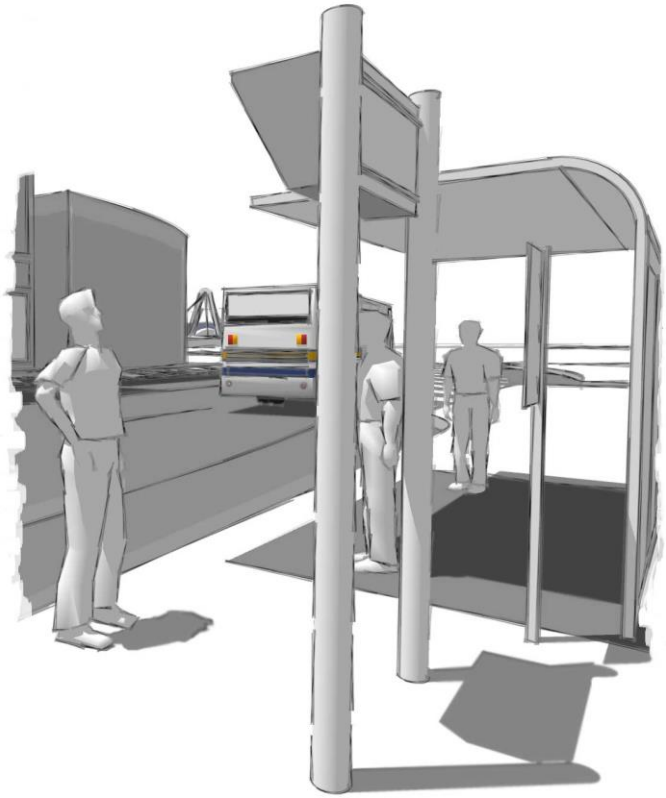
CONSAT
Telematics

ITS4mobility SIRI-VM

Service Interface for Real Time Information
Vehicle Monitoring (VM)



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Terms, Acronyms and Abbreviations

Abbreviation	Description
SIRI	Service Interface for Real Time Information, CEN/TS 15531.
Transmodel	An abstract general purpose model for public transport information (CEN TC278, Reference Data Model For Public Transport, ENV12896 revised, June 2001).
I4M	ITS4Mobility
HTTP	Hypertext Transfer Protocol.
Service	The program (process) that implements one or more of the SIRI functions.
Subscriber	A client that receives data from a Service using HTTP.
Client	A subscriber that receives data from a Service using HTTP.
Server	A computer that hosts one or more Services.
VM	Vehicle Monitoring, a SIRI functional service interface.

1. Introduction

This document contains a description of the ITS4mobility SIRI Vehicle Monitoring (VM) implementation. The SIRI/VM implementation is an open API that provides access to data from the ITS4mobility system.

The primary intended use of the ITS4mobility SIRI/VM implementation is for integration with external systems (machine-to-machine).

2. Scope and Purpose

SIRI as a standard has a large number of features and several optional capabilities. This document is intended to give developers the information needed to use the SIRI/SX functional service supplied with ITS4mobility. The capabilities and features of the ITS4mobility implementation are specified in detail.

3. SIRI Vehicle Monitoring (VM)

3.1. VehicleMonitoringSubscriptionRequest

These are the elements of the *VehicleMonitoringSubscriptionRequest* that are used in the ITS4mobility implementation. Please refer to the appendix for an example document.

Element	**Description**
SubscriberRef	A client reference, which can be any string. Will be returned in the *SituationExchangeDelivery*.
SubscriptionIdentifier	An identifier that will be returned as *SubscriptionRef* in the *SituationExchangeDelivery*.
InitialTerminationTime	How long this subscription will last before it is terminated by the server. For continuous operation this value should be far away.
VehicleMonitoringRequest	See below.

The *VehicleMonitoringRequest* element contains the following elements.

Element	**Description**
RequestTimestamp	The date and time that the client posted this request. The value is not used by the server.

3.2. VehicleMonitoringDelivery

These are the elements of the *VehicleMonitoringDelivery* that are used in the ITS4mobility implementation. Please refer to the appendix for an example document.

