's stop_timezone value. If the parent has no stop_timezone value, the stops that belong to that station are assumed to be in the timezone specified by agency_timezone, even if the stops have their own stop_timezone values. In other words, if a given stop has a parent_station value, any stop_timezone value specified for that stop must be ignored.	
		Even if stop_timezone values are provided in stops.txt, the times in stop_times.txt should continue to be specified as time since midnight in the timezone specified by agency_timezone in agency.txt. This ensures that the time values in a trip always increase over the course of a trip, regardless of which timezones the trip crosses.	

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
wheelchair_boarding	**Yes**	The **wheelchair_boarding** field identifies whether wheelchair boardings are possible from the specified stop or station. The field can have the following values: • 0 (or empty) - indicates that there is no accessibility information for the stop • 1 - indicates that at least some vehicles at this stop can be boarded by a rider in a wheelchair • 2 - wheelchair boarding is not possible at this stop When a stop is part of a larger station complex, as indicated by a stop with a parent_station value, the stop's wheelchair_boarding field has the following additional semantics: • 0 (or empty) - the stop will inherit its wheelchair_boarding value from the parent station, if specified in the parent • 1 - there exists some accessible path from outside the station to the specific stop / platform • 2 - there exists no accessible path from outside the station to the specific stop / platform	Indicates that a stop is wheelchair accessible
platform_code	**Yes**	**TfNSW Extension**	Platform/stop number as detailed in the stop name For Example: "14" for Platform 14

3.8   Stop_times.txt

The Stops times file provides stop time information for all stops included in trips defined within the GTFS file-set bundle.

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **stops_times.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
trip_id	**Yes**	The **trip_id** field contains an ID that identifies a trip. This value is referenced from the trips.txt file.	

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
arrival_time	**Yes**	The **arrival_time** specifies the arrival time at a specific stop for a specific trip on a route. The time is measured from "noon minus 12h" (effectively midnight, except for days on which daylight savings time changes occur) at the beginning of the service date. For times occurring after midnight on the service date, enter the time as a value greater than 24:00:00 in HH:MM:SS local time for the day on which the trip schedule begins. If you don't have separate times for arrival and departure at a stop, enter the same value for arrival_time and departure_time.	The arrival time at a specific stop for a specific trip on a route.

The arrival_time specifies the arrival time at a specific stop for a specific trip on a route. The time is measured from "noon minus 12h" (effectively midnight, except for days on which daylight savings time changes occur) at the beginning of the service date. For times occurring after midnight on the service date, enter the time as a value greater than 24:00:00 in HH:MM:SS local time for the day on which the trip schedule begins. If you don't have separate times for arrival and departure at a stop, enter the same value for arrival_time and departure_time.

If this stop isn't a time point, use an empty string value for the arrival_time and departure_time fields. Stops without arrival times will be scheduled based on the nearest preceding timed stop. To ensure accurate routing, please provide arrival and departure times for all stops that are time points. Do not interpolate stops.

You must specify arrival and departure times for the first and last stops in a trip.

Times must be eight digits in HH:MM:SS format (H:MM:SS is also accepted, if the hour begins with 0). Do not pad times with spaces. The following columns list stop times for a trip and the proper way to express those times in the arrival_time field:

Time	arrival_time value
08:10:00 A.M.	08:10:00 or 8:10:00
01:05:00 P.M.	13:05:00
07:40:00 P.M.	19:40:00
01:55:00 A.M.	25:55:00

Note: Trips that span multiple dates will have stop times greater than 24:00:00. For example, if a trip begins at 10:30:00 p.m. and ends at 2:15:00 a.m. on the following day, the stop times would be 22:30:00 and 26:15:00. Entering those stop times as 22:30:00 and 02:15:00 would not produce the desired results.

TfNSW specific requirements column:

The arrival time at a specific stop for a specific trip on a route.

Times are to be provided to seconds (level of accuracy)

Times for trips starting before 04:00 am will be expressed in '36 hour format'.

For Example: "25:25:10" (01:25:10 am)

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
departure_time	**Yes**	The **departure_time** specifies the departure time from a specific stop for a specific trip on a route. The time is measured from "noon minus 12h" (effectively midnight, except for days on which daylight savings time changes occur) at the beginning of the service date. For times occurring after midnight on the service date, enter the time as a value greater than 24:00:00 in HH:MM:SS local time for the day on which the trip schedule begins. If you don't have separate times for arrival and departure at a stop, enter the same value for arrival_time and departure_time.	The departure time from a specific stop for a specific trip on a route.

The departure_time field description continues:

If this stop isn't a time point, use an empty string value for the arrival_time and departure_time fields. Stops without arrival times will be scheduled based on the nearest preceding timed stop. To ensure accurate routing, please provide arrival and departure times for all stops that are time points. Do not interpolate stops.

You must specify arrival and departure times for the first and last stops in a trip.

Times must be eight digits in HH:MM:SS format (H:MM:SS is also accepted, if the hour begins with 0). Do not pad times with spaces. The following columns list stop times for a trip and the proper way to express those times in the departure_time field:

TfNSW specific requirements:

Times are to be provided to seconds (level of accuracy)

Times for trips starting before 04:00 am will be expressed in '36 hour format'.

For Example: "25:25:10" (01:25:10 am)

Time	departure_time value
08:10:00 A.M.	08:10:00 or 8:10:00
01:05:00 P.M.	13:05:00
07:40:00 P.M.	19:40:00
01:55:00 A.M.	25:55:00

Note: Trips that span multiple dates will have stop times greater than 24:00:00. For example, if a trip begins at 10:30:00 p.m. and ends at 2:15:00 a.m. on the following day, the stop times would be 22:30:00 and 26:15:00. Entering those stop times as 22:30:00 and 02:15:00 would not produce the desired results.

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
stop_id	**Yes**	The **stop_id** field contains an ID that uniquely identifies a stop. Multiple routes may use the same stop. The stop_id is referenced from the stops.txt file. If location_type is used in stops.txt, all stops referenced in stop_times.txt must have location_type of 0. Where possible, stop_id values should remain consistent between feed updates. In other words, stop A with stop_id 1 should have stop_id 1 in all subsequent data updates. If a stop is not a time point, enter blank values for arrival_time and departure_time.	Must be a TfNSW registered stop number from the TfNSW Transit Stop Management (TSM) data store the source of truth for all stops in NSW. The stop numbers must follow the TfNSW stop numbering and Naming standard. For Example: "2000253"
stop_sequence	**Yes**	The **stop_sequence** field identifies the order of the stops for a particular trip. The values for stop_sequence must be non-negative integers, and they must increase along the trip. For example, the first stop on the trip could have a stop_sequence of 1, the second stop on the trip could have a stop_sequence of 23, the third stop could have a stop_sequence of 40, and so on.	The sequence of the Stop within the Trip. For Example: "**3**" (indicating that the stop is the 3rd in the Trip)
stop_headsign	**Yes**	The **stop_headsign** field contains the text that appears on a sign that identifies the trip's destination to passengers. Use this field to override the default trip_headsign when the headsign changes between stops. If this headsign is associated with an entire trip, use trip_headsign instead.	The stop headsign must applied from the TfNSW registered stop numbers from the TfNSW Transit Stop Management (TSM) data store the source of truth for all stops in NSW. Must not be greater than 15 characters (the current limit) and follow the TfNSW naming standard For Example: "Dulwich Hill"

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
pickup_type	**Yes**	The **pickup_type** field indicates whether passengers are picked up at a stop as part of the normal schedule or whether a pickup at the stop is not available. This field also allows the transit agency to indicate that passengers must call the agency or notify the driver to arrange a pickup at a particular stop. Valid values for this field are: • 0 - Regularly scheduled pickup • 1 - No pickup available • 2 - Must phone agency to arrange pickup • 3 - Must coordinate with driver to arrange pickup The default value for this field is 0.	For Example: "**0**" (indicating that regularly scheduled pickup occurs at the Stop for the Trip)
drop_off_type	**Yes**	The **drop_off_type** field indicates whether passengers are dropped off at a stop as part of the normal schedule or whether a drop off at the stop is not available. This field also allows the transit agency to indicate that passengers must call the agency or notify the driver to arrange a drop off at a particular stop. Valid values for this field are: • 0 - Regularly scheduled drop off • 1 - No drop off available • 2 - Must phone agency to arrange drop off • 3 - Must coordinate with driver to arrange drop off The default value for this field is 0.	For Example: "**0**" (indicating that no drop off available for the Stop for the Trip)

