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SignalR

Uses .net framework version of signalr server and need to use the corresponding client library for communication (.NET core is not compatible according to documentation). See official SignalR documentation for general advice and lifecycle.

When connecting client needs to set authentication using basic-auth header or append "access_token" with basic-auth value in the query string. Once connected client is expected to call server "Subscribe" method with json object in accordance to "SubscribeRequest" and setting version in accordance to used version. "SubscribeRequest" has message filter property to have server filtering of messages and can also be used to filter future additions to messages, that the client might not know of at the time of implementation. Don't forget to listen to OnMsgs that will be called by server whenever a matching message is available.

Configuration:

hub-uri=/Tmix.Cap.ExternalApi/signalr/hubs

hub-name=realtimehub

Client methods

```
void OnMsgs(List<Msg> msgs)
```

Server methods

```
void Subscribe(SubscribeRequest request)
```

```
void Unsubscribe()
```

General principle for clients is that the [schema files](#) are documentation over the data rather than a strict schema e.g. the clients need to handle new properties and the fact that enums could have values not matching schema.

Authentication

Authentication is using basic-auth style where the authentication token can be passed as query param "access_token" or request header "authorization".

The token is created similar to the [standard](#):

1. obtains the user-id and password
2. constructs the user-pass by concatenating the user-id, a single colon (":") character, and the password
3. encodes the user-pass into an octet sequence
4. and obtains the basic-credentials by encoding this octet sequence using Base64

Messages

Messages are wrapped in a generic message consisting of message header and a reference to the message.

Message structure

As seen in the [schema files](#) the structure is:

```
{
  "Header": { ... },
  "Message": { ... }
}
```

The name of the message can be found inside the "Header" to correctly interpret the "Message" correctly.

Name	Description
MsgVehicleEvent	General message for tracking vehicle and events that occur during normal operation.
MsgDriverStatus	Tracking of driver (driver status e.g. login, logout). Seperate message but can also be attached to vehicle event.
MsgPositions	Compressed low resolution positioning message - containing a list of positions. Only enabled in certain systems.
MsgSystemEvent	An offboard generated event message depending on rules and configurations. Only enabled in certain systems.

Message samples

```
{
  "Header": {
    "MessageName": "MsgVehicleEvent"
  },
  "Message": {
    "Vehicle": {
      "ExternalId": "HelloVehicle"
    },
    "Company": {
      "ExternalId": "1"
    },
    "Event": {
      "EventType": "VehicleEventTypeAlarmActiveState",
      "VehicleTimestamp": "2019-04-15T14:27:35.000000Z"
    },
    "Position": {
      "Timestamp": "1970-01-01T00:00:00.000000Z",
      "Hdop": 100,
      "Vdop": 100,
      "Latitude": 0,
      "Longitude": 0,
      "Altitude": 0
    },
    "Metadata": {
      "Alarms": [
        {
          "SourceType": "PID",
          "Mid": 128,
          "Number": 100,
          "Fmi": 1,
          "Type": "Mid",
          "Name": "VolvoJ1587J17081et",
          "Instance": "MID_128",
          "AlarmCode": 0,
          "Severity": "Critical"
        },
        {
          "TellTale": 8,
          "Type": "Fms",
          "Name": "FmsCanlet",
          "Instance": "FMS_0",
          "AlarmCode": 0,
          "Severity": "Critical"
        }
      ],
      "Signals": [
        {
          "Name": "AnyDoorOpen",
          "Value": "0"
        }
      ]
    }
  }
}
```

```
{
  "Header": {
    "MessageName": "MsgVehicleEvent"
  },
  "Message": {
    "Vehicle": {
      "ExternalId": "B5LH_100000"
    },
    "Company": {
      "ExternalId": "1000"
    },
    "Driver": {
      "ExternalId": "S 1000000000000000"
    },
    "Event": {
      "EventType": "VehicleEventTypeSignalChanged",
      "VehicleTimestamp": "2019-01-01T14:37:12.419000Z"
    }
  }
}
```

```
    },
    "Position": {
      "Timestamp": "2019-04-15T14:37:12.000000Z",
      "Hdop": 1,
      "Vdop": 1,
      "Speed": 0,
      "Latitude": 57.70784539170563,
      "Longitude": 11.937675308436155,
      "Altitude": 13
    },
    "Metadata": {
      "Signals": [
        {
          "Name": "AnyDoorOpen",
          "Value": "0"
        },
        {
          "Name": "Axle1Weight",
          "Value": "6638"
        },
        {
          "Name": "Axle2Weight",
          "Value": "10725"
        },
        {
          "Name": "BatteryVoltage",
          "Value": "28.3"
        },
        {
          "Name": "EngineCoolantTemp",
          "Value": "63"
        },
        {
          "Name": "FuelConsumption",
          "Value": "17.3491230010986"
        },
        {
          "Name": "FuelLevel",
          "Value": "96"
        },
        {
          "Name": "InsidePassengerTemperature",
          "Value": "22"
        },
        {
          "Name": "Odometer",
          "Value": "145781"
        },
        {
          "Name": "OutsideTemperature",
          "Value": "15"
        },
        {
          "Name": "RegenerationMoveDelay",
          "Value": "370800"
        },
        {
          "Name": "RegenerationMoveStatus",
          "Value": "0"
        },
        {
          "Name": "RegenerationParkDelay",
          "Value": "590400"
        },
        {
          "Name": "RegenerationParkStatus",
          "Value": "1"
        },
        {
          "Name": "StateOfCharge",
          "Value": "80"
        },
        {
          "Name": "TotalDistance",
          "Value": "126286245"
        },
        {
          "Name": "TotalEngineHours",
          "Value": "1009"
        },
        {
          "Name": "TotalFuelUsed",
          "Value": "1879"
        }
      ],
      "SignalChange": [
        {
          "ValueType": "PreviousValue",
          "Name": "StateOfCharge",