Element	**Description**
ResponseTimestamp	The date and time that the server sent this document.
SubscriberRef	The subscriber (client) reference.
SubscriptionRef	The subscription reference which is the *SubscriptionIdentifier* that the client supplied in the *SituationExchangeSubscriptionRequest*.
ValidUntil	Not used (always set to 9999-12-31T23:59:59).
VehicleActivity	One or more *VehicleActivity* elements. See below.

The *VehicleActivity* element contains the following elements.

Element	**Description**
RecordedAtTime	The date and time the activity was created, which is the date and time that the vehicle reported the data.
ValidUntilTime	Not used (always set to 9999-12-31T23:59:59).
ProgressBetweenStops	See below.
MonitoredVehicleJourney	See below.
Extensions	See below.

The *ProgressBetweenStops* element contains the following elements.

Element	**Description**
LinkDistance	The total distance in meters of the link that the vehicle is currently at.
Percentage	The percentage of the link that the vehicle has moved so far.

The *MonitoredVehicleJourney* element contains the following elements.

Element	Description
LineRef	The line of the journey.
FramedVehicleJourneyRef	See below.
PublishedLineName	The name of the line as displayed to the general public.
Monitored	Always set to “true”.
VehicleLocation	See below.
Bearing	The current bearing of the vehicle from the onboard GPS receiver. The *Bearing* element is only present if the vehicle has a valid and known position.
Occupancy	The vehicle occupancy (full, seatsAvailable, standingAvailable). Also see the server configuration option “PublishOccupancy”.
Delay	The delay of the vehicle as compared to the timetable.
VehicleRef	The vehicle identity. Also see the server configuration option “PublishVehicleRef”.
MonitoredCall	See below.
PreviousCalls	See below.

A *FramedVehicleJourneyRef* contains the following elements.

Element	Description
DataFrameRef	The calendar day of the journey.
DatedVehicleJourneyRef	The external journey id.

A *VehicleLocation* contains the following elements. The *VehicleLocation* element is only present if the vehicle has a valid and known position.

Element	Description
Longitude	The longitude of the vehicle position.
Latitude	The latitude of the vehicle position.

A *MonitoredCall* is the call currently being made by the vehicle. It contains the following elements.

Element	Description
StopPointRef	The stop point that the call is for.
VisitNumber	The order of the call within the journey.
StopPointName	The name of the stop point as displayed to the general public.
VehicleAtStop	Value indicating if the vehicle is currently at the stop or not.
Extensions	An extension element is optionally present if the Occupancy Extension is enabled and there is alighting or boarding data for the current stop point. The extension element can contain an ITS4mobility element with a Vehicle element and an OccupancyChange element. No other extension elements will be present in this context.

A *PreviousCalls* element contains a single *PreviousCall* element that represents the previous stop point. The *PreviousCall* element contains the following elements.

Element	Description
StopPointRef	The stop point that the call is for.
VisitNumber	The order of the call within the journey. In this case it will always have the value “1”.
StopPointName	The name of the stop point as displayed to the general public.
VehicleAtStop	Value indicating if the vehicle is currently at the stop or not. In this case it will always have the value “false”.
Extensions	A PreviousCall extension element is optionally present if the Occupancy Extension is enabled and there is alighting or boarding data for the previous stop point. The extension element can contain an ITS4mobility element with a Vehicle element and an OccupancyChange element. No other extension elements will be present in this context.

The VehicleActivity *Extensions* element contains the *ITS4mobility* extension element which may contain a *Vehicle*. The schema for the full extension is found in the appendix. Also see the server configuration option “PublishOccupancyExtension” which needs to be enabled.

The extension *Vehicle* element may contain the following elements:

Element	Description
PassengerCapacity	See below.
PassengerCount	The number of passengers.
OccupancyPercent	Percent occupancy on the vehicle. **Values range between 0 and 200.** The range 0 to 100 is for seated and 100 to 200 for standing.
OccupancyChange	See below.

The *PassengerCapacity* element contain the following elements:

Element	Description
Seats	The number of seats the vehicle has available.
Stands	The number of standing passengers the vehicle can accommodate.