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
shape_dist _traveled	**Yes**	When used in the stop_times.txt file, the **shape_dist_traveled** field positions a stop as a distance from the first shape point. The shape_dist_traveled field represents a real distance traveled along the route in units such as feet or kilometers. For example, if a bus travels a distance of 5.25 kilometers from the start of the shape to the stop, the shape_dist_traveled for the stop ID would be entered as "5.25". This information allows the trip planner to determine how much of the shape to draw when showing part of a trip on the map. The values used for shape_dist_traveled must increase along with stop_sequence: they cannot be used to show reverse travel along a route. The units used for shape_dist_traveled in the stop_times.txt file must match the units that are used for this field in the shapes.txt file.	Where possible shape distance travelled should be provided For Example: **"50.3"**
timepoint	**Yes**	The **timepoint** field can be used to indicate if the specified arrival and departure times for a stop are strictly adhered to by the transit vehicle or if they are instead approximate and/or interpolated times. The field allows a GTFS producer to provide interpolated stop times that potentially incorporate local knowledge, but still indicate if the times are approximate. For stop-time entries with specified arrival and departure times, valid values for this field are: • empty - Times are considered exact. • 0 - Times are considered approximate. • 1 - Times are considered exact. For stop-time entries without specified arrival and departure times, feed consumers must interpolate arrival and departure times. Feed producers may optionally indicate that such an entry is not a timepoint (value=0) but it is an error to mark a entry as a timepoint (value=1) without specifying arrival and departure times.	Indicates whether the Stop is a timing point for the Trip. All stops for Train, Light, Ferry, Coach are timing points. For bus services only the first and last stop and key locations such as Points of Interest, interchanges along a route are timing points. For Example: **"1"**

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
stop_note	**Yes**	**TfNSW Extension** Stop notes are provided by Operators for each stop and are to be made available to Customers.	Reference key to the notes.txt file (a TfNSW extension to the standard GTFS – refer to **Section 3.9 Notes.txt**) where stop notes can be defined. Unique identifier for a note For stops without a stop note this field can be left blank e.g. **""** For Example: ***no example – system generated***

3.9 Notes.txt

The Notes file is a **TfNSW defined extension** to the standard GTFS file-set. It is used to provide additional informed such as irregularities of a trip or special conditions on a stop to complement standard timetable information. This file contains the actual note text and is reference by the **Trips.txt** file (via the trip_note field) and or the **Stop_times.txt** file (via the stop_note field).

Field specific requirements required by TfNSW in conjunction with the published GTFS standards for the generation of a **notes.txt** file are defined below:

Field	Required by TfNSW	Published GTFS Field Description	TfNSW specific requirements, additional business rules and sample data
note_id	**Yes**	The **note_id** field contains an ID that uniquely identifies a note. This ID is referenced in the stop_notes.txt and trips.txt files.	Unique identifier for a note independently generated by Data Provider. For Example: ***no example – system generated***
note_text	**Yes**	The note_text field contains the note text that will be made available to customers.	Leading and trailing spaces should be trimmed For Example: "Gates close two minutes before scheduled departure time." Notes must follow the TfNSW guidelines notes and must not be greater than (*to be confirmed*) characters.

4 Real-Time Data Feed – General Requirements

4.1 Scope

A GTFS Realtime feed lets transit agencies provide consumers with realtime information about disruptions to their service (stations closed, lines not operating, important delays, etc.) location of their vehicles, and expected arrival times.

4.2 Standards

Feed data is to be provided to GTFS Realtime standards as well as the TfNSW specific business rules detailed in this document. For published GTFS Realtime standards refer to the reference guide available at https://developers.google.com/transit/gtfs-realtime/reference/.

4.3 Structure

The specification currently supports the following types of information:

- Trip updates - delays, cancellations, changed routes

- Vehicle positions - information about the vehicles including location and congestion level

- Service alerts - stop moved, unforeseen events affecting a station, route or the entire network

4.3.1   Realtime element index

- TripUpdate
  - TripDescriptor
    - ScheduleRelationship
  - VehicleDescriptor
  - StopTimeUpdate
    - StopTimeEvent
    - ScheduleRelationship
- VehiclePosition
  - TripDescriptor
    - ScheduleRelationship
  - VehicleDescriptor
  - Position
  - VehicleStopStatus
  - CongestionLevel
  - OccupancyStatus
- Alert
  - TimeRange
    - EntitySelector
      - TripDescriptor
        - ScheduleRelationship
  - Cause
  - Effect
  - TranslatedString
    - Translation

4.4 Trip Updates

4.4.1 Excluding of Trips

Certain trips may need to be excluded from the feed depending on characteristics of a trip and/or according to a configuration rules for trips. These trips may include non-revenue generating trips, operational trips, operator exclusions and route-variant exclusions. *TfNSW to provide details on definitions of non-revenue and operational trips.*

4.4.2 Ascending Trip Times

All stop time updates should be in ascending times when factoring in predictions. It should not be possible for vehicles to 'travel back in time'.

4.4.3 Historical Trips

Historical trips should be included in the feed for a configurable period of time, initially set to 30-minutes. The definition of a historical trip is a trip where the scheduled arrival time AND actual arrival time < current time.

4.4.4 Trips with less than two stops

All trips must have at least 2-stops. Trips with less than two stops after filtering out non-revenue and operational stops should be omitted from the feed.

4.4.5 Configurable capacity

Feeds are configured to contain all the trips that are currently in progress and started up to 120 minutes in the past as well as trips that will commence within next 60 minutes. This capacity is configurable and can be extended/reduced depending on future needs.

The initial default values are:

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

4.4.6   Prediction Management

During off-route or reverse journey – GIVEN where the bus has gone off-route or starts doing reverse journey during the trip THEN certain smarts are applied to compare the scheduled arrival/departure times at the remaining TSNs with the current time and replace predicted arrival/departure times with scheduled times.

During pre-journey – GIVEN where the bus hasn't arrived at the first TSN but the driver has already logged onto the trip THEN predicted arrival/departure GTFS Feed for NSW Buses Fileset Consumer Guide – November 2015 TfNSW_Realtime_Bus_Technical_Doc_v2.1.docx times from the TSNs of that trip will not be published. Instead, scheduled arrival/departure times will be published. Vehicle information will also not be published.

4.4.7   Blocking and Next trip delay calculation

Trip updates should apply BLOCKING to previous trips to convey delay information.

4.4.8   Publishing Cancelled Trips

TripUpdate::ScheduleRelationship::Cancelled trips are marked as CANCELED in the feed

4.4.9   Expected trip update frequency

Trip updates must be at least every 15 second update,
It is expected that the source systems will have the capability to operate at 5 seconds and therefore the 15 second update will be close to live as possible.

The vehicle positions feed should also comply with this.

4.5 Use Cases

4.5.1 Cancel Trip within 5-mins before trip start

GIVEN: Scheduled trip starts in 5 mins, GTFS-R information provided. Operator decides trip will not operate before trip starts

THEN: A CANCELED/NO_DATA trip should appear in the feed until its scheduled finished time

4.5.2 Cancel Trip within 5-mins before trip start, trip already started

GIVEN: Scheduled trip starts in 5 mins, GTFS-R information provided. Operator decides, trip will not operate after trip has already started and real time information has been provided for running trip

THEN: A CANCELED/NO_DATA trip should appear in the feed until its scheduled finished time

4.5.3 Cancel Trip within 5-mins before trip start, trip already started

GIVEN: ADDED trip (includes driver error) starts in 5 mins, GTFS-R information provided. Operator decides, trip will not operate before trip starts

THEN: A CANCELED/NO_DATA trip should appear in the feed until its scheduled finished time

4.5.4 Skip a stop for an added trip

GIVEN: An added trip is operating or real time information has already been provided. The operator decides to skip a stop.

THEN: Trip should be handled as a REPLACEMENT

4.5.5 Diversion – skipped and added stops

GIVEN: Operator decides to skip stops and/or add additional stops in a SCHEDULED or ADDED trip

THEN: Trip should be handled as a REPLACEMENT

4.5.6   Additional Stop in SCHEDULED / ADDED Trip

GIVEN: Operator decides to add additional stops in a SCHEDULED or ADDED trip

THEN: Trip should be handled as a REPLACEMENT

4.5.7   Change of stop_id in a SCHEDULED / ADDED Trip

GIVEN: Change of stop_id in a SCHEDULED or ADDED trip

THEN: Trip should be handled as a REPLACEMENT

5 Real-Time Data Feed - File and Field Specific Requirements

5.1   Trip Update

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
Id	string	Required	One		The id should be traceable back to the incoming source SIRI message
trip	TripDescriptor	Required	One	The Trip that this message applies to. There can be at most one TripUpdate entity for each actual trip instance. If there is none, that means there is no prediction information available. It does *not* mean that the trip is progressing according to schedule.	All the trips that should be in progress as per the schedule are listed up to the configured time period of 120 minutes (configurable) in the past. All the trips that will be running in the future (up to the configured time period of 60 minutes (configurable), as per the schedule are listed All unscheduled trips that are currently in progress will contain a valid trip_id and will be are listed.
vehicle	VehicleDescriptor	Optional	One	Additional information on the vehicle that is serving this trip.	*TfNSW to revisit at a later date*
stop_time_update	StopTimeUpdate	Conditionally required	Many	Updates to StopTimes for the trip (both future, i.e., predictions, and in some cases, past ones, i.e., those that already happened). The updates must be sorted by stop_sequence, and apply for all the	REPLACEMENT - only future TSNs will contain stop time updates, except for REPLACEMENT services where the entire stop sequence is provided.