```

```

        "Value": "79"
      },
      {
        "ValueType": "CurrentValue",
        "Name": "StateOfCharge",
        "Value": "80"
      }
    ]
  }
}

{
  "Header": {
    "MessageName": "MsgDriverStatus"
  },
  "Message": {
    "Vehicle": {
      "ExternalId": "B5LH_100000"
    },
    "Company": {
      "ExternalId": "1000"
    },
    "Driver": {
      "ExternalId": "S 1000000000000000"
    },
    "DriverStatus": {
      "SourceDriverReference": "S 1000000000000000",
      "StatusType": "Login",
      "Source": "Ui",
      "Timestamp": "2019-01-01T13:00:00.000000Z",
      "SequenceNumber": 9
    }
  }
}

{
  "Header": {
    "MessageName": "MsgVehicleEvent"
  },
  "Message": {
    "Vehicle": {
      "ExternalId": "B5LH_100000"
    },
    "Company": {
      "ExternalId": "1000"
    },
    "Driver": {
      "ExternalId": "S 1000000000000000"
    },
    "Event": {
      "EventType": "VehicleEventTypeDriverLogin",
      "VehicleTimestamp": "2019-01-01T13:00:00.000000Z"
    },
    "Position": {
      "Timestamp": "2019-01-01T13:00:00.000000Z",
      "Hdop": 100,
      "Vdop": 100,
      "Speed": 0,
      "Latitude": 0,
      "Longitude": 0,
      "Altitude": 0
    },
    "Metadata": {
      "Signals": [
        {
          "Name": "AnyDoorOpen",
          "Value": "0"
        },
        {
          "Name": "FuelConsumption",
          "Value": "0"
        }
      ]
    },
    "Data": {
      "DriverStatus": {
        "SourceDriverReference": "S 1000000000000000",
        "StatusType": "Login",
        "Source": "Ui",
        "Timestamp": "2019-01-01T13:00:00.000000Z",
        "SequenceNumber": 9
      }
    }
  }
}

```

```

}

{
  "Header": {
    "MessageName": "MsgSystemEvent"
  },
  "Message": {
    "Company": {
      "ExternalId": "35"
    },
    "Event": {
      "Id": 10545795,
      "EventType": "VehicleOffRouteEvent",
      "Properties": {
        "Altitude": "49.00000",
        "AltitudeValid": "True",
        "BlockId": "10360510",
        "CalendarDayServerLocalTime": "2022-01-04 04:00:00",
        "Distance": "9",
        "DriverId": "0",
        "ExternalBlockId": "2420693",
        "ExternalIdStopPoint": "12016652",
        "ExternalJourneyId": "11979084_151014",
        "ExternalLineId": "51",
        "Heading": "0",
        "HeadingValid": "False",
        "JourneyId": "10329891",
        "LateTimeSec": "-65",
        "Latitude": "60.28990",
        "LineId": "35051",
        "LineName": "51",
        "Longitude": "5.25962",
        "LongitudeLatitudeValid": "True",
        "Reason": "Unknown",
        "SeqNumInJourney": "25",
        "Speed": "0.4",
        "SpeedValid": "True",
        "StopPointId": "12016652",
        "SystemAddress": "3350387141"
      },
      "CreatedTimestamp": "2022-01-04T12:07:56.8970000Z",
      "Source": "NV Vehicle3(3350387141)"
    }
  }
}

```

```

{
  "Header": {
    "MessageName": "MsgVehicleEvent"
  },
  "Message": {
    "Vehicle": {
      "ExternalId": "3350-453137"
    },
    "Company": {
      "ExternalId": "45"
    },
    "Event": {
      "EventType": "VehicleEventTypeNextStopPressed",
      "VehicleTimestamp": "2023-04-21T13:35:22.42+02:00"
    },
    "Position": {
      "Timestamp": "2023-04-21T13:35:22+02:00",
      "Heading": 324.5,
      "Hdop": 1.0,
      "Vdop": 1.0,
      "Speed": 5.04,
      "Latitude": 60.39284264668822,
      "Longitude": 5.331185460090637,
      "Altitude": 16.0
    },
    "LogicalPosition": {
      "Timestamp": "2023-04-21T13:35:22.42+02:00",
      "OperatingCalendarDay": "2023-04-21",
      "SequenceNumber": 55306,
      "JourneyStatus": "InBetween",
      "ServiceType": "Towrun",
      "StatusFlags": [
        "NextStopPressed",
        "NextIsTimingPoint"
      ],
      "IsValid": false,
      "Delay": 9,
      "BlockExternalId": "0011",
      "JourneyExternalId": "11122222_160333",

```

```
    "SequenceNumInJourney": 26,
    "Distance": 65
  },
  "Metadata": {
    "Signals": [
      {
        "Name": "AnyDoorOpen",
        "Value": "0"
      },
      {
        "Name": "BatteryVoltage",
        "Value": "27.7"
      },
      {
        "Name": "GsmNetworkType",
        "Value": "13"
      },
      {
        "Name": "GsmSignalStrength",
        "Value": "96"
      },
      {
        "Name": "InsidePassengerTemperature",
        "Value": "21"
      },
      {
        "Name": "Odometer",
        "Value": "5982894"
      },
      {
        "Name": "OffboardChargerConnected",
        "Value": "0"
      },
      {
        "Name": "OutsideTemperature",
        "Value": "22"
      },
      {
        "Name": "PeopleOnboard",
        "Value": "24"
      },
      {
        "Name": "RemainingRange",
        "Value": "229028"
      },
      {
        "Name": "StateOfCharge",
        "Value": "62"
      },
      {
        "Name": "TotalEngineHours",
        "Value": "5278"
      },
      {
        "Name": "TotalPeopleInOnboard",
        "Value": "69"
      },
      {
        "Name": "TotalPeopleOutOnboard",
        "Value": "45"
      },
      {
        "Name": "VehicleSpeed",
        "Value": "5.27778196334839"
      }
    ]
  }
}
```

Vehicle event types

[Portal documentation](#)

Name	Description
VehicleEventTypeNone	
VehicleEventTypeOdometer	Triggered by the odometer changing more than the configured amount of meters, normally between 100-250m. Reset if any other positional event is triggered
VehicleEventTypeDoorOpen	Triggered by a change from door closed to door open
VehicleEventTypeDoorClose	Triggered by a change from door opened to door closed