The *OccupancyChange* element is only present in the MonitoredCall and PreviousCall context.
The *OccupancyChange* element may contain the following elements:

Element	Description
AlightingCount	The number of passengers that left the vehicle.
BoardingCount	The number of passengers that boarded the vehicle.

4. Server Configurations

Some settings that are configurable on the server will affect the output from the server:

4.1. PublishIntervalInSeconds

The minimum number of seconds between posts of the *ServiceDelivery* documents. If set to 5, vehicle reports will be cached and sent every 5 seconds.

4.2. MaxSubscriptionQueueSize

The number of outgoing documents that can be queued for delivery. If the queue exceeds this size, the subscription will be terminated.

4.3. PublishVehicleRef

If set to “true”, the *MonitoredVehicleJourney.VehicleRef* element will be published. If set to “false”, the vehicle identity will not be published.

4.4. PublishOccupancy

If set to ”true”, the *MonitoredVehicleJourney.Occupancy* element will be published. If set to “false”, the occupancy will not be published.

4.5. PublishOccupancyExtension

If set to ”true”, the *VehicleActivity.Extensions.ITS4mobility.Vehicle* element will be published. The *Vehicle* element contains detailed occupancy data. If set to “false”, the extension data will not be published.

5. References

CEN/TS 15531-1:2007 Service interface for real-time information relating to public transport operations: Context and framework.

CEN/TS 15531-2:2007 Service interface for real-time information relating to public transport operations: Communications infrastructure.

CEN/TS 15531-3:2007 Service interface for real-time information relating to public transport operations: Functional service interfaces.

CEN/TS 15531-4:2011 Service interface for real-time information relating to public transport operations: Functional service interfaces - Facility Monitoring

CEN/TS 15531-5:2011 Service interface for real-time information relating to public transport operations: Functional service interfaces - Situation Exchange

6. Document history

Revision	Date	Comment
1	2014-02-14	Version 1.
2	2014-06-26	PublishVehicleRef added. Version 2.
3	2018-06-02	Added occupancy. Version 3.
4	2019-03-30	Expanded occupancy. Updated extension schema. Added example with occupancy extension. Version 4.

7. Appendix

7.1. The ITS4mobility VM extension schema

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema xmlns="http://tmix.se/siri/vm/va" attributeFormDefault="unqualified"
elementFormDefault="qualified" targetNamespace="http://tmix.se/siri/vm/va"
xmlns:xs="http://www.w3.org/2001/XMLSchema">

    <xs:complexType name="OccupancyChangeType">
        <xs:sequence>
            <xs:element name="AlightingCount" type="xs:int">
                <xs:annotation>
                    <xs:documentation>Number of passengers that left the vehicle.</xs:documentation>
                </xs:annotation>
            </xs:element>
            <xs:element name="BoardingCount" type="xs:int">
                <xs:annotation>
                    <xs:documentation>Number of passengers that boarded the vehicle.</xs:documentation>
                </xs:annotation>
            </xs:element>
        </xs:sequence>
    </xs:complexType>


    <xs:element name="ITS4mobility">
        <xs:complexType>
            <xs:sequence>
                <xs:element name="Vehicle" minOccurs="0">
                    <xs:complexType>
                        <xs:sequence>
                            <xs:element name="PassengerCapacity" minOccurs="0">
                                <xs:complexType>
                                    <xs:sequence>
                                        <xs:element name="Seats" type="xs:int" minOccurs="0">
                                            <xs:annotation>
                                                <xs:documentation>Total number of available seats. If
AvailableStands exists, it is for seated passengers, otherwise it is the number of passengers the vehicle has
room for.</xs:documentation>
                                            </xs:annotation>
                                        </xs:element>
                                        <xs:element name="Stands" type="xs:int" minOccurs="0">
                                            <xs:annotation>
                                                <xs:documentation>Total number of available places for
standing passengers.</xs:documentation>
                                            </xs:annotation>
                                        </xs:element>
                                    </xs:sequence>
                                </xs:complexType>
                            </xs:element>
                            <xs:element name="PassengerCount" type="xs:int" minOccurs="0">
                                <xs:annotation>
                                    <xs:documentation>Current number of passengers on the
vehicle.</xs:documentation>
                                </xs:annotation>
                            </xs:element>
                            <xs:element name="OccupancyPercent" type="xs:int" minOccurs="0">
                                <xs:annotation>
                                    <xs:documentation>
                                        Percent occupancy on the vehicle. Values range between 0 and 200. The
range 0 to 100 is for seated and 100 to 200 for standing.
                                    </xs:documentation>
                                </xs:annotation>
                            </xs:element>
                            <xs:element name="OccupancyChange" type="OccupancyChangeType" minOccurs="0" />
                        </xs:sequence>
                    </xs:complexType>
```

