

GTFS-realtime

What is GTFS-realtime

GTFS-realtime is an extension of the General Transit Feed Specification (GTFS) that gives public transportation agencies the capability to provide realtime updates about their fleet.

Feed Types

There are three distinct feed types:

- **Trip updates** - delays, cancellations, changed routes
- **Service alerts** - stop moved, unforeseen events affecting a station, route or the entire network
- **Vehicle positions** - information about the vehicles including location and congestion level

Feeds

Feeds contain only one feed type, and are served via HTTP. Data must be updated frequently (30-90 seconds) or whenever new data arrives.

Trip Updates

- Represents changes to the timetable
- Consists of one or more updates to vehicle stop times (referred to as **StopTimeUpdates**)
- Each StopTimeUpdate is linked to a stop either by a GTFS stop_id or GTFS stop_sequence if the GTFS trip_id is provided
- The update can provide the exact arrival or departure to the stop.
- StopTimeUpdates must be ordered by GTFS stop_sequence

Trip Updates

- The updates can also provide an **Uncertainty** to provide for possible window of error in the arrival and departure from the stop
- A **Trip Descriptor** to describe what kind of trip it is:
 - Scheduled : This trip is running according to a GTFS schedule
 - Added : This trip was not scheduled and has been added
 - Unscheduled : This trip is running and is never associated with a schedule
 - Cancelled : This trip was scheduled, but is now removed.

Service Alerts

Service Alerts allows to provide updates whenever there is disruption on the network.

The alert may be in the format of the following :

- URL – contains the link to the site explaining the alert
- Header Text – a summary of the alert
- Description – a full description of the alert

Service Alerts

- The alert should contain a **time range** which indicates for how long the alert is useful. If an alert does not contain a time range, the alert will be displayed for as long as it is in the feed.
- An **entity selector** is also needed to indicate which parts of the network the alert affects. Entities are selected using GTFS identifiers(Agency, Route, Route type, Trip, Stop).
- The alert also contains the **cause** of the alert and what **effect** the alert does.

Cause & Effect (Service Alerts)

Cause

- Unknown Cause
- Technical Problem
- Strike
- Demonstration
- Accident
- Holiday
- Weather
- Maintenance
- Construction
- Police Activity
- Medical Emergency
- Other Cause

Effect

- No Service
- Reduced Service
- Significant Delays
- Detour
- Additional Service
- Modified Service
- Stop Moved
- Other Effect
- Unknown Effect

Vehicle Positions

Vehicle Position provides information on the location of the vehicle. It must contain a **timestamp** to denote when the data was taken. The **current stop sequence** may also be included to indicate which stop the vehicle is in transit to.

Vehicle Positions

Position

- Latitude - degrees North, in the WGS-84 coordinate system
- Longitude - degrees East, in the WGS-84 coordinate system
- Bearing - direction that the vehicle is facing
- Odometer - the distance that the vehicle has travelled
- Speed - momentary speed measured by the vehicle, in meters per second

Congestion Level

- Unknown congestion level
- Running smoothly
- Stop and go
- Congestion
- Sever congestion

Vehicle Positions

Vehicle Stop Status

- Incoming at - the vehicle is about to arrive at the referenced stop
- Stopped at - the vehicle is stopped at the referenced stop
- in transit to - the referenced stop is the next stop for the vehicle

Vehicle Descriptor

- ID - internal system of identification for the vehicle. Should be unique to the vehicle
- Label - a user visible label
- License Plate - the actual license plate of the vehicle

Data Format

Uses Protocol Buffers

- Language- and platform-neutral
- GTFS-realtime.proto
- Smaller, faster, and simpler than XML

Data Feed

Feed Message

Field Name	Type	Cardinality	Description
header	FeedHeader	required	Metadata about this feed and feed message.
entity	FeedEntity	repeated	Contents of the feed.

Data Feed

Feed Header

Field Name	Type	Cardinality	Description
gtfs_realtime_version	string	required	Version of the feed specification. The current version is 1.0.
timestamp	uint64	optional	This timestamp identifies the moment when the content of this feed has been created (in server time). In POSIX time (i.e., number of seconds since January 1st 1970 00:00:00 UTC).