Name	Description
VehicleEventTypeUnexpectedDoorOpen	Triggered if a door open event happens outside a stop point geofence when on journey
VehicleEventTypeSpeedLimitTriggerFired	Triggered when the vehicle speed exceeds a configured speed limit, this is triggered for every limit exceeded, i.e if 60 and 70kmh are configured an event will trigger at 65 and one at 71 .e.g.. A new event won't trigger until a clear is VehicleEventTypeSpeedLimitTriggerRearmed for the particular limit.
VehicleEventTypeSpeedLimitTriggerRearmed	Triggered when a VehicleEventTypeSpeedLimitTriggerFired is rearmed, this uses a hysteresis of 95% of the limit by default
VehicleEventTypeTimeLimit	Triggered if no other event has been sent since a configured amount of seconds, normally 120s. Reset if any other positional event is triggered
VehicleEventTypeGpsDistanceLimit	Triggered if the gps position since the last event is farther away than a configured amount of meters normally 250m. Reset if any other positional event is triggered
VehicleEventTypeGpsHeadingDelta	Triggered if the heading since the last event has changed more than a set number of degrees, normally 45. Reset if any other positional event is triggered
VehicleEventTypeScriptTrigger	Triggered when a script rule has triggered a script to run.
VehicleEventTypeNetworkStateChange	Triggered whenever the network state changes from UP to DOWN or DOWN to UP
VehicleEventTypeDataBlockInfo	Triggered whenever a message is received that isn't allowed
VehicleEventTypeAlarmActivated	Triggered when an alarm state is triggered in the vehicle, could be an FMS tell tale fault, BEA, J1939, J1708 or internal faults such as GPS failure
VehicleEventTypeAlarmCleared	Triggered when a previously activated alarm is cleared.
VehicleEventTypeSignalChanged	Triggered whenever a configured signal change rule is triggered, any signal from any CAN, J1708, digital in or internal signals can be used.
VehicleEventTypeSignalState	Triggered whenever the signal state of configured signals which are normally sent with each event needs to be sent when no other event is triggered
VehicleEventTypeDriverLogin	Triggered when a driver logs in to the system, either through USB, Tacho, Fareboxes or GUI
VehicleEventTypeDriverLogout	Triggered when a logged in driver logs out, or a new driver is detected
VehicleEventTypeDriverInit	Triggered whenever the system has been offline from the system more than 1s, normally at each reboot
VehicleEventTypeVehicleMovingStart	Triggered whenever the vehicle speed exceeds 0.1m/s
VehicleEventTypeVehicleMovingStop	Triggered whenever the vehicle speed decreases below 0.1m/s
VehicleEventTypeRequestResponse	Triggered when an external request for the vehicle's position is received.
VehicleEventTypeFuelDrain	Triggered if a fuel drain has been detected
VehicleEventTypeFmsTellTaleChange	Triggered if an FMS tell tale changes. This is in addition to event type: VehicleEventTypeAlarmActivated/VehicleEventTypeAlarmCleared
VehicleEventTypeAlarmActiveState	Triggered as a periodic update of the current alarm state of the vehicle, that is all currently active alarms.
VehicleEventTypeDataLimitInfo	Triggered when a data limit update is sent. A state containing the data usage if a configured group of events and their configured warning and block limits.

Name	Description
VehicleEventTypeAlcoLockTestNegative	Triggered whenever a alco lock test has been detected with a negative response.
VehicleEventTypeAlcoLockTestPositive	Triggered whenever a alco lock test has been detected with a positive response.
VehicleEventTypeConnectionLimitInfo	Triggered when a connection limit update is sent. A state containing the number of GPRS reconnects the current month, week, day and their warning and blocks limits.
VehicleEventTypeIgnitionOn	Triggered whenever a ignition transition to ON is detected. Will also happen on every reboot of the unit.
VehicleEventTypeIgnitionOff	Triggered whenever a ignition transition to OFF is detected
VehicleEventTypePassengerCount	Triggered whenever a passenger count update is sent. Normally at every departure.
VehicleEventTypePassengerCountLimitExceeded	Triggered if the current number of passenger exceeds a configured number or if the manual trigger button of bus full is pressed.
VehicleEventTypePassengerCountLimitCleared	Triggered when a previous VehicleEventTypePassengerCountLimitExceeded is cleared.
VehicleEventTypeTwoWayTextSent	Triggered whenever a text message is sent by the driver
VehicleEventTypeTwoWayTextReceived	Triggered whenever a text message is received.
VehicleEventTypeHarshForwardAcceleration	Triggered when a harsh acceleration is detected, i.e. when the acceleration exceeds a configured limit. Can be set globally or specifically in certain geofences
VehicleEventTypeHarshForwardDeacceleration	Triggered when a harsh braking is detected, i.e. when the deacceleration exceeds a configured limit. Can be set globally or specifically in certain geofences
VehicleEventTypeHarshUpwardAcceleration	Triggered when a harsh upward acceleration is detected, i.e. when the passing a speed bump too harshly. Limit can be set globally or specifically in certain geofences
VehicleEventTypeHarshUpwardDeacceleration	Triggered when a harsh downward acceleration is detected, i.e. when the passing a hole in the street too harshly. Limit can be set globally or specifically in certain geofences
VehicleEventTypeHarshRightAcceleration	Triggered when a harsh right acceleration is detected, i.e. if a shock force from the left is detected, or turning creates a excessive G-force. Limit can be set globally or specifically in certain geofences
VehicleEventTypeHarshRightDeacceleration	Triggered when a harsh left acceleration is detected, i.e. if a shock force from the right is detected, or turning creates a excessive G-force. Limit can be set globally or specifically in certain geofences
VehicleEventTypeHarshAngularMovement	Triggered the rate of turning degrees exceeds a certain limit, that is a turning G-focre. Limit can be set globally or specifically in certain geofences
VehicleEventTypeInclinationLimitExceeded	Not used
VehicleEventTypeInclinationLimitCleared	Not used
VehicleEventTypeOverSpeedExceeded	Triggered when the vehicle speed exceeds a configured limit.
VehicleEventTypeOverSpeedCleared	Triggered when a previously triggered VehicleEventTypeOverSpeedExceeded speed limit decreases below the set limit. A hysteresis on 94% is used by default
VehicleEventTypeSignalDiffLimitExceeded	Triggered whenever a monitored custom signal rule exceeds the set limit.
VehicleEventTypeSignalDiffLimitCleared	Triggered whenever a previously trigged VehicleEventTypeSignalDiffLimitCleared monitored custom signal rule decreases below the limit