```
                </xs:element>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
</xs:schema>
```

7.2. Example VehicleMonitoringSubscriptionRequest

```
<?xml version="1.0"?><AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:SubscriptionRequest>
    <AA:RequestTimestamp>2014-02-17T22:05:32</AA:RequestTimestamp>
    <AA:RequestorRef>ITS4mobilityTestClient</AA:RequestorRef>
    <AA:MessageIdentifier>MessageIdentifier</AA:MessageIdentifier>
    <AA:ConsumerAddress>http://192.168.4.15:80/siri/client/</AA:ConsumerAddress>
    <AA:SubscriptionContext>
      <AA:HeartbeatInterval>PT1M</AA:HeartbeatInterval>
    </AA:SubscriptionContext>
    <AA:VehicleMonitoringSubscriptionRequest>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionIdentifier>ITS4mobilityTestClient</AA:SubscriptionIdentifier>
      <AA:InitialTerminationTime>9999-12-31T23:59:59.999</AA:InitialTerminationTime>
      <AA:VehicleMonitoringRequest version="1.4">
        <AA:RequestTimestamp>2014-02-17T22:05:32</AA:RequestTimestamp>
      </AA:VehicleMonitoringRequest>
    </AA:VehicleMonitoringSubscriptionRequest>
  </AA:SubscriptionRequest>
</AA:Siri>
```

7.3. Example VehicleMonitoringDelivery

```
<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:ServiceDelivery>
    <AA:ResponseTimestamp>2014-02-17T22:06:46</AA:ResponseTimestamp>
    <AA:ProducerRef>ITS4mobility-VM</AA:ProducerRef>
    <AA:VehicleMonitoringDelivery version="1.4">
      <AA:ResponseTimestamp>2014-02-17T22:06:46</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:ValidUntil>9999-12-31T23:59:59</AA:ValidUntil>
      <AA:VehicleActivity>
        <AA:RecordedAtTime>2014-02-17T22:06:40</AA:RecordedAtTime>
        <AA:ValidUntilTime>9999-12-31T23:59:59</AA:ValidUntilTime>
        <AA:ProgressBetweenStops>
          <AA:LinkDistance>589</AA:LinkDistance>
          <AA:Percentage>86.59</AA:Percentage>
        </AA:ProgressBetweenStops>
        <AA:MonitoredVehicleJourney>
          <AA:LineRef>4</AA:LineRef>
          <AA:FramedVehicleJourneyRef>
            <AA:DataFrameRef>2014-02-17T04:00:00</AA:DataFrameRef>
            <AA:DatedVehicleJourneyRef>3879557</AA:DatedVehicleJourneyRef>
          </AA:FramedVehicleJourneyRef>
          <AA:PublishedLineName>4</AA:PublishedLineName>
          <AA:Monitored>true</AA:Monitored>
          <AA:VehicleLocation>
            <AA:Longitude>5.35547998733819</AA:Longitude>
            <AA:Latitude>60.4621616564691</AA:Latitude>
          </AA:VehicleLocation>
          <AA:Bearing>66</AA:Bearing>
          <AA:Delay>PT168S</AA:Delay>
          <AA:VehicleRef>3350248630</AA:VehicleRef>
          <AA:MonitoredCall>
            <AA:StopPointRef>12011368</AA:StopPointRef>
            <AA:VisitNumber>40</AA:VisitNumber>
            <AA:StopPointName>Flaktveitsvingane</AA:StopPointName>
            <AA:VehicleAtStop>false</AA:VehicleAtStop>
          </AA:MonitoredCall>
        </AA:MonitoredVehicleJourney>
      </AA:VehicleActivity>
    </AA:VehicleMonitoringDelivery>
  </AA:ServiceDelivery>
</AA:Siri>
```

7.4. Example VehicleMonitoringDelivery with Extensions

