



improving  
public transport  
through technology

# Providing Vehicle Occupancy Data:- Data Interfaces

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# 1 Introduction

## 1.1 Background and Purpose

- 1.1.1 The measurement - in real time, of vehicle occupancy for buses is not something that has been carried out regularly or, is in widespread use in the UK. The rail industry has more experience in it and is currently experimenting with providing information to the public.
- 1.1.2 This means that there is little experience in managing vehicle occupancy data within the bus sector.
- 1.1.3 The current requirement for social distancing has resulted in significant interest in providing information to customers on vehicle occupancy - as one way of encouraging trust in the safety of public transport.
- 1.1.4 This document sets out how it is possible to communicate vehicle occupancy between systems in a standardised manner.
- 1.1.5 The document does not provide information on how to collect vehicle occupancy, nor how to present it to the passenger, as there are a wide range of different approaches and technologies already available to do this.
- 1.1.6 Note: The document has been written during the 2020 COVID-19 pandemic. As such, some comments and discussion are specifically relevant to the period during which the document was developed.

## 1.2 Status of this document

- 1.2.1 This document is **Released**.
- 1.2.2 If there are any comments or feedback arising from the review or use of the document please contact us at [secretariat@rtig.org.uk](mailto:secretariat@rtig.org.uk).

## 2 Vehicle Occupancy Measures

- 2.1.1 There are two potential measures against which current vehicle occupancy can be compared in order to determine its passenger loading:
- the designed capacity of the vehicle; and
  - the safe capacity of the vehicle based on current guidance.
- 2.1.2 The designed capacity is fixed and therefore only needs the baseline setting once. The other, however, may vary over time: as social distancing guidance changes. The baseline will therefore, need to have the flexibility to be varied over time.
- 2.1.3 It is the *current* safe capacity of a vehicle that is of most interest to customers; and it is possible to provide an indication of occupancy level against this baseline.

## **3 Data Interfaces**

### **3.1 Static Data Interfaces**

- 3.1.1 It may be beneficial to provide vehicle capacity to an information service, authority or regulator: to allow appropriate planning decisions to be made; or for inclusion into customer information.
- 3.1.2 The NeTEx format includes PassengerCapacity as part of the VehicleType and has a structure that allows for detail - including seated and standing capacities, to be handled.
- 3.1.3 Neither ATCO CIF or TransXChange include the ability to provide vehicle seating and standing capacity. Any approach to providing planned capacity data would therefore, require a bespoke extension.

### **3.2 Live Data Interfaces**

- 3.2.1 There are two commonly used data interfaces appropriate for the transfer of live vehicle occupancy data:
- SIRI; and
  - GTFS RT.
- 3.2.2 Other interfaces are in use but are proprietary and have not therefore been considered in this document.

### **3.3 SIRI**

- 3.3.1 The SIRI structure for occupancy has remained consistent since the initial version, will continue to be supported; and is in widespread use in Europe and beyond.
- 3.3.2 The Occupancy field in SIRI is one of the optional properties of ProgressInfo of a MonitoredVehicleJourney. This element can be used in both SIRI-SM and SIRI-VM services.
- 3.3.3 There is, in addition, an Occupancy field in the EstimatedCall structure of the SIRI-ET service. If this is populated it represents a predicted passenger load. If the corresponding field is filled in a MonitoredVehicleJourney, this should be used in preference - as it reflects the actual current passenger occupancy value.

### 3.4 GTFS – RT

- 3.4.1 Within GTFS-RT, there are two experimental fields that can contain real-time vehicle occupancy information:
- 3.4.2 **OccupancyStatus** – an enumeration of seven values added to the specification six years ago and included in the official reference site, but not formally adopted. There are nonetheless, multiple suppliers that have implemented this field.
- 3.4.3 **occupancy\_percentage** – a percentage value representing the degree of passenger occupancy of the vehicle. This was a new inclusion into the GitHub site in early 2020 but its adoption level is unclear.

## 4 Occupancy Levels

4.1.1 The two interfaces use different enumerations for the occupancy level:

SIRI	GTFS-RT	Value	Description
		• <i>full</i>	Service is full.
		• <i>standingAvailable</i>	Standing space is available.
		• <i>seatsAvailable</i>	Seats are available.
		• <i>unknown</i>	Occupancy is unknown. (the equivalent of not providing the data element)
		• <i>empty</i>	The vehicle is considered empty by most measures, and has few or no passengers onboard, but is still accepting passengers.
		• <i>manySeatsAvailable</i>	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.
		• <i>fewSeatsAvailable</i>	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.
		• <i>standingRoomOnly</i>	The vehicle can currently accommodate only standing passengers.
		• <i>crushedStandingRoomOnly</i>	The vehicle can currently accommodate only standing passengers and has limited space for them.
		• <i>notAcceptingPassengers</i>	The vehicle cannot accept passengers.

4.1.2 In the next release of SIRI, the GTFS-RT enumerations will be included to allow easier interfacing between systems

4.1.3 A number of suppliers have implemented proprietary additions to SIRI to provide occupancy in an alternative format. Typically, these have a banded approach along these lines:

1	Low	0 - 10 %
2	Medium	11 – 50 %
3	High	51 – 90 % or 100 %
4	Overload	90% + or > 100%

4.1.4 Because these are proprietary, the transfer of data using these structures requires development by the receiver.



## 5 Boarding Activity

- 5.1.1 In the event that a vehicle is determined to be full, measured against either the designed or safe capacity, then it may be appropriate to not allow further passengers to board the vehicle until some existing passengers have alighted.
- 5.1.2 This can be achieved through the use of `DepartureBoardingActivity` in the `MonitoredCall` element of SIRI-ET AND SIRI-SM; or `MonitoredVehicleJourney` in SIRI-SM and SIRI-VM.
- 5.1.3 In this case `DepartureBoardingActivity` should be set to 'noBoarding'.
- 5.1.4 One consideration if using this approach, is the overall latency of data from the decision to set `DepartureBoardingActivity` to 'noBoarding' - to when a customer will be informed through any channel; and the likelihood of sufficient passengers having alighted to enable additional passengers to board during this time.

## 6 Glossary

ATCO	Association of Transport Co-ordinating Officers
ATCO CIF	ATCO Common Interface Format.
GTFS – RT	General Transit Feed Specification – Real Time <a href="https://developers.google.com/transit/gtfs-realtime">https://developers.google.com/transit/gtfs-realtime</a>
NeTEx	Network Timetable Exchange <a href="http://netex.uk/">http://netex.uk/</a>
SIRI	Service Interface for Real Time Information <a href="https://siri.org.uk/">https://siri.org.uk/</a>
Transmodel	A public transport reference data model <a href="http://www.transmodel-cen.eu/">http://www.transmodel-cen.eu/</a>
TransXChange	An XML format for the transfer of timetable data, based on Transmodel