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
				following stops of the trip up to the next specified stop_time_update. At least one stop_time_update must be provided for the trip unless the trip.schedule_relationship is CANCELED - if the trip is canceled, no stop_time_updates need to be provided.	CANCELED –stop time information is not required for CANCELED services
timestamp	uint64	Optional	One	Moment at which the vehicle's real-time progress was measured. In POSIX time (i.e., the number of seconds since January 1st 1970 00:00:00 UTC).	For each trip that is in progress and being serviced by a vehicle, this field will be populated with the driver console's time from the most recent message from that vehicle else this field will not be included in the feed.
delay	int32	Optional	One	The current schedule deviation for the trip. Delay should only be specified when the prediction is given relative to some existing schedule in GTFS. Delay (in seconds) can be positive (meaning that the vehicle is late) or negative (meaning that the vehicle is ahead of schedule). Delay of 0 means that the vehicle is exactly on time. Delay information in StopTimeUpdates take precedent of trip-level delay information, such that trip-level delay is only propagated until the next stop along the trip with a StopTimeUpdate delay value specified. Feed providers are strongly encouraged to provide a TripUpdate.timestamp value indicating when the delay value was last updated, in order to evaluate the freshness of the data. Caution: this field is still experimental, and subject to change. It may be formally adopted in the future.	N/A - this field is not populated High frequency services such as Metro and light rail run to an operational timetable as per the relevant GTFS bundles, however they will adjust to headway in response to operational requirements throughout the day. Therefore we recommend ignoring the delay information passed on in GTFS-R feeds for these routes, and only showing real-time arrival/departure times to customers.

5.1.1   TripDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
trip_id	string	Conditionally required	One	The trip_id from the GTFS feed that this selector refers to. For non frequency-based trips (trips not defined in GTFS frequencies.txt), this field is enough to uniquely identify the trip. For frequency-based trips defined in GTFS frequencies.txt, trip_id, start_time, and start_date are all required. For scheduled-based trips (trips not defined in GTFS frequencies.txt), trip_id can only be omitted if the trip can be uniquely identified by a combination of route_id, direction_id, start_time, and start_date, and all those fields are provided.	Required by TfNSW trip_id must be unique within a GTFS-R feed For GTFS-R messages that have duplicate trip_ids these trips will be set back to scheduled time. All real time information will be ignored by the consuming system. In GTFS-R used elements must be consistent with values coming from GTFS. The trip_id in GTFS_R must match in GTFS, except for trips which have been ADDED. This field is to be mapped to the Vehicle Journey ID in the input feed
route_id	string	Conditionally required	One	The route_id from the GTFS that this selector refers to. If trip_id is omitted, route_id must be provided.	Required by TfNSW In GTFS-R used element route_id must be consistent with values coming from GTFS. For inconsistent route_id´s, the trip is mapped back to the GTFS using the stopping sequence in order to derive a route id.

direction_id	uint32	Conditionally required	One	The direction_id from the GTFS feed trips.txt file, indicating the direction of travel for trips this selector refers to. If trip_id is omitted, direction_id must be provided. Caution: this field is still experimental, and subject to change. It may be formally adopted in the future.	For trip_update:: SCHEDULED where direction_id is not provided, then direction is taken from GTFS on basis of consistent trip_id´s. For trip_update::ADDED, direction is required
start_time	string	Conditionally required	One	The initially scheduled start time of this trip instance. When the trip_id corresponds to a non-frequency-based trip, this field should either be omitted or be equal to the value in the GTFS feed. When the trip_id correponds to a frequency-based trip defined in GTFS frequencies.txt, start_time is required and must be specified for trip updates and vehicle positions. If the trip corresponds to exact_times=1 GTFS record, then start_time must be some multiple (including zero) of headway_secs later than frequencies.txt start_time for the corresponding time period. If the trip corresponds to exact_times=0, then its start_time may be arbitrary, and is initially expected to be the first departure of the trip. Once established, the start_time of this frequency-based exact_times=0 trip should be considered immutable, even if the first departure time changes -- that time change may instead be reflected in a StopTimeUpdate. If trip_id is omitted, start_time must be provided. Format and semantics of the field is same as that of GTFS/frequencies.txt/start_time, e.g., 11:15:35 or 25:15:35.	Required by TfNSW This is to be equivalent of the trip start time associated with the trip_id in the schedule.

| start_date | string | Conditionally required | One | The start date of this trip instance in YYYYMMDD format. For scheduled trips (trips not defined in GTFS frequencies.txt), this field must be provided to disambiguate trips that are so late as to collide with a scheduled trip on a next day. For example, for a train that departs 8:00 and 20:00 every day, and is 12 hours late, there would be two distinct trips on the same time. This field can be provided but is not mandatory for schedules in which such collisions are impossible - for example, a service running on hourly schedule where a vehicle that is one hour late is not considered to be related to schedule anymore. This field is required for frequency-based trips defined in GTFS frequencies.txt. If trip_id is omitted, start_date must be provided. | Required by TfNSW

Where we have repeated trip_id on subsequent days (everyday trips) a start_date is required

This is to be equivalent of the trip start date associated with the trip ID in the schedule.

Where a trip id is not available and route id (and route variant number) cannot be mapped to the trips in the schedule then this field will contain the present date. |
| schedule_relationship | ScheduleRelationship | Optional | One | | Required by TfNSW |

5.1.1.1　Schedule Relationship

Value	Comment	TfNSW Rules
SCHEDULED	Trip that is running in accordance with its GTFS schedule, or is close enough to the scheduled trip to be associated with it.	GTFS-R trip_id must exist and is unique in corresponding GTFS data When no other trip with same trip_id is in in Progress when the trip entity is created then the schedule relationship for the trip will be SCHEDULED
ADDED	An extra trip that was added in addition to a running schedule, for example, to replace a broken vehicle or to respond to sudden passenger load.	GTFS-R trip_id must not exist in corresponding GTFS data and must be unique across all GTFS/GTFS-R trip_ids The trip must be provided with full stop sequence. Trip is consistent and persistent across messages. trip_id of CANCELED trip must not be reused for a new ADDED trip The route_id of an added trip must refer to a route_id in GTFS. direction_id is required for ADDED trips When another trip with same trip_id is in progress when the trip entity is created then the schedule relationship for the trip will be 'ADDED'
UNSCHEDULED	A trip that is running with no schedule associated to it - this value is used to identify trips defined in GTFS frequencies.txt with exact_times = 0. It should not be used to describe trips not defined in GTFS frequencies.txt, or trips in GTFS frequencies.txt with exact_times = 1.	These are additional trips, that do not go on the same stop sequence or do have a different timing than an existing GTFS scheduled trip. GTFS-R trip_id must not exist in corresponding GTFS data and must be unique across all GTFS/GTFS-R trip_ids UNSCHEDULED trips do not have a trip_id but they have route_id. Real-time information is provided only for future stops. There must never more than one UNSCHEDULED trip per route at the same time.