Name	Description
VehicleEventTypeGeoFenceEnter	Not used, see VehicleEventTypeZoneStateEvent
VehicleEventTypeGeoFenceLeave	Not used, see VehicleEventTypeZoneStateEvent
VehicleEventTypeExcessiveldling	Triggered whenever a vehicle has been idling, standing still with engine on, for more than configured amount of seconds, normally 120
VehicleEventTypeGeoFenceOverSpeedExceeded	Not used, see VehicleEventTypeZoneDeviationEvent
VehicleEventTypeGeoFenceOverSpeedCleared	Not used, see VehicleEventTypeZoneDeviationEvent
VehicleEventTypeOverRevExceeded	Triggered whenever the RPM of the vehicle exceeds a set limit.
VehicleEventTypeOverRevCleared	Triggered whenever a previously triggered VehicleEventTypeOverRevCleared decreases below the set limit. A hysteresis of 94% is used by default.
VehicleEventTypeJourneyNew	Triggered whenever a new journey is assigned to the vehicle.
VehicleEventTypeJourneyStart	Triggered whenever a assigned journey starts, that is its starting condition's apply, such as start time, geographical closeness and/or movement
VehicleEventTypeJourneyCancel	Whenever an assigned journey is removed before its designated destination
VehicleEventTypeJourneyEnd	Triggered when a journey reaches its end destination, i.e. the last stop point
VehicleEventTypeJourneyOffRoute	Triggered whenever the vehicle leaves the route defined by the journey by more than 70% of the radius of the current link distance.
VehicleEventTypeJourneyOnRoute	Triggered when a previously VehicleEventTypeJourneyOffRoute returns back onto the route defined by the journey
VehicleEventTypeJourneyDeviationUpdate	Triggered whenever the local estimated delay from timetable (adherence) changes more than a set delta since last update. 30s by default.
VehicleEventTypeJourneyTimeUpdate	Triggered if no other journey event has triggered for a set time. 120s by default. Resets on any other journey event.
VehicleEventTypeJourneyStopPointArrive	Triggered when a bus arrives at a stop point on the current journey, i.e. inside the geofence defined by the stop point and opens the doors.
VehicleEventTypeJourneyStopPointDepart	Triggered whenever the vehicle leaves the geofence defined by the stop point it has previously sent a VehicleEventTypeJourneyStopPointArrive for.
VehicleEventTypeJourneyStopPointPassBy	Triggered whenever the vehicle passes a stop point defined by the journey without stopping and opening the door, i.e. no passengers could embark/disembark
VehicleEventTypeJourneyRepositionAutomaticAssignment	Triggered whenever the vehicle's logical position on the route defined by the journey is changed due a change of assigned journey.
VehicleEventTypeJourneyRepositionManualAssignment	Triggered whenever the vehicle's logical position on the route defined by the journey is changed due to a manual change of assignment by the driver.
VehicleEventTypeJourneyRepositionManualOverride	Triggered whenever the drivers changes the current stop point manually on the currently assigned journey, normally done if starting in the middle of a journey or if GPS coverage is lost and the odometer based route adherence get out of sequence.
VehicleEventTypeJourneyRepositionFromOffroute	Triggered whenever a vehicle changes its logical position when returning from offroute, i.e. skipped from one link to another, thus skipping stop points while offroute.
VehicleEventTypeJourneyRepositionDoor	Triggered whenever the vehicle's position logic changes it route adherence due to matching of stop point geofences when the

Name	Description
VehicleEventTypeJourneyPointInLinkEnter	door opens, to a stop different from the one next in sequence. Such as an unplanned short run/turn. Triggered whenever the geofence of a route adherence measure point is entered. Default off. Can be used to debug route adherence or connect logic to a certain route point in the backend
VehicleEventTypeJourneyPointInLinkLeave	Triggered whenever the geofence of a route adherence measure point is entered. Default off.. Can be used to debug route adherence or connect logic to a certain route point in the backend
VehicleEventTypeJourneyAtStopEnter	Triggered when the vehicle enters inside the geofence of the stop point in sequence.
VehicleEventTypeJourneyAtStopLeave	Triggered when the vehicle leaves a previously triggered stop point geofence.
VehicleEventTypeUpdateSigns	Triggered whenever the internal or external signs are updated, .i.e. when new text is displayed.
VehicleEventTypeNextStopPressed	Triggered when the next stop button is pressed.
VehicleEventTypeInterchangeQueryRequest	Triggered when a driver requests that a connecting vehicle should wait for the current vehicle's arrival.
VehicleEventTypeInterchangeQueryResponse	Triggered when a previous request is responded to.
VehicleEventTypeVolumeChanged	Triggered whenever the volume is changed on internal, external or driver speaker.
VehicleEventTypeInternalSpeakerCall	Triggered when a passenger audio announcement is made for the next stop in sequence on the interior speakers.
VehicleEventTypeExternalSpeakerCall	Triggered when a passenger audio announcement is made for current stop on the exterior speakers.
VehicleEventTypeDriverSpeakerCall	Triggered when an audio announcement on the driver speakers.
VehicleEventTypeAllSpeakerCall	Triggered when an audio announcement is made through all speakers.
VehicleEventTypeLoopArrive	Triggered when a loop is detected, either physical induction loop or virtual geofence loop
VehicleEventTypeLoopDepart	Triggered when a previously detected loop is no longer detected, either physical induction loop or virtual geofence loop
VehicleEventTypePanicAlarmActivated	Triggered when the driver triggered the panic alarm.
VehicleEventTypeInterchangeFailed	Triggered when a planned connection failed, due to either bus being late or leaving early, thus breaking the interchange rules
VehicleEventTypeInterchangeStatus	Triggered when an interchange is completed.
VehicleEventTypePointInLinkEvent	Triggered when an event is configured to trigger on a certain point in link on the current route.
VehicleEventTypePtcRequestEvent	Triggered whenever the driver requests a Push to Communicate request to the dispatch
VehicleEventTypePtcResponseEvent	Triggered when a response/acknowledgement of a previous request is received.
VehicleEventTypePtcCallStartEvent	Triggered when a voice call is started.
VehicleEventTypePtcCallEndEvent	Triggered when a voice call is terminated.
VehicleEventTypePtcCallInfoEvent	Triggered when a periodic update about a ongoing call is sent.
VehicleEventTypeZoneStateEvent	Triggered when a vehicle enters or leave a zone, containing the state of currently active zones, and currently exited and/or entered zone
VehicleEventTypeZoneStateEnterEvent	Not used, see VehicleEventTypeZoneStateEvent