Data Feed

Feed Entity

Field Name	Type	Cardinality	Description
id	string	required	Feed-unique identifier for this entity.
trip_update	TripUpdate	optional	Data about the realtime departure delays of a trip.
vehicle	VehiclePosition	optional	Data about the realtime position of a vehicle.
alert	Alert	optional	Data about the realtime alert.

Data Feed

Trip Update

Field Name	Type	Cardinality	Description
trip	TripDescriptor	required	The Trip that this message applies to.
vehicle	VehicleDescriptor	optional	Additional information on the vehicle that is serving this trip.
stop_time_update	StopTimeUpdate	repeated	Updates to StopTimes for the trip .
timestamp	uint64	optional	Moment at which the vehicle's real-time progress was measured. In POSIX time

Data Feed

Trip Descriptor

Field Name	Type	Cardinality	Description
trip_id	string	optional	The trip_id from the GTFS feed that this selector refers to.
route_id	string	optional	The route_id from the GTFS that this selector refers to.
start_time	string	optional	The initially scheduled start time of this trip instance. Format is same as that of GTFS/frequencies.txt/start_time, e.g., 11:15:35 or 25:15:35.
start_date	string	optional	The scheduled start date of this trip instance. In YYYYMMDD format.
schedule_relationship	ScheduleRelationship	optional	

Data Feed

Schedule Relationship

Value	Comment
SCHEDULED	Trip that is running in accordance with its GTFS schedule, or is close enough to the scheduled trip to be associated with it.
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.
UNSCHEDULED	A trip that is running with no schedule associated to it, for example, if there is no schedule at all.
CANCELED	A trip that existed in the schedule but was removed.

Data Feed

Vehicle Descriptor

Field Name	Type	Cardinality	Description
id	string	optional	Internal system identification of the vehicle.
label	string	optional	User visible label, i.e., something that must be shown to the passenger to help identify the correct vehicle.
license_plate	string	optional	The license plate of the vehicle.

Data Feed

Stop Time Update

Field Name	Type	Cardinality	Description
stop_sequence	uint32	optional	Must be the same as in stop_times.txt in the corresponding GTFS feed.
stop_id	string	optional	Must be the same as in stops.txt in the corresponding GTFS feed.
arrival	StopTimeEvent	optional	
departure	StopTimeEvent	optional	
schedule_relationship	Schedule Relationship	optional	The default relationship is SCHEDULED.

Data Feed

Stop Time Event

Field Name	Type	Cardinality	Description
delay	int32	optional	Delay (in seconds) can be positive (meaning that the vehicle is late) or negative (meaning that the vehicle is ahead of schedule).
time	int64	optional	Event as absolute time. In POSIX time.
uncertainty	int32	optional	

Data Feed

Vehicle Position

Field Name	Type	Cardinality	Description
trip	TripDescriptor	optional	The Trip that this vehicle is serving.
vehicle	VehicleDescriptor	optional	Additional information on the vehicle that is serving this trip. Each entry should have a unique vehicle id.
position	Position	optional	Current position of this vehicle.
current_stop_sequence	uint32	optional	The stop sequence index of the current stop.
stop_id	string	optional	Identifies the current stop. The value must be the same as in stops.txt in the corresponding GTFS feed.
current_status	VehicleStopStatus	optional	The exact status of the vehicle with respect to the current stop.
timestamp	uint64	optional	Moment at which the vehicle's position was measured. In POSIX time .
congestion_level	CongestionLevel	optional	

Data Feed

Position

Field Name	Type	Cardinality	Description
latitude	float	required	Degrees North, in the WGS-84 coordinate system.
longitude	float	required	Degrees East, in the WGS-84 coordinate system.
bearing	float	optional	Bearing, in degrees, clockwise from True North.
odometer	double	optional	Odometer value, in meters.
speed	float	optional	Momentary speed measured by the vehicle, in meters per second.

Data Feed

Vehicle Stop Status

Value	Comment
INCOMING_AT	The vehicle is just about to arrive at the stop (on a stop display, the vehicle symbol typically flashes).
STOPPED_AT	The vehicle is standing at the stop.
IN_TRANSIT_TO	The vehicle has departed the previous stop and is in transit.