Value	Comment	TfNSW Rules
		UNSCHEDULED trips are provided with arrival_delay and departure_delay are set to 0. Arrival time and departure time should be populated for all UNSCHEDULED service stops
CANCELED	A trip that existed in the schedule but was removed.	The trip_id must be either a SCHEDULED trip in GTFS or the trip_id must be an ADDED trip which does not exist in GTFS data.
REPLACEMENT	A replacement service for a scheduled or added trip	REPLACMENT was compliant with an older GTFS-R standard, but is not compliant with the latest version of GTFS-R. route_id and trip_id in trip_update::REPLACEMENT references to GTFS data Where Stop sequence GTFS-R = GTFS REPLACEMENT trips are handled as trip_update::SCHEDULED Stop sequence GTFS-R != GTFS REPLACEMENT trips are handled as if the existing scheduled trip is rerouted. Full Stop Sequence and Full Stop List must be provided, including passed stops if a trip is in progress. Passing Stops stops must have a schedule_relationship of SKIPPED The message must continually send the full stop list and stop sequence for all updates until the trip is completed. Both the stop_time and stop_date are required. Both arrival_time and departure_time are required for each stop. Delay for each stop is also required in order for consumers to calculate the intended scheduled time of a replacement trip

5.1.2   VehicleDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
id	string	Optional	One	Internal system identification of the vehicle. Should be unique per vehicle, and is used for tracking the vehicle as it proceeds through the system. This id should not be made visible to the end-user; for that purpose use the label field	Required by TfNSW This should be mapped to the SIRI Vehicle Descriptor.
label	string	Optional	One	User visible label, i.e., something that must be shown to the passenger to help identify the correct vehicle.	NA
license_plate	string	Optional	One	The license plate of the vehicle.	NA

5.1.3   StopTimeUpdate

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
stop_sequence	uint32	Conditionally required	One	Must be the same as in stop_times.txt in the corresponding GTFS feed. Either stop_sequence or stop_id must be provided within a StopTimeUpdate - both fields cannot be empty. stop_sequence is required for trips that visit the same stop_id more than once (e.g., a loop) to disambiguate which stop the prediction is for.	Required by TfNSW
stop_id	string	Conditionall	One	Must be the same as in stops.txt in the corresponding	Required by TfNSW

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
		y required		GTFS feed. Either stop_sequence or stop_id must be provided within a StopTimeUpdate - both fields cannot be empty.	In GTFS-R used elements must be consistent with values coming from GTFS. stop_id and stop_sequence_id in GTFS_R must match with GTFS . For each trip listed as per the schedule, all the related stop ID's will be listed For all the 'unscheduled' trips listed all the related stop ID's will be listed
arrival	StopTimeEvent	Conditionally required	One	If schedule_relationship is empty or SCHEDULED, either arrival or departure must be provided within a StopTimeUpdate - both fields cannot be empty. arrival and departure may both be empty when schedule_relationship is SKIPPED. If schedule_relationship is NO_DATA, arrival and departure must be empty.	Required by TfNSW
departure	StopTimeEvent	Conditionally required	One	If schedule_relationship is empty or SCHEDULED, either arrival or departure must be provided within a StopTimeUpdate - both fields cannot be empty. arrival and departure may both be empty when schedule_relationship is SKIPPED. If schedule_relationship is NO_DATA, arrival and departure must be empty.	Required by TfNSW
schedule_relationship	ScheduleRelationship	Optional	One	The default relationship is SCHEDULED.	

5.1.3.1   StopTimeEvent

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
delay	int32	Conditionally required	One	Delay (in seconds) can be positive (meaning that the vehicle is late) or negative (meaning that the vehicle is ahead of schedule). Delay of 0 means that the vehicle is exactly on time. Either delay or time must be provided within a StopTimeEvent - both fields cannot be empty.	stop_time_update::delay for all trips that have trip_update:: = SCHEDULED is mandatory, for stops in the sequence. When the arrival field is populated in the 'StopTimeUpdate' entity then one of the following conditions will apply: a. For a particular 'TSN', compare the predicted arrival time for that 'TSN' with the scheduled arrival time and if there is delay then convert it in seconds and populate this field with it. b. For a particular 'TSN', compare the predicted arrival time for that 'TSN' with the scheduled arrival time and if it is early then convert it in seconds, prefix it with '-' symbol and populate this field with it. c. For a particular 'TSN', compare the predicted arrival time for that 'TSN' with the scheduled arrival time and if there no difference then populate this field with 0. d. For a particular 'TSN', if a prediction is not available then populate this field with 0. When the departure field is populated in the StopTimeUpdate' entity then one of the following conditions will apply: a. For a particular 'TSN', compare the predicted departure time for that 'TSN' with the scheduled departure time and if there is delay then convert it in seconds and populate this field with it. b. For a particular 'TSN', compare the predicted departure time for that 'TSN' with the scheduled departure time and if it is early then convert it in seconds, prefix it with '-' symbol and populate this field with it. c. For a particular 'TSN', compare the predicted departure time for that 'TSN' with the scheduled departure time and if there no

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
					difference then populate this field with 0. d. For a particular 'TSN', if a prediction is not available then populate this field with 0.
time	int64	Conditionally required	One	Event as absolute time. In POSIX time (i.e., number of seconds since January 1st 1970 00:00:00 UTC). Either delay or time must be provided within a StopTimeEvent - both fields cannot be empty.	For all trips that have trip_update:: = SCHEDULED, actual time will be calculated by adding stop_time_update::delay to scheduled time taken from GTFS. This is true for arrival and departure. Therefore trip_update::time is optional. When the arrival field is populated in the 'StopTimeUpdate' entity then this field contains the predicted arrival time when the vehicle will be arriving at the TSN.
uncertainty	int32	Optional	One	If uncertainty is omitted, it is interpreted as unknown. To specify a completely certain prediction, set its uncertainty to 0.	Uncertainty applies to both the time and the delay value of a StopTimeUpdate. The uncertainty specifies the expected error in true delay as an integer in seconds. For example, a service with an estimated delay of 60-seconds arriving to its next stop within a 30-second window of error (+/- 15 seconds) will have an Uncertainty value of 30.

5.1.3.2   ScheduleRelationship

Value	Comment	TfNSW Rules
SCHEDULED	The vehicle is proceeding in accordance with its static schedule of stops, although not necessarily according to the times of the schedule. This is the default behaviour. At least one of arrival and departure must be provided. If the schedule for this stop contains both arrival and departure times then so must this update.	Stop must have same stop_sequence in GTFS and GTFS-R For each trip listed as per the schedule, if a vehicle is associated then this option will be selected for that trip For each 'unscheduled' trip listed this option will be selected for that trip
SKIPPED	The stop is skipped, i.e., the vehicle will not stop at this stop. Arrival and departure are optional.	Skipped stop must have the same stop_sequence in GTFS and GTFS-R. All stops before and after the skipped stop do not change the stop_sequence When the scheduled arrival time at a TSN is less than the feed generation time then the 'schedule_relationship' will be populated with a value of 'SKIPPED'
NO_DATA	No data is given for this stop. It indicates that there is no real-time information available. When set NO_DATA is propagated through subsequent stops so this is the recommended way of specifying from which stop you do not have real-time information. When NO_DATA is set neither arrival nor departure should be supplied.	stop must have same stop_sequence in GTFS and GTFS-R NO_DATA results in real-time not being available for the full trip

5.2 VehiclePosition

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
Id	string	required	One		The id should be traceable back to the source providing system
trip	TripDescriptor	Optional	One	The Trip that this vehicle is serving. Can be empty or partial if the vehicle can not be identified with a given trip instance.	Required by TfNSW All the trips that should be in progress as per the schedule are listed up to the configured time period of 120 minutes (configurable) the past. All the trips that will be running in the future up to the configured time period of 60 minutes (configurable) as per the schedule are listed All unscheduled trips that are currently in progress will contain a valid trip_id and will be listed.
vehicle	VehicleDescriptor	Optional	One	Additional information on the vehicle that is serving this trip. Each entry should have a unique vehicle id.	Required by TfNSW
position	Position	Optional	One	Current position of this vehicle.	Required by TfNSW
current_stop_sequence	uint32	Optional	One	The stop sequence index of the current stop. The meaning of current_stop_sequence (i.e., the stop that it refers to) is determined by current_status. If current_status is	Required by TfNSW If the vehicle is in transit to the first stop then the current_stop_sequence will be "1".

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
				missing IN_TRANSIT_TO is assumed.	
stop_id	string	Optional	One	Identifies the current stop. The value must be the same as in stops.txt in the corresponding GTFS feed.	Required by TfNSW If the vehicle is in transit to the first stop then the stop_id will be that of the first TSN. This field is equivalent of 'TSN' sent in the message from the vehicle
current_status	VehicleStopStatus	Optional	One	The exact status of the vehicle with respect to the current stop. Ignored if current_stop_sequence is missing.	Required by TfNSW
timestamp	uint64	Optional	One	Moment at which the vehicle's position was measured. In POSIX time (i.e., number of seconds since January 1st 1970 00:00:00 UTC).	Required by TfNSW This field is equivalent of 'ConsoleTime' in the message received from the vehicle
congestion_level	CongestionLevel	Optional	One		Required by TfNSW
occupancy_status	*OccupancyStatus*	*Required*	One	The degree of passenger occupancy of the vehicle.	Required by TfNSW
Transit_realtime.tfnsw_vehicle_descriptor	User extension	*Optional*		Include following information about the bus in service: Air-conditioning is available or not and Wheelchair access is available or not	Required by TfNSW This field contains following information: - Air-conditioning availability – sent as a 'True/False' value - Wheelchair access availability – sent as a bit value – 0 being not available and 1 being