Name	Description
VehicleEventTypeZoneStateLeaveEvent	Not used, see VehicleEventTypeZoneStateEvent
VehicleEventTypeJourneyOffRouteUpdate	Triggered by a vehicle as a periodic update when offroute on a journey.
VehicleEventTypeZoneDeviationEvent	Triggered when a configured deviation rule is violated for a geofence, e.g. RSL limit.
VehicleEventTypeUploadLogWatchEvent	Triggered when a log collection rule triggered a log collection.
VehicleEventTypeGpsAltitudeDelta	Triggered when the vehicle's altitude changes more than a certain delta since the last event. Reset on any other positional event.
VehicleEventTypeLeftLaneDepartureWarning	Triggered when a lane is departed to the left without using the turn signal, i.e crossing the lane line.
VehicleEventTypeRightLaneDepartureWarning	Triggered when a lane is departed to the right without using the turn signal, i.e crossing the lane line.
VehicleEventTypeForwardCollisionWarning	Triggered when a potential obstacle in front of the vehicle is detected that could cause a collision avoidance action isn't taken
VehicleEventTypePedestrianCollisionWarning	Triggered when a pedestrian in front of the vehicle is detected that could cause a collision avoidance action isn't taken
VehicleEventTypePedestrianDangerWarning	Triggered when a potential obstacle in front of the vehicle is detected that could cause a collision avoidance action isn't taken immediately
VehicleEventTypeTrafficSignDetected	Triggered when a traffic sign has been detected and decoded, such as a highway sign.
VehicleEventTypeTamperAlert	Triggered if someone is tampering with the camera used for safety detections
VehicleEventTypeFailsafeWarning	Triggered if camera used for safety detection has failed or cannot detect images.
VehicleEventTypeCloseInPathVehicleDetected	Triggered if when a vehicle is detect further ahead with a distance larger than 1.6s
VehicleEventTypeCloseInPathVehicleWarning	Triggered if when a vehicle is detect further ahead with a distance less than 1.6s
VehicleEventTypeCloseInPathVehicleCritical	Triggered if when a vehicle is detect further ahead with a distance larger than 0.8s
VehicleEventTypeTrafficSpeedInfo	Triggered when the speed exceeds the currently/last detected traffic speed sign.
VehicleEventTypeTrafficSpeedWarning	Triggered when the speed exceeds the currently/last detected traffic speed sign with larger than 5kmh.
VehicleEventTypeTrafficSpeedCritical	Triggered when the speed exceeds the currently/last detected traffic speed sign with larger than 10kmh.
VehicleEventTypeSignalPrioAvailable	Triggered when a traffic signal prio point is detected, and a manual choice is required.
VehicleEventTypeSignalPrioRequested	Triggered manual choice is selected on the current signal prio point.
VehicleEventTypeSignalPrioExpired	Triggered if a manual signal prio choice was presented to the driver but was not selected before leaving the prio point
VehicleEventTypeSignalPrioNotificationPointEnter	Triggered when an automatic signal prio point is detected
VehicleEventTypeSignalPrioNotificationPointLeave	Triggered when a previously deteted automatic signal prio point is no longer detected
VehicleEventTypeSignalPrioNotificationPointNotify	Triggered when a automatic request for priority is sent.
VehicleEventTypeAssignmentNoProgress	Triggered when a vehicle is making no progress on an assignment journey for a set amount of time, i.e. not moving

Name	Description
VehicleEventTypeDriverCoachingSummary	logically along the route, that is not progressing as planned. Triggered if a driver coaching summary is sent, with data about fuel, comfort other driving statistics.
VehicleEventTypeLinkReport	Triggered when a report with status about the coverage of the current link, that is meters actually physically covered of the route
VehicleEventTypeAnyMsg	Triggered when a configured message is trigger on the internal message bus. Used for debugging.
VehicleEventTypeJourneyRepositionLinksSkipped	Triggered if either through automatic or manual reposition links are skipped on the currently planned route, the not covering some stop points in sequence
VehicleEventTypeReportSheetAnswered	A report sheet has been entered by a person in the vehicle for a specified poi and/or location
VehicleEventTypeMovingRgnStatusChanged	Triggered if moving regeneration status is changed
VehicleEventTypeParkedRgnStatusChanged	Triggered if parked regeneration status is changed
VehicleEventTypeAtMvgRgnDelayChanged	Triggered if moving regeneration delay is changed
VehicleEventTypeAtParkRgnDelayChanged	Triggered if parked regeneration delay is changed
VehicleEventTypeAssignmentChanged	Triggered if a service (block/journey) is assigned to the vehicle (block changes to anything but 0)
VehicleEventTypeAssignmentEnd	Triggered if a service that was assigned to the vehicle is removed (block goes to 0)
VehicleEventTypePositionUpdate	Normally used for high rate of position updates out of bonds, not updating sequence number.
VehicleEventTypeJourneyUpdate	Triggered by a vehicle if it wants to update the backend for any reason.
VehicleEventTypeLinkReportSummary	Triggered when changing assignment, to report the previous state
VehicleEventTypePanicAlarmDeactivated	Triggered when the vehicle cleared the panic alarm.
VehicleEventTypePanicAlarmUpdate	Triggered when the driver triggered the panic alarm.
VehicleEventTypePanicAlarmStandStillLimit	Triggered when the driver triggered the panic alarm.
VehicleEventTypeSystemTestReport	Triggered after one or more system tests were run
VehicleEventTypeNextStopPressedButStopPassed	Triggered when the next stop button is pressed but stop was passed by.
VehicleEventTypeCCTVIncidentActivated	Triggered when the next stop button is pressed but stop was passed by.
VehicleEventTypeCCTVIncidentDeactivated	Triggered when the next stop button is pressed but stop was passed by.
VehicleEventTypeLeavingStop	Triggered when the the vehicle has started to move from stop point. Will happen before the depart event, that is triggered when leaving stop point radius or zone.
VehicleEventTypeAudioCallErrorResult	Sent when an audio call fails.
VehicleEventTypeJourneyStopPointPassThrough	As passed by, but within a defined GPS distance from the stop
VehicleEventTypeAssignmentOverlapDetected	Not in use.
VehicleEventTypeAssignmentOverlapDetectedTakeOverRequired	Triggered when assignment server responds that the assignment we want is already assigned to some other vehicle.
VehicleEventTypeAssignmentOverlapTakeOverNow	Triggered when driver chooses to take over an assignment from another vehicle, from now on.
VehicleEventTypeAssignmentOverlapReinforce	Triggered when driver reinforces an assignment.
VehicleEventTypeAssignmentOverlapCancel	Take-over request is withdrawn.