```
<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
   <AA:ServiceDelivery>
       <AA:ResponseTimestamp>2019-03-29T21:57:28</AA:ResponseTimestamp>
       <AA:ProducerRef>ITS4mobility-VM</AA:ProducerRef>
       <AA:VehicleMonitoringDelivery version="1.4">
           <AA:ResponseTimestamp>2019-03-29T21:57:28</AA:ResponseTimestamp>
           <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
           <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
           <AA:ValidUntil>9999-12-31T23:59:59</AA:ValidUntil>
           <AA:VehicleActivity>
               <AA:RecordedAtTime>2019-03-29T21:56:24</AA:RecordedAtTime>
               <AA:ValidUntilTime>9999-12-31T23:59:59</AA:ValidUntilTime>
               <AA:ProgressBetweenStops>
                   <AA:LinkDistance>417</AA:LinkDistance>
                   <AA:Percentage>26.14</AA:Percentage>
               </AA:ProgressBetweenStops>
               <AA:MonitoredVehicleJourney>
                   <AA:LineRef>3</AA:LineRef>
                   <AA:FramedVehicleJourneyRef>
                       <AA:DataFrameRef>2019-03-29T04:00:00</AA:DataFrameRef>

<AA:DatedVehicleJourneyRef>7598976_106941</AA:DatedVehicleJourneyRef>
                   </AA:FramedVehicleJourneyRef>
                   <AA:PublishedLineName>3</AA:PublishedLineName>
                   <AA:Monitored>true</AA:Monitored>
                   <AA:VehicleLocation>
                       <AA:Longitude>5.32271831296384</AA:Longitude>
                       <AA:Latitude>60.4095216281712</AA:Latitude>
                   </AA:VehicleLocation>
                   <AA:Bearing>6.5313720703125</AA:Bearing>
                  <AA:Occupancy>standingAvailable</AA:Occupancy>
                   <AA:Delay>PT203S</AA:Delay>
                  <AA:VehicleRef>3350248642</AA:VehicleRef>
                   <AA:PreviousCalls>
                       <AA:PreviousCall>
                           <AA:StopPointRef>12011110</AA:StopPointRef>
                           <AA:VisitNumber>22</AA:VisitNumber>
                           <AA:StopPointName>Sandvikstorget</AA:StopPointName>
                           <AA:VehicleAtStop>false</AA:VehicleAtStop>
                           <AA:Extensions>
                             <ITS4mobility xmlns="http://tmix.se/siri/vm/va">
                               <Vehicle>
                                 <OccupancyChange>
                                   <AlightingCount>1</AlightingCount>
                                   <BoardingCount>7</BoardingCount>
                                 </OccupancyChange>
                               </Vehicle>
                             </ITS4mobility>
                           </AA:Extensions>
                       </AA:PreviousCall>
                   </AA:PreviousCalls>
                   <AA:MonitoredCall>
                       <AA:StopPointRef>12011112</AA:StopPointRef>
                       <AA:VisitNumber>23</AA:VisitNumber>
```

```
                    <AA:StopPointName>Ludebryggen</AA:StopPointName>
                    <AA:VehicleAtStop>false</AA:VehicleAtStop>
                  </AA:MonitoredCall>
                </AA:MonitoredVehicleJourney>
                <AA:Extensions>
                  <ITS4mobility xmlns="http://tmix.se/siri/vm/va">
                    <Vehicle>
                      <PassengerCapacity>
                        <Seats>32</Seats>
                        <Stands>8</Stands>
                      </PassengerCapacity>
                      <PassengerCount>37</PassengerCount>
                      <OccupancyPercent>162</OccupancyPercent>
                    </Vehicle>
                  </ITS4mobility>
                </AA:Extensions>
              </AA:VehicleActivity>
            </AA:VehicleMonitoringDelivery>
          </AA:ServiceDelivery>
        </AA:Siri>
```