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
					available - Vehicle Model – sent as text value - Following information is sent as a bitmask in the 'special_vehicle_attributes': 　Wi-Fi availability – bitmask value 0001 　Christmas bus or not – bitmask value 0010 　Both Wi-Fi and Christmas bus -bitmask value 0011 TfNSW has been assigned extension 1007 for these attributes. https://groups.google.com/forum/#!topic/gtfs-realtime/G75O1zyQS_Q
CarriageDescriptor	User extension	*Optional*	Many	To pass on information at a carriage level such as occupancy levels and facilitates available.	Required by TfNSW TfNSW has been assigned extension 1007 for these attributes. https://groups.google.com/forum/#!topic/gtfs-realtime/G75O1zyQS_Q

5.2.1　　TripDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
trip_id	string	Conditionally required	One	The trip_id from the GTFS feed that this selector refers to. For non frequency-based trips (trips not defined in GTFS frequencies.txt), this field is enough to	Required by TfNSW trip_id must be unique within a GTFS-R feed For GTFS-R messages that have duplicate trip_ids these trips will be set back to scheduled time. All real time

				uniquely identify the trip. For frequency-based trips defined in GTFS frequencies.txt, trip_id, start_time, and start_date are all required. For scheduled-based trips (trips not defined in GTFS frequencies.txt), trip_id can only be omitted if the trip can be uniquely identified by a combination of route_id, direction_id, start_time, and start_date, and all those fields are provided.	information will be ignored. In GTFS-R used elements must be consistent with values coming from GTFS. The trip_id in GTFS_R must match in GTFS, except for trips which have been ADDED. This field is to be mapped to the Vehicle Journey ID in the input feed
route_id	string	Conditionall y required	One	The route_id from the GTFS that this selector refers to. If trip_id is omitted, route_id must be provided.	Required by TfNSW In GTFS-R used element route_id must be consistent with values coming from GTFS. For inconsistent route_id´s, the trip is mapped back to the GTFS using the stopping sequence in order to derive a route id.
direction_id	uint32	Conditionall y required	One	The direction_id from the GTFS feed trips.txt file, indicating the direction of travel for trips this selector refers to. If trip_id is omitted, direction_id must be provided. Caution: this field is still experimental, and subject to change. It may be formally adopted in the future.	For trip_update:: SCHEDULED where direction_id is not provided, then direction is taken from GTFS on basis of consistent trip_id´s. For trip_update::ADDED, direction is required
start_time	string	Conditionall y required	One	The initially scheduled start time of this trip instance. When the trip_id corresponds to a non-frequency-based trip, this field should either be omitted or be equal to the value in the GTFS feed. When the trip_id correponds to a frequency-based trip defined in GTFS	Required by TfNSW This is to be equivalent of the trip start time associated with the trip ID in the schedule.

				frequencies.txt, start_time is required and must be specified for trip updates and vehicle positions. If the trip corresponds to exact_times=1 GTFS record, then start_time must be some multiple (including zero) of headway_secs later than frequencies.txt start_time for the corresponding time period. If the trip corresponds to exact_times=0, then its start_time may be arbitrary, and is initially expected to be the first departure of the trip. Once established, the start_time of this frequency-based exact_times=0 trip should be considered immutable, even if the first departure time changes -- that time change may instead be reflected in a StopTimeUpdate. If trip_id is omitted, start_time must be provided. Format and semantics of the field is same as that of GTFS/frequencies.txt/start_time, e.g., 11:15:35 or 25:15:35.	
start_date	string	Conditionally required	One	The start date of this trip instance in YYYYMMDD format. For scheduled trips (trips not defined in GTFS frequencies.txt), this field must be provided to disambiguate trips that are so late as to collide with a scheduled trip on a next day. For example, for a train that departs 8:00 and 20:00 every day, and is 12 hours late, there would be two distinct trips on the same time. This field can be provided but is not	Required by TfNSW This is to be equivalent of the trip start date associated with the trip ID in the schedule. Where we have repeated trip_id on subsequent days (everyday trips) a start_date is required Where a trip_id is not available and route_id (and route variant number) cannot be mapped to the trips in the schedule then this field will contain the present date.

				mandatory for schedules in which such collisions are impossible - for example, a service running on hourly schedule where a vehicle that is one hour late is not considered to be related to schedule anymore. This field is required for frequency-based trips defined in GTFS frequencies.txt. If trip_id is omitted, start_date must be provided.	
schedule_relationship	ScheduleRelationship	Optional	One		Required by TfNSW

5.2.1.1   ScheduleRelationship

Value	Comment	TfNSW Rules
SCHEDULED	Trip that is running in accordance with its GTFS schedule, or is close enough to the scheduled trip to be associated with it.	GTFS-R trip_id must exist and is unique in corresponding GTFS data When no other trip with same trip_id is in in Progress when the trip entity is created then the schedule relationship for the trip will be SCHEDULED
ADDED	An extra trip that was added in addition to a running schedule, for example, to replace a broken vehicle or to respond to sudden passenger load.	GTFS-R trip_id must not exist in corresponding GTFS data and must be unique across all GTFS/GTFS-R trip_ids The trip must be provided with full stop sequence. Trip is consistent and persistent across messages. trip_id of CANCELED trip must not be reused for a new ADDED trip

Value	Comment	TfNSW Rules
		The route_id of an added trip must refer to a route_id in GTFS. direction_id is required for ADDED trips When another trip with same trip_id is in progress when the trip entity is created then the schedule relationship for the trip will be 'ADDED'
UNSCHEDULED	A trip that is running with no schedule associated to it - this value is used to identify trips defined in GTFS frequencies.txt with exact_times = 0. It should not be used to describe trips not defined in GTFS frequencies.txt, or trips in GTFS frequencies.txt with exact_times = 1.	These are additional trips, that do not go on the same stop sequence or do have a different timing than an existing GTFS scheduled trip. GTFS-R trip_id must not exist in corresponding GTFS data and must be unique across all GTFS/GTFS-R trip_ids UNSCHEDULED trips do not have a trip_id but they have route_id. Real-time information is provided only for future stops. There must never more than one UNSCHEDULED trip per route at the same time. UNSCHEDULED trips are provided with arrival_delay and departure_delay are set to 0. Arrival time and departure time should be populated for all UNSCHEDULED service stops
CANCELED	A trip that existed in the schedule but was removed.	The trip_id must be either a SCHEDULED trip in GTFS or the trip_id must be an ADDED trip which does not exist in GTFS data.
REPLACEMENT	A replacement service for a scheduled or added trip	REPLACMENT was compliant with an older GTFS-R standard, but is not compliant with the latest version of GTFS-R. route_id and trip_id in trip_update::REPLACEMENT references to GTFS data Where Stop sequence GTFS-R = GTFS REPLACEMENT trips are handled as trip_update::SCHEDULED Stop sequence GTFS-R != GTFS REPLACEMENT trips are handled as if the existing scheduled trip is rerouted.

Value	Comment	TfNSW Rules
		Full Stop Sequence and Full Stop List must be provided, including passed stops if a trip is in progress and for platform changes the TSN of the new stop needs to be included. Passing Stops stops must have a schedule_relationship of SKIPPED The message must continually send the full stop list and stop sequence for all updates until the trip is completed. Both the stop_time and stop_date are required. Both arrival_time and departure_time are required for each stop. Delay for each stop is also required in order for consumers to calculate the intended scheduled time of a replacement trip

5.2.2 VehicleDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
id	string	Optional	One	Internal system identification of the vehicle. Should be unique per vehicle, and is used for tracking the vehicle as it proceeds through the system. This id should not be made visible to the end-user; for that purpose use the label field	Required by TfNSW This should be traceable to the incoming SIRI Vehicle Monitoring message.
label	string	Optional	One	User visible label, i.e., something that must be shown to the passenger to help identify the correct vehicle.	Examples include using the vehicle name or service name.
license_plate	string	Optional	One	The license plate of the vehicle.	