Name	Description
VehicleEventTypeAssignmentOverlapContinueLocal	Triggered when the assignment is taken over by some other vehicle, but we carry on with the assignment locally anyway.
VehicleEventCentralTypeGeoFenceEnter	
VehicleEventCentralTypeGeoFenceLeave	
VehicleEventTypeAssignmentTakeOverGrantedNow	Triggered when granting another vehicle to take over my assignment from now.
VehicleEventTypeAssignmentEndTakeOver	Triggered when a vehicle ends its assignment due to some other vehicle taking over.
VehicleEventTypeAssignmentEndTakeOverNextJourney	Triggered when a vehicle ends its assignment at journey end, due to some other vehicle taking over assignment from next journey on.
VehicleEventTypeAssignmentEndTakeOverDeniedByDriver	Triggered when the other vehicle denies you to take over its assignment.
VehicleEventTypeAssignmentEndRequest	Triggered when a vehicle gets a request from some other vehicle wanting to take over the assignment.
VehicleEventTypeAssignmentEndTakeOverDeniedByControlCentre	Triggered when control centre denies you to take over another vehicles assignment.
VehicleEventTypeAssignmentTakeOverDeny	Triggered when a driver denies another vehicle to take over its assignment.
VehicleEventTypeAssignmentOverlapTakeOverNext	Triggered when driver chooses to take over an assignment from another vehicle, from next journey on.
VehicleEventTypeAssignmentTakeOverGrantedNext	Triggered when granting another vehicle to take over my assignment from next journey.
VehicleEventTypeSignStateChanged	Triggered when automatic/manual sign state change, or data in sign message.
VehicleEventTypeHeaterPreHeaterOn	Triggered when pre heater has been turn on.
VehicleEventTypeHeaterDriverHeaterOn	Triggered when (electric) driver heater has been turned on.
VehicleEventTypeHeaterEngineHeaterOn	Triggered when (electric) engine heater has been turned on.
VehicleEventTypeHeaterDieselHeaterOn	Triggered when diesel/main (Webasto, Spheros, ...) heater is turned on.
VehicleEventTypeHeaterAllOff	Triggered when all heaters has been turned off at once, typical reason is engine has been started.
VehicleEventTypeHeaterPreHeaterOff	Triggered when the pre heater has been turned off, typical reason is it has finished and the main (diesel) heater is about to turn on, or if configured to require external power and it has been disconnected.
VehicleEventTypeHeaterEngineHeaterOff	Triggered when the electric engine heater has been turned off, typical reason is if configured to require external power and it has been disconnected. If engine starts the all heaters off event is usually sent instead.
VehicleEventTypeHeaterDriverHeaterOff	Triggered when the electric driver heater has been turned off, typical reason is if configured to require external power and it has been disconnected. If engine starts the all heaters off event is usually sent instead.
VehicleEventTypeHeaterDieselHeaterOff	Triggered when the diesel/main heater has been turned off, typical reason is engine started, but usually the all heaters off event is usually sent instead if so.
VehicleEventTypeReturningToStop	Triggered when is pre depart is revoked
VehicleEventTypeHeaterStateUpdated	Triggered when the internal state changed for the heater, general update.
VehicleEventTypeHeaterAdditionalHeaterOn	Triggered when an additional heater has been turned on.

Name	Description
VehicleEventTypeHeaterAdditionalHeaterOff	Triggered when an additional heater has been turned on.
VehicleEventTypeExternalCommandRequestedEvent	Triggered when an external request is sent.
VehicleEventTypeNextStopReleased	Triggered when the next stop button is released.
VehicleEventTypeRebootTriggered	Triggered when the unit start a reboot for some reason.
VehicleEventTypeBootup	Triggered when the unit cold starts or boots.
VehicleEventTypePointOfInterestVisitedUpdate	Triggered when the some point of interest have been "covered".
VehicleEventTypeAlarmActiveStateFragment	Remapping VehicleEventTypeAlarmActiveState=45 as 245 centrally when its not complete (state is split into multiple messages)
VehicleEventTypeAlightingOnlyModeActive	Triggered when boarding restriction is on.
VehicleEventTypeAlightingOnlyModeCleared	Triggered when boarding restriction is cleared.
VehicleEventTypeRoadLimitationViolated	
VehicleEventTypeNotSupportedByVersion	If protocol version doesn't support > 255 it will be mapped to 255.
VehicleEventTypeDrivingMonitorDriverNotPresentActive	
VehicleEventTypeDrivingMonitorDriverNotPresentCleared	
VehicleEventTypeDrivingMonitorDriverFatigueActive	
VehicleEventTypeDrivingMonitorDriverFatigueCleared	
VehicleEventTypeDrivingMonitorDistractedActive	
VehicleEventTypeDrivingMonitorDistractedCleared	
VehicleEventTypeDrivingMonitorVideoOcclusionActive	
VehicleEventTypeDrivingMonitorVideoOcclusionCleared	
VehicleEventTypeDrivingMonitorVideoLossActive	
VehicleEventTypeDrivingMonitorVideoLossCleared	
VehicleEventTypeDrivingMonitorPhoneCallActive	
VehicleEventTypeDrivingMonitorPhoneCallCleared	
VehicleEventTypeDrivingMonitorSmokingActive	
VehicleEventTypeDrivingMonitorSmokingCleared	
VehicleEventTypeFuelTankHeaterOn	Triggered when the electrical fuel tank heater is turned on. Contolled by a separate logic than other onboard heaters.
VehicleEventTypeFuelTankHeaterOff	Triggered when the electical fuel tank heater is turned off. Contolled by a separate logic than other onboard heaters.
VehicleEventTypePreliminaryStopArrival	Route Discovery Mode - Arrived at a stop while in route discovery mode.
VehicleEventTypePreliminaryStopDeparture	Route Discovery Mode - Departed from a stop while in route discovery mode.
VehicleEventTypePreliminaryStopPassby	Route Discovery Mode - Passed by a stop while in route discovery mode.
VehicleEventTypePreliminaryPassengerCount	Route Discovery Mode - Sent after a preliminarary depart. Might get completed with passenger counts if this was a depart for the journey.
VehicleEventTypeJourneyRepositionAutomaticAssignmentRouteDiscovery	Triggered whenever the vehicle's logical position on the route defined by the journey is changed due a change of assigned journey.
VehicleEventTypeManualCharterAssignment	
VehicleEventTypeManualCharterAssignmentEnd	
VehicleEventTypeCharterStart	