Data Feed

Congestion Level

Value
UNKNOWN_CONGESTION_LEVEL
RUNNING_SMOOTHLY
STOP_AND_GO
CONGESTION
SEVERE_CONGESTION

Data Feed

Alert

Field Name	Type	Cardinality	Description
active_period	TimeRange	repeated	Time when the alert should be shown to the user.
informed_entity	EntitySelector	repeated	Entities whose users we should notify of this alert.
cause	Cause	optional	
effect	Effect	optional	
url	TranslatedString	optional	The URL which provides additional information about the alert.
header_text	TranslatedString	optional	Header for the alert.
description_text	TranslatedString	optional	Description for the alert.

Data Feed

Time Range

Field Name	Type	Cardinality	Description
start	uint64	optional	Start time, in POSIX time.
end	uint64	optional	End time, in POSIX time.

Data Feed

Entity Selector

Field Name	Type	Cardinality
agency_id	string	optional
route_id	string	optional
route_type	int32	optional
trip	TripDescriptor	optional
stop_id	string	optional

Data Feed

Translated String

Field Name	Type	Cardinality	Description
translation	Translation	repeated	At least one translation must be provided.

Data Feed

Translation

Field Name	Type	Cardinality	Description
text	string	required	A UTF-8 string containing the message.
language	string	optional	BCP-47 language code.

Sample Data Feed (Trip Updates)

```
header {
  gtfs_realtime_version: "1.0"
  timestamp: 1284457468
}
entity {
  id: "simple-trip"
  trip_update {
    trip {
      trip_id: "trip-1"
    }
    stop_time_update {
      stop_sequence: 3
      arrival {
        delay: 5
      }
    }
    stop_time_update {
      stop_sequence: 8
      arrival {
        delay: 1
      }
    }
  }
}
```

```
stop_time_update {
  stop_sequence: 10
}
}
entity {
  id: "3"
  trip_update {
    trip {
      trip_id: "frequency-expanded-trip"
      start_time: "11:15:35"
    }
    stop_time_update {
      stop_sequence: 1
      arrival {
        delay: -2
      }
    }
    stop_time_update {
      stop_sequence: 9
    }
  }
}
```


Sample Data Feed (Alerts)

```
header {
  gtfs_realtime_version: "1.0"
  timestamp: 1284457468
}
entity {
  id: "0"
  alert {
    active_period {
      start: 1284457468
      end: 1284468072
    }
    informed_entity {
      route_id: "219"
    }
    informed_entity {
      stop_id: "16230"
    }
    cause: CONSTRUCTION
    effect: DETOUR
    url {
      translation {
        text: "http://www.sometransitagency/alerts"
        language: "en"
      }
    }
  }
}
```

```
header_text {
  translation {
    text: "Stop at Elm street is closed, temporary stop at
Oak street"
    language: "en"
  }
}
description_text {
  translation {
    text: "Due to construction at Elm street the stop is
closed. The temporary stop can be found 300 meters
north at Oak street"
    language: "en"
  }
}
}
```

Partner Dashboard

Transit - Realtime Feeds

Google Transit

EACOMM Transit

Successfull vs All Feed Updates 2,507 / 2,500

Configuration

Feed name	
Delivery method	Fetch
Encoding	ProtoBuffer
Realtime data source	
Fetch interval	30 seconds

Realtime Feed Reports

- [Report covering Feb 28, 2016 through Mar 7, 2016](#)
- [Report covering Feb 27, 2016 through Mar 6, 2016](#)
- [Report covering Feb 26, 2016 through Mar 5, 2016](#)
- [Report covering Feb 25, 2016 through Mar 4, 2016](#)
- [Report covering Feb 24, 2016 through Mar 3, 2016](#)

[older...](#)

Last Update

Date	Mar 7, 2016 - 10:10:47 PM
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Warnings

Warnings	4
MULTIPLE_ENTITIES_PER_TRIP	4

Status: Success

Last Successful Update

Date	Mar 7, 2016 - 10:10:47 PM
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Active Trip Updates 3512

Windows taskbar: 10:12 PM 3/7/2016