5.2.3 Position

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
latitude	float	Required	One	Degrees North, in the WGS-84 coordinate system.	Required by TfNSW Formatted to at least 6 decimal places
longitude	float	Required	One	Degrees East, in the WGS-84 coordinate system.	Required by TfNSW Formatted to at least 6 decimal places
bearing	float	Optional	One	Bearing, in degrees, clockwise from True North, i.e., 0 is North and 90 is East. This can be the compass bearing, or the direction towards the next stop or intermediate location. This should not be deduced from the sequence of previous positions, which clients can compute from previous data.	Required by TfNSW Rounded to 2 decimal places
odometer	double	Optional	One	Odometer value, in meters.	
speed	float	Optional	One	Momentary speed measured by the vehicle, in meters per second.	Required by TfNSW Rounded to 2 decimal places

5.2.4 VehicleStopStatus

Value	Comment	TfNSW Rules
INCOMING_AT	The vehicle is just about to arrive at the stop (on a stop display, the	No additional requirements

Value	Comment	TfNSW Rules
	vehicle symbol typically flashes).	
STOPPED_AT	The vehicle is standing at the stop.	No additional requirements
IN_TRANSIT_TO	The vehicle has departed the previous stop and is in transit.	No additional requirements

5.2.5 CongestionLevel

Following is the notation for the mathematical formulas below:

ẍ = mean average

σLong = Long term standard deviation

ẍLong = mean Long term average

ẍshort = mean Short term average

Value	TfNSW Rules
UNKNOWN_CONGESTION_LEVEL	Unknown is when the short term average is not known. Ie ẍshort has no value
RUNNING_SMOOTHLY	ẍLong + σLong > ẍshort
STOP_AND_GO	ẍLong + σLong <= ẍshort < ẍLong + 2σLong
CONGESTION	ẍLong + 2σLong <= ẍshort < ẍLong + 3σLong
SEVERE_CONGESTION	ẍLong + 3σLong <= ẍshort

5.2.6   OccupancyStatus

Value	Comment	TfNSW Rules
EMPTY	The vehicle is considered empty by most measures, and has few or no passengers onboard, but is still accepting passengers.	Not Populated
MANY_SEATS_AVAILABLE	The vehicle has a large percentage of seats available. What percentage of free seats out of the total seats available is to be considered large enough to fall into this category is determined at the discretion of the producer.	Where the count of the number of passengers received from the vehicle is 50% or less than the seating capacity of the vehicle
FEW_SEATS_AVAILABLE	The vehicle has a small percentage of seats available. What percentage of free seats out of the total seats available is to be considered small enough to fall into this category is determined at the discretion of the producer.	Where the count of the number of passengers received from the vehicle is equal to or less than the seating capacity of the vehicle
STANDING_ROOM_ONLY	The vehicle can currently accommodate only standing passengers.	Where the count of the number of passengers received from the vehicle is greater than the seating capacity of the vehicle
CRUSHED_STANDING_ROOM_ONLY	The vehicle can currently accommodate only standing passengers and has limited space for them.	Not Populated
FULL	The vehicle is considered full by most measures, but may still be allowing passengers to board.	Not Populated
NOT_ACCEPTING_PASSENGERS	The vehicle cannot accept passengers.	Not Populated

Note: If the vehicle cannot provide the capability to provide Occupancy in Real-time, the Occupancy status must be omitted. Omission of "Occupancy Status" is taken to mean Occupancy_Status = "UNKNOWN".

5.2.7   CarriageDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
name	string	optional	one	This should refer to a value customers can see	No additional rules
position_in_consist	Int	required	one	Carriage position in the consist. The position of carriages is relative to the current leading carriage and commences with 1 for the leading carriage.	No additional rules
occupancy_status	OccupancyStatus	required	one	OccupancyStatus of the vehicle or individual carriage. For vehicles with more than one passenger carriage, the carriage level provides a more granular view. The field in VehiclePosition should be a rollup of the individual carriage occupancy metrics.	If passenger count is not available then omit the occupany_status field.
quiet_carriage	Boolean	optional	one	Is this a quiet carriage - used to indicate to passengers they should keep noise to a minimum	No additional rules

toilet	ToiletStatus	optional	One	Does the carriage have a toilet and if so, is it an accessible toilet?
				NONE = 0; // No toilet in this carriage
				NORMAL = 1; // regular toilet for able bodied people
				ACCESSIBLE = 2;
					No additional rules

luggage_rack	Boolean	Optional	One	Does the carriage have luggage racks	

5.2.8 Transit_realtime.tfnsw_vehicle_descriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
air_conditioned	True/false	Optional	One		Air-conditioning availability – sent as a 'True/False' value
wheelchair_accessible	Boolean	Optional	One		Wheelchair access availability – sent as a bit value – 0 being not available and 1 being available
vehicle_model	string	Optional	One		For Bus, this field will be a combination of the following information - vehicleManufacturerName, chassisName, vehicleBodyManufacturerName and bodyName; separated by tilde (~). E.g. Mercedes~O405NH~Custom Coaches~CUSTOMCITARO For other mode it will be a single description of the model e.g. "Alstom Metropolis"
performing_prior_trip	True/False	Optional	One		When the vehicle has not yet commenced its current trip and is performing the prior trip this will be populated as "true"
special_vehicle_attributes	Boolean	Optional	One		Following information is sent as a bitmask in the 'special_vehicle_attributes': Wi-Fi availability – bitmask value 0001 Christmas bus or not – bitmask value 0010 Both Wi-Fi and Christmas bus –bitmask value 0011

5.3 Alert

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
active_period	TimeRange	Required	Many	Time when the alert should be shown to the user. If missing, the alert will be shown as long as it appears in the feed. If multiple ranges are given, the alert will be shown during all of them.	Required by TfNSW
informed_entity	EntitySelector	Required	Many	Entities whose users we should notify of this alert. At least one informed_entity must be provided.	
cause	Cause	Optional	One		
effect	Effect	Required	One		
url	TranslatedString	Optional	One	The URL which provides additional information about the alert.	
header_text	TranslatedString	Required	One	Header for the alert. This plain-text string will be highlighted, for example in boldface.	Short description of situation no greater than (*to be confirmed*) characters
description_text	TranslatedString	Required	One	Description for the alert. This plain-text string will be formatted as the body of the alert (or shown on an explicit "expand" request by the user). The information in the description should add to the information of the header.	Description to provide call to action and details on the reason for the alert.

5.3.1 TimeRange

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
start	uint64	Conditionally required	One	Start time, in POSIX time (i.e., number of seconds since January 1st 1970 00:00:00 UTC). If missing, the interval starts at minus infinity. If a TimeRange is provided, either start or end must be provided - both fields cannot be empty.	
end	uint64	Conditionally required	One	End time, in POSIX time (i.e., number of seconds since January 1st 1970 00:00:00 UTC). If missing, the interval ends at plus infinity. If a TimeRange is provided, either start or end must be provided - both fields cannot be empty.	

5.3.2 EntitySelector

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
agency_id	string	Conditionally required	One	At least one specifier must be given - all fields in an EntitySelector cannot be empty.	Required by TfNSW
route_id	string	Conditionally required	One	At least one specifier must be given - all fields in an EntitySelector cannot be empty.	Provide on the route, line level.

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
route_type	int32	Conditionally required	One	At least one specifier must be given - all fields in an EntitySelector cannot be empty.	
trip	TripDescriptor	Conditionally required	One	At least one specifier must be given - all fields in an EntitySelector cannot be empty.	If there is only one trip affected
stop_id	string	Conditionally required	One	At least one specifier must be given - all fields in an EntitySelector cannot be empty.	Station, Wharf, Stop

5.3.2.1   TripDescriptor

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
trip_id	string	Conditionally required	One	The trip_id from the GTFS feed that this selector refers to. For non frequency-based trips (trips not defined in GTFS frequencies.txt), this field is enough to uniquely identify the trip. For frequency-based trips defined in GTFS frequencies.txt, trip_id, start_time, and start_date are all required. For scheduled-based trips (trips not defined in GTFS frequencies.txt), trip_id can only be omitted if the trip can be uniquely identified by a combination of route_id, direction_id, start_time, and start_date, and all those fields are provided.	
route_id	string	Conditionally required	One	The route_id from the GTFS that this selector refers to. If trip_id is omitted, route_id must	

				be provided.	
direction_id	uint32	Conditionally required	One	The direction_id from the GTFS feed trips.txt file, indicating the direction of travel for trips this selector refers to. If trip_id is omitted, direction_id must be provided. Caution: this field is still experimental, and subject to change. It may be formally adopted in the future.	
start_time	string	Conditionally required	One	The initially scheduled start time of this trip instance. When the trip_id corresponds to a non-frequency-based trip, this field should either be omitted or be equal to the value in the GTFS feed. When the trip_id correponds to a frequency-based trip defined in GTFS frequencies.txt, start_time is required and must be specified for trip updates and vehicle positions. If the trip corresponds to exact_times=1 GTFS record, then start_time must be some multiple (including zero) of headway_secs later than frequencies.txt start_time for the corresponding time period. If the trip corresponds to exact_times=0, then its start_time may be arbitrary, and is initially expected to be the first departure of the trip. Once established, the start_time of this frequency-based exact_times=0 trip should be considered immutable, even if the first departure time changes -- that time change may instead be reflected in a StopTimeUpdate. If trip_id is omitted, start_time must be provided. Format and semantics of the field is same as that of GTFS/frequencies.txt/start_time, e.g., 11:15:35 or 25:15:35.	