Name	Description
VehicleEventTypeCharterEnd	
VehicleEventTypeRemainingRangeWarning	
VehicleEventTypeDriverAnnouncementTriggered	
VehicleEventTypeDriverAnnouncementCancelled	

General Units

Generally the units will be as marked below, even though there could be exceptions.

Name	Description
Volume	Liters
Temperature	Celsius
Speed	Meters/second
Pressure	Kilopascal

Signals

Name	Unit	Description
AnyDoorOpen		
Axle1Weight	Kilogram	
Axle2Weight	Kilogram	
Axle3Weight	Kilogram	
Axle4Weight	Kilogram	
BatteryVoltage	Volts	
BodyExtractorStatus		
CurrentGear		
DriverSeatBeltSwitch		
EngineCoolantTemp	Celsius	
EngineOilPressure	Kilopascal	
EngineOilTemperature	Celsius	
FuelConsumption	Liters	Fuel used in liters since last boot/restart.
FuelLevel	Percentage	
GpsSpeed	Meters/second	
GsmSignalStrength	Percentage	
InsideDriverTemperature	Celsius	Temperature in the driver cabin/around the driver seat
InsideFloorTemperature	Celsius	
InsidePassengerTemperature	Celsius	Temperature inside the bus around the passengers
InteriorLightsStatus		
OutsideTemperature	Celsius	
RegenerationMoveDelay		
RegenerationMoveStatus		
RegenerationParkDelay		
RegenerationParkStatus		
RetarderPosition		
StateOfCharge	Percentage	
TotalDistance	Meters	

Name	Unit	Description
TotalEngineHours	Hours	
TotalFuelUsed	Liters	
VehicleSpeed	Meters/second	
VentilationStatus		
WiperStatus		

Alarms

The alarms are categorized into AlarmType that have different properties depending on the type - a reference of properties per type can be found in provided schemas.

Alarm types:

- Fms: FMS/TellTales
- J1939: DM1 messages
- Mid: MID fault codes (J1708/J1587)
- Bea: fault codes
- Custom: non standardized alarms/specialized alarms and messages

Severity:

- Critical: shown as red alarm
- Major: shown as yellow alarm
- Minor: shown as yellow alarm
- Warning: shown as a white alarm
- Cleared: alarm is no longer active
- Indeterminate: unknown/unspecified

Alarm is tracked by a composite key that for the standard alarms looks as:

[Name, Instance, AlarmCode]

When looking at the fault information in the general case Name, Instance and AlarmCode is not needed other than making a unique key. For custom alarms they are however needed to fully understand some alarms.

Sample:

```
{
  "SourceType": "PID",
  "Mid": 128,
  "Number": 100,
  "Fmi": 1,
  "Type": "Mid",
  "Name": "VolvoJ1587J1708let",
  "Instance": "MID_128",
  "AlarmCode": 100025601,
  "Severity": "Critical"
}

{
  "AdditionalParameters": [
    "knopflerfish",
    "/home/i4m/bin/knopflerfish"
  ],
  "Type": "Custom",
  "Name": "knopflerfish",
  "Instance": "",
  "AlarmCode": 1,
  "Severity": "Critical"
}
```

Custom alarms

Customized and non-standard alarms such as tracking gps-failures, internal software alarms, tracking failures of external components etc.

Alarm code

Alarm code is a unique code used to classify and is required to understand and classify custom alarms.

Id	Name
0	NULL_PROBABLE_CAUSE
1	PROCESS_CRASHED
2	PROCESS_FAILED
3	IP_HOST_UNREACHABLE
4	SERVICE_UNREACHABLE
5	TCP_CONNECT_FAILURE
6	TEST
7	SERVICE_UPDATE_MISSING
8	DATABASE_UNREACHABLE
9	RESOURCE_LIMIT_ERROR
10	DATABASE_ERROR
11	CORBA_SERVER_UNREACHABLE
12	WEB_SERVICE_UNREACHABLE
13	SYSTEM_TIME_ERROR
14	PROTOCOL_ERROR
15	INFORMATION_DISPLAY_UNREACHABLE
16	URL_UNREACHABLE
17	DETECTOR_FAILURE
18	VEHICLE_ODOMETER
19	VEHICLE_GPS
20	VEHICLE_TIC1R
21	VEHICLE_SIGN
22	VEHICLE_GATEWAY_UNREACHABLE
23	VEHICLE_DEPOT_UNREACHABLE
24	VEHICLE_FARE_BOX
25	VEHICLE_APC
26	VEHICLE_MODEM
27	VEHICLE_CAN
28	VEHICLE_J1708
29	VEHICLE_DST
30	VEHICLE_LAMP_AND_FAULT_STATUS
31	VEHICLE_BEA_FAULT
32	VEHICLE_J1939_FAULT
33	VEHICLE_VERSION_REQUEST_MISSING
34	VEHICLE_CUSTOM_FAULT
35	APC_NO_DATA_AVAILABLE
36	APC_EXTERNAL_SYSTEM_PUSH_FAILURE
37	UPLOAD_SERVICE_NO_DATA_UPLOADED
38	VEHICLE_J1587_FAULT
39	TRAFFIC_MEASUREMENT_MISSING_REPORTS
40	TRAFFIC_MEASUREMENT_LOW_FLOW
41	TRAFFIC_MEASUREMENT_HIGH_FLOW
42	VEHICLE_DATA_ERROR
43	DEPOT_PARAMETER_ERROR