start_date	string	Conditionally required	One	The start date of this trip instance in YYYYMMDD format. For scheduled trips (trips not defined in GTFS frequencies.txt), this field must be provided to disambiguate trips that are so late as to collide with a scheduled trip on a next day. For example, for a train that departs 8:00 and 20:00 every day, and is 12 hours late, there would be two distinct trips on the same time. This field can be provided but is not mandatory for schedules in which such collisions are impossible - for example, a service running on hourly schedule where a vehicle that is one hour late is not considered to be related to schedule anymore. This field is required for frequency-based trips defined in GTFS frequencies.txt. If trip_id is omitted, start_date must be provided.	
schedule_relationship	ScheduleRelationship	Optional	One		

5.3.2.1.1 ScheduleRelationship

Value	Comment	TfNSW Rules
SCHEDULED	Trip that is running in accordance with its GTFS schedule, or is close enough to the scheduled trip to be associated with it.	No additional rules
ADDED	An extra trip that was added in addition to a running schedule, for example, to replace a broken vehicle or to respond to sudden passenger load.	No additional rules
UNSCHEDULED	A trip that is running with no schedule associated to it - this value is used to identify trips defined in GTFS frequencies.txt with exact_times = 0. It should not be used to describe trips not defined in GTFS frequencies.txt, or trips in GTFS frequencies.txt with exact_times = 1.	No additional rules
CANCELED	A trip that existed in the schedule but was removed.	No additional rules
REPLACEMENT	The trip identified in the GTFS timetable has been modified.	No additional rules
SKIPPED	The stop is skipped, i.e., the vehicle will not stop at this stop. Arrival and departure are optional.	No additional rules

5.3.3   Cause

Value	TfNSW Rules
UNKNOWN_CAUSE	No additional rules
OTHER_CAUSE	No additional rules

Value	TfNSW Rules
TECHNICAL_PROBLEM	No additional rules
STRIKE	No additional rules
DEMONSTRATION	No additional rules
ACCIDENT	No additional rules
HOLIDAY	No additional rules
WEATHER	No additional rules
MAINTENANCE	No additional rules
CONSTRUCTION	No additional rules
POLICE_ACTIVITY	No additional rules
MEDICAL_EMERGENCY	No additional rules

5.3.4 Effect

Value	TfNSW Rules
NO_SERVICE	No additional rules

Value	TfNSW Rules
REDUCED_SERVICE	No additional rules
SIGNIFICANT_DELAYS	No additional rules
DETOUR	No additional rules
ADDITIONAL_SERVICE	No additional rules
MODIFIED_SERVICE	No additional rules
OTHER_EFFECT	No additional rules
UNKNOWN_EFFECT	No additional rules
STOP_MOVED	No additional rules

5.3.5 TranslatedString

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
translation	Translation	Required	Many	At least one translation must be provided.	

5.3.6   Translation

Field Name	Type	Required	Cardinality	Description	TfNSW Rules
text	string	Required	One	A UTF-8 string containing the message.	
language	string	Conditionally required	One	BCP-47 language code. Can be omitted if the language is unknown or if no internationalization is done at all for the feed. At most one translation is allowed to have an unspecified language tag - if there is more than one translation, the language must be provided.	

6 Glossary

6.1 Glossary of Terms

Term	Explanation
Passing Stops	Transit Stops on a trip which are ahead of a vehicle on a route path
Passed Stops	Transit Stops on a trip which a vehicle has already passed

7 Appendix

7.1 Approved Agency & Route Values

7.1.1 Agency Names

NOTE: The Bus Agency IDs are accurate as of 20-October-2017 but are subject to change. The following list is provided as an example of the agencies that exist in the system and is not exhaustive. The Agency Name is defined as part of the Interface Contract between the Agency and TfNSW.

agency_id	agency_name
SYDT	Sydney Trains
MT	Sydney Metro
SF	Sydney Ferries
LR	Sydney Light Rail
NSWTTLT	NSW TrainLink Train & Coach
NSWTICT	Intercity Train
NSWTTLC	NSW TrainLink Coach
NT	Newcastle Transport
PLR	Parramatta Light Rail
BUS2425	Sydney Olympic Park Major Event Buses
BUS2426	Sydney Olympic Park Major Event Buses

agency_id	agency_name
BUS2430	Sydney Olympic Park Major Event Buses
BUS2431	Sydney Olympic Park Major Event Buses
BUS2411	NightRide
BUS2412	NightRide
BUS2413	NightRide
BUS2414	NightRide
BUS2415	NightRide
BUS2416	NightRide
BUS2417	NightRide
BUS2418	NightRide
BUS2419	NightRide
BUS2420	NightRide
BUS2421	NightRide
BUS2422	NightRide
BUS2423	NightRide
BUS3000	Newcastle Transport
BUS2447	Rover Coaches
BUS2448	Hunter Valley Buses

agency_id	agency_name
BUS2449	Port Stephens Coaches
BUS2450	Hunter Valley Buses
BUS2451	*Not used*
BUS2452	Busways Central Coast
BUS2453	Red Bus Service
BUS2454	Blue Mountains Transit
BUS2455	Premier Charters
BUS2456	Premier Illawarra
BUS2457	Coastal Liner
BUS2458	Dions Bus Service
BUS2433	Busways Western Sydney
BUS2434	Interline Bus Services
BUS2435	Transit Systems
BUS2436	Hillsbus
BUS2437	Punchbowl Bus Company
BUS2438	State Transit Sydney
BUS2439	State Transit Sydney
BUS2440	State Transit Sydney

agency_id	agency_name
BUS2441	State Transit Sydney
BUS2442	Transdev NSW
BUS2443	Transdev NSW
BUS2444	Transdev NSW
BUS2445	Forest Coach Lines
BUS2446	Busabout

7.1.2 Route Short Names

Example of Short Name. Note, this is not an exhaustive list. The Route Short Name is defined as part of the Interface Contract between the Agency and TfNSW.

Agency	Route Short Name
Sydney Light Rail	L1
Sydney Trains	T8

7.1.3 Route Long Names

Example of Long Name. Note, this is not an exhaustive list. The Route Long Name is defined as part of the Interface Contract between the Agency and TfNSW.

Agency	Route Long Name
Sydney Light Rail	Dulwich Hill Line
Sydney Trains	Airport & South Line

7.1.4 Service Direction Names

Example of Service Direction Names. Note, this is not an exhaustive list. The Service Direction Name is defined as part of the Interface Contract between the Agency and TfNSW.

Agency	Service Direction Name
Sydney Light Rail	Central to Dulwich Hill
	Dulwich Hill to Central
Sydney Trains	City Circle to Leppington via Airport
	Leppington to City Circle via Airport

7.1.5 Route Types

Example of Route Types. Note, this is not an exhaustive list. The Route Type is defined as part of the Interface Contract between the Agency and TfNSW.

There may be more than one route type in the GTFS file depending to the service type offered by agency

Service Type	Route Type
Regular, Express, Event bus service type	700
School bus service	*712*
Rail replacement bus service	*714*
On demand service	*715*
Metro service	*401*
Light rail service	*900*

7.1.6 Network Names

Example of Network Names. Note, this is not an exhaustive list. The Network Name is defined as part of the Interface Contract between the Agency and TfNSW.

Agency	Network Name
Sydney Light Rail	Sydney Light Rail Network

Agency	Network Name
Sydney Trains	Sydney Trains Network
Sydney Ferries	Sydney Ferries Network
Newcastle Transport	Newcastle Ferries
Newcastle Transport	Newcastle Buses

7.1.7   Route Information Mappings

Example of Route mappings. Note, this is not an exhaustive list

Route Short Name	Route Long Name	Direction	Service Direction Name	Route Type	Network Name (Route Desc)
L1	**Yes**	0 - Outbound	Central to Dulwich Hill	900	Sydney Light Rail Network
L1	**Yes**	1 - Inbound	Dulwich Hill to Central	900	Sydney Light Rail Network
333	**Yes**	0 - Outbound	Bondi to Circular Quay	700	Sydney Buses Network
333	**Yes**	1 - Inbound	Circular Quay to Bondi	700	Sydney Buses Network

7.1.8 Stops

Example of Stops. Note, this is not an exhaustive list

stop_name stop_id	stop_id	stop_lat	stop_lon	Platform code	location_type	parent_station
Arlington Light Rail	220366	-33.90184127	151.1380613	1	Null	Null
Arlington Light Rail	220367	-33.90181274	151.1381365	2	Null	Null
Capitol Square Light Rail	2000256	-33.87983455	151.2056004	2	Null	Null
Capitol Square Light Rail	2000255	-33.87975438	151.2056556	1	Null	Null
Central Station Light Rail	2000257	-33.88242003	151.2066908	1	Null	200060

7.1.9 Networks and Line Colours

Note: Network and Line colours are subject to change

TRANSPORT_NAME	TEXT_COLOUR	BACKGROUND_COLOUR	FOREGROUND_COLOUR
Blue Mountains Buses Network	#FFFFFF	#FFFFFF	#00B5EF
Central Coast Buses Network	#FFFFFF	#FFFFFF	#00B5EF
Hunter Buses Network	#FFFFFF	#FFFFFF	#00B5EF
Illawarra Buses Network	#FFFFFF	#FFFFFF	#00B5EF
Intercity Trains Network	#FFFFFF	#FFFFFF	#F6891F
Newcastle Ferries	#FFFFFF	#FFFFFF	#5AB031

Private bus services	#FFFFFF	#FFFFFF	#00B5EF
Private coach services	#FFFFFF	#FFFFFF	#732A82
Private ferry and fast ferry services	#FFFFFF	#FFFFFF	#5AB031
Regional Trains and Coaches Network (Coach)	#FFFFFF	#FFFFFF	#732A82
Regional Trains and Coaches Network (Train)	#FFFFFF	#FFFFFF	#E56E0F
School buses	#FFFFFF	#FFFFFF	#00B5EF
Sydney Buses Network	#FFFFFF	#FFFFFF	#00B5EF
Sydney Ferries Network	#FFFFFF	#FFFFFF	#5AB031
Sydney Light Rail Network	#FFFFFF	#FFFFFF	#EE343F
Sydney Trains Network	#FFFFFF	#FFFFFF	#F6891F

7.2　　TfNSW GTFS Server details

To be confirmed. TfNSW to advise, interface contract

7.3 TfNSW Scenarios that TfNSW require in the GTFS feed

7.3.1 Cancelled trips

| ```
entity {
  id: "20190613_154605_9"
  trip_update {
    trip {
      trip_id: "352-12.130619.8.1540"
      start_time: "15:40:00"
      start_date: "20190613"
      schedule_relationship: CANCELED
      route_id: "SMNW_M"
    }
  }
}
``` | The trip update for the service's schedule_relationship shows CANCELED which indicates the service has been cancelled. This message should remain for the duration of the service's original scheduled start and end time. |

7.3.2 Skipped/cancel a stop remove stop from trip

This should use the scheduled_relationship value SKIPPED for the particular stop(s) being skipped/removed from the trip

```
entity {
  id: "20190516_160405_12"
  trip_update {
    trip {
      trip_id: "350-10.160519.8.1520"
        ....
        schedule_relationship: REPLACEMENT
    }
    stop_time_update {
      stop_sequence: 2
      stop_id: "2113362"
      schedule_relationship: SKIPPED
    }
        }
}
```

The trip update for the service schedule_relationship is set to REPLACEMENT to indicate the service is being replaced with new data.

The schedule_relationship of the stop_id 2113362 being skipped/cancelled is shown as SKIPPED. Arrival and departure times are optional in this case.

7.3.3 Terminate trip short / Change stopping pattern to cancel multiple stops when trains is suspended part way through a trip

``
entity {
  id: "20190516_160405_12"
  trip_update {
    trip {
      trip_id: "350-10.160519.8.1520"
        ....
      schedule_relationship: REPLACEMENT
    }
    stop_time_update {
      stop_sequence: 12
      stop_id: "2113361"
      schedule_relationship: SKIPPED
    }
    stop_time_update {
      stop_id: "2067142"
      schedule_relationship: SKIPPED
    }
  }
}
``
	The trip update for the service schedule_relationship is set to REPLACEMENT to indicate the service is being replaced with new data.
	
	The schedule_relationship of the 12th and 13th stops are shown as SKIPPED

7.3.4 Change in platform

The initial trip update indicates the original TSN where the vehicle will stop

``
entity {
  id: "20190604_170131_40"
  trip_update {
    trip {
      trip_id: "93-21.270519.7.1705"
      start_time: "17:05:00"
      start_date: "20190604"
      schedule_relationship: SCHEDULED
      route_id: "SMNW_M"
    }
    stop_time_update {
      stop_sequence: 6
      arrival {
        delay: 193
      }
      departure {
        delay: 193
      }
      stop_id: "2126160
      schedule_relationship: SCHEDULED
    }
}
``
	The schedule_relationship value indicates the trip is as per the original schedule. The stop_id/TSN is 2126160

```
entity {
  id: "20190604_170148_40"
  trip_update {
   trip {
     trip_id: "93-21.270519.7.1705"
     start_time: "17:05:00"
     start_date: "20190604"
     schedule_relationship: REPLACEMENT
     route_id: "SMNW_M"
   }
   stop_time_update {
     stop_sequence: 6
     arrival {
       delay: 185
     }
     departure {
       delay: 185
     }
     stop_id: "2126159"
     schedule_relationship: SCHEDULED
   }
}
```

In the subsequent TripUpdate, a schedule_relationship of REPLACEMENT is set to indicate there are changes to the service compared to the original schedule.

The stop_id/TSN is changed to 2126159

7.3.5 Start short – change stopping pattern to start beyond the first stop

``
entity {
 id: "20190617_104042_2"
 trip_update {
  trip {
   trip_id: "186-15.100619.7.1010"
   start_time: "10:10:00"
   start_date: "20190617"
   schedule_relationship: REPLACEMENT
   route_id: "SMNW_M"
  }
  stop_time_update {
   stop_sequence: 1
   stop_id: "2155269"
   schedule_relationship: SKIPPED
  }
  stop_time_update {
   stop_sequence: 2
   arrival {
    delay: 342
   }
   departure {
    delay: 405
   }
   stop_id: "2155267"
   schedule_relationship: SCHEDULED
  }
``
	The trip update for the service schedule_relationship is set to REPLACEMENT to indicate the service is being replaced with new data.
	
	The schedule_relationship of the 1st stop is shown as SKIPPED

7.3.6 Hold/Delay train (add time to trip)

The delay value must be interpreted together with the scheduled time the vehicle is expected at a TSN.

1. Go through the stop_times.txt file and find the scheduled arrival and departure times for a trip

`"trip_id","arrival_time","departure_time","stop_id","stop_sequence","pickup_type","drop_off_type","timepoint","stop_note","shape_dist_traveled"`
 	
`"319-11.130619.8.1010","10:10:00","10:10:00","2067143","1","0","0","1","","0.0"`
 	
`"319-11.130619.8.1010","10:16:00","10:16:00","2113362","2","0","0","1","","6412.21"`
	This indicates trip_id 319-11.130619.8.1010 is scheduled to depart from the first stop at 10:10AM and the second stop at 10:16AM.

2. In the realtime TripUpdate files, look for the trip_id 319-11.130619.8.1010

```
trip_update {
  trip {
    trip_id: "319-11.130619.8.1010"
    start_time: "10:10:00"
    start_date: "20190613"
    schedule_relationship: SCHEDULED
    route_id: "SMNW_M"
  }
  stop_time_update {
    stop_sequence: 1
    departure {
      delay: -273
      time: 1560384326
    }
    stop_id: "2067143"
    schedule_relationship: SCHEDULED
  }
  stop_time_update {
    stop_sequence: 2
    arrival {
      delay: -322
      time: 1560384637
    }
    departure {
      delay: -261
      time: 1560384698
    }
    stop_id: "2113362"
    schedule_relationship: SCHEDULED
  }
```

The real-time file indicates there are delays to the trip.

At the first stop, it departed 273 seconds earlier than the timetable schedule. This is indicated with a negative delay, i.e. ahead of schedule.

The earlier departure at the previous stop means the arrival and departure times at subsequent stops also changes. At the second stop, the vehicle arrived 322 seconds ahead of schedule, indicated with an arrival delay of -322. It departed 261 seconds ahead of schedule, indicated with a departure delay of -261.

If the vehicle departed after schedule, then the delay value should be positive to indicate the number of seconds after the timetable time.

If the arrival delay is negative, i.e. ahead of schedule, AND the departure delay is zero, then it would indicate the service is stopped at the TSN and going back to the scheduled departure time.

7.3.7   Added trip/replacement trip

<table>
<tr>
<td>

```
trip_update {
  trip {
    trip_id: "319-11.130619.8.1010"
    start_time: "10:10:00"
    start_date: "20190613"
    schedule_relationship: ADDED
    route_id: "SMNW_M"
  }
  stop_time_update {
    stop_sequence: 1
    departure {
      delay: -273
      time: 1560384326
    }
    stop_id: "2067143"
    schedule_relationship: SCHEDULED
  }
...
}
```

</td>
<td>

A new trip is added to the GTFS-R file with the stops for the service.

</td>
</tr>
</table>