Id	Name
44	VEHICLE_DOOR_SIGNAL
45	LOOP_ERROR
46	MR_SYNC
47	VEHICLE_EXTERNAL_SIGN_CONTROLLER_OVERRIDE
48	VEHICLE_FMS_TELL_TALE
49	VEHICLE_TOUCH
50	UDP_NODE_SPAM
51	TASK_SCHEDULER_TASK_ERROR
52	VEHICLE_APC_COUNTS_NOT_UPDATED_ON_JOURNEY
53	VEHICLE_APC_DOOR_COUNTS_NOT_UPDATED_ON_JOURNEY
54	VEHICLE_GPS_NO_FIX
55	VEHICLE_GPS_NO_FIX_ON_JOURNEY
56	EXCESSIVE_NODE_DOWNLOADS
57	EXCESSIVE_NODE_UPLOADS
58	MQTT_CONNECTION_LOST
59	MQTT_TETRA_CONNECTION_DOWN
60	MQTT_TETRA_SEND_ERROR
61	DISPLAY_BACKLIGHT_SENSOR_FAILURE
62	VEHICLE_IGNITION_SIGNAL
63	VEHICLE_GPS_CRAZY_JUMP
64	DATAIMPORT_IMPORT_FAILED
65	DATAIMPORT_VERIFY_FAILED
66	DATAIMPORT_DEPLOY_FAILED
67	VEHICLE_NEXT_STOP_BUTTON
68	VEHICLE_PANIC_BUTTON
69	VEHICLE_ODK_CONNECTION
70	DISCO_SLAVE_MISSING
71	DISCO_SLAVE_UNKNOWN
72	CAMERA_CONTROL_CONNECTION
73	VEHICLE_CCTV_CONNECTION
74	VEHICLE_CCTV_SYSTEM
75	VEHICLE_CCTV_CAMERA
76	VEHICLE_CCTV_DISK
77	INFORMATION_DISPLAY_FLAPPING
78	VEHICLE_INTERIOR_PASSENGER_DISPLAY_UNREACHABLE
79	VEHICLE_TRAFFIC_DATABASE_VERSION_MISMATCH
80	DEPOT_EXCESSIVE_SYNC
81	DISCO_CONNECTION_LOST
82	VEHICLE_DOOR_SIGNAL_OPEN_WHILE_DRIVING
83	VEHICLE_SIGNAL_IO_ERROR
84	VEHICLE_INTERIOR_TEMP_SENSOR
85	VEHICLE_HEATER_NOT_STARTED
86	VEHICLE_TSP_MODEM
87	VEHICLE_PROCESS_HUNG_RESTART

Id	Name
88	VEHICLE_PROCESS_HUNG_REBOOT
89	VEHICLE_DRIVING_MONITOR_CONNECTION
90	VEHICLE_DRIVING_MONITOR_CAMERA_ERROR
91	VEHICLE_DRIVING_MONITOR_INDICATOR_ERROR
92	VEHICLE_EXTERNAL_POWER_NOT_CONNECTED
93	SOFTWARE_BUG
94	VEHICLE_HEATER_NOT_HEATING
95	VEHICLE_HEATER_FAULT_CODE_ACTIVE
96	VEHICLE_DISPLAY_CONTROLLER
97	VEHICLE_SENSOR_ALCOLOCK
98	VEHICLE_INTERIOR_PASSENGER_DISPLAY_MISMATCH
99	VEHICLE_ASSIGNMENT_MISMATCH
100	VEHICLE_REMAINING_RANGE_INSUFFICIENT
101	VEHICLE_EXCESSIVE_UNEXPECTED_REBOOTS
102	VEHICLE_RTC_BATTERY_DRAINED
103	VEHICLE_IP_ADDRESS_CONFLICT
104	SERVICE_SELF_TEST_FAILED
1000	VEHICLE_CUSTOM_FAULT_0
1001	VEHICLE_CUSTOM_FAULT_1
1002	VEHICLE_CUSTOM_FAULT_2
1003	VEHICLE_CUSTOM_FAULT_3
1004	VEHICLE_CUSTOM_FAULT_4
1005	VEHICLE_CUSTOM_FAULT_5
1006	VEHICLE_CUSTOM_FAULT_6
1007	VEHICLE_CUSTOM_FAULT_7
1008	VEHICLE_CUSTOM_FAULT_8
1009	VEHICLE_CUSTOM_FAULT_9
1010	VEHICLE_CUSTOM_FAULT_10
1011	VEHICLE_CUSTOM_FAULT_11
1012	VEHICLE_CUSTOM_FAULT_12
1013	VEHICLE_CUSTOM_FAULT_13
1014	VEHICLE_CUSTOM_FAULT_14
1015	VEHICLE_CUSTOM_FAULT_15
1016	VEHICLE_CUSTOM_FAULT_16
1017	VEHICLE_CUSTOM_FAULT_17
1018	VEHICLE_CUSTOM_FAULT_18
1019	VEHICLE_CUSTOM_FAULT_19
1020	VEHICLE_CUSTOM_FAULT_20
1999	VEHICLE_CUSTOM_FAULT_RANGE_END
2000	VEHICLE_LAMP_AND_FAULT_STATUS_RANGE_START
3023	VEHICLE_LAMP_AND_FAULT_STATUS_RANGE_END
100000	VEHICLE_BEA_FAULT_RANGE_START
200000	VEHICLE_BEA_FAULT_RANGE_END
1000000	VEHICLE_FMS_FAULT_RANGE_START

Id	Name
1001000	VEHICLE_FMS_FAULT_RANGE_END
10000000	VEHICLE_J1939_FAULT_RANGE_START_OLD
60000000	VEHICLE_J1939_FAULT_RANGE_END_OLD
100000000	VEHICLE_J1587_RANGE_START
109999999	VEHICLE_J1587_RANGE_END
110000000	VEHICLE_J1939_FAULT_RANGE_START
130000000	VEHICLE_J1939_FAULT_RANGE_END