

Austrian Recommended Reference Profile SRTI

Version 1.0

A.1 Data Structure and Content

ASFINAG provides DATEX II traffic data of Austrian motorways and highways for service providers and other interested institutions.

This section describes the structure and content of ASFINAG unplanned events. Unplanned events cover a wide range of events that causes temporary service disruptions to the road users. These include for example: accidents, traffic jams, short term road maintenance works, damage to the road infrastructures, obstructions caused by vehicles, hazardous weather and road related conditions, poor environment conditions, etc. The unplanned events use the DATEX II *SituationPublication*.

The unplanned events contain basic information such as event type, version, update time, validity duration, event text, and event location.

Unplanned events are represented using the DATEX II situation element, which contains an *id* and a *version* element. The version contains the version number, which is increased with every update of the corresponding event.

The *situation* element contains an arbitrary number of *situationRecord* sub-elements which contain the actual traffic information, for example information that describes a traffic jam or an accident. The *SituationRecord* element also includes the *validityTimeSpecification* element. The *overallStartTime* represents the begin timestamp of the traffic situation and the *overallEndTime* the estimated end timestamp of the traffic situation.

Example 1: Consecutive unplanned events with the same id and increased version number.

The following example shows an event of type accident that caused a traffic jam of 2km.

```
<ql:situation id="ASFINAGTM_T_1_2_2114100">
  <ql:overallSeverity>high</ql:overallSeverity>
  <ql:headerInformation>
    <ql:situationRecord dipl:type="ql:Accident" id="ASFINAGTM_T_1_2_2114100_203_1" version="1">
      <ql:situationRecordCreationReference>2114100</ql:situationRecordCreationReference>
      <ql:situationRecordCreationTime>2022-11-24T10:15:15+01:00</ql:situationRecordCreationTime>
      <ql:situationRecordVersionTime>2022-11-24T10:26:12+01:00</ql:situationRecordVersionTime>
      <ql:source>
      <ql:validity>
      <ql:impact>
      <ql:generalPublicComment>
        <ql:comment>
          <values xmlns="http://levelC/schema/3/common">
            <value lang="de-at">A23 Autobahn Südosttangente Wien, Kagran Richtung Inzersdorf, zwischen Gürtel-Landstraßer Hauptstraße (km 9) und Knoten Inzersdorf (km 2) bei km 5, Unfall mit mehreren Fahrzeugen, 2 km zähfließender Verkehr</value>
            <value lang="en">A23 Autobahn Südosttangente Wien, Kagran direction Inzersdorf, between Gürtel-Landstraßer Hauptstraße (km 9) and Knoten Inzersdorf (km 2) at km 5, multi-vehicle accident, 2 km slow-moving traffic</value>
          </values>
        </ql:comment>
        <ql:commentDateTime>2022-11-24T10:26:12+01:00</ql:commentDateTime>
        <ql:commentType>description</ql:commentType>
      </ql:generalPublicComment>
      <ql:locationReference xmlns:q2="http://levelC/schema/3/locationReferencing" dipl:type="q2:SingleRoadLinearLocation">
      <ql:situationRecordExtension>
      <ql:accidentType>multipleVehicleAccident</ql:accidentType>
    </ql:situationRecord>
    <ql:situationRecord dipl:type="ql:AbnormalTraffic" id="ASFINAGTM_T_1_2_2114100_117_1" version="1">
      <ql:situationRecordCreationReference>2114100</ql:situationRecordCreationReference>
      <ql:situationRecordCreationTime>2022-11-24T10:15:15+01:00</ql:situationRecordCreationTime>
      <ql:situationRecordVersionTime>2022-11-24T10:26:12+01:00</ql:situationRecordVersionTime>
      <ql:severity>high</ql:severity>
      <ql:source>
      <ql:validity>
      <ql:impact>
      <ql:generalPublicComment>
        <ql:comment>
          <values xmlns="http://levelC/schema/3/common">
            <value lang="de-at">A23 Autobahn Südosttangente Wien, Kagran Richtung Inzersdorf, zwischen Gürtel-Landstraßer Hauptstraße (km 9) und Knoten Inzersdorf (km 2) bei km 5, Unfall mit mehreren Fahrzeugen, 2 km zähfließender Verkehr</value>
            <value lang="en">A23 Autobahn Südosttangente Wien, Kagran direction Inzersdorf, between Gürtel-Landstraßer Hauptstraße (km 9) and Knoten Inzersdorf (km 2) at km 5, multi-vehicle accident, 2 km slow-moving traffic</value>
          </values>
        </ql:comment>
        <ql:commentDateTime>2022-11-24T10:26:12+01:00</ql:commentDateTime>
        <ql:commentType>description</ql:commentType>
      </ql:generalPublicComment>
      <ql:locationReference xmlns:q3="http://levelC/schema/3/locationReferencing" dipl:type="q3:SingleRoadLinearLocation">
      <ql:situationRecordExtension>
      <ql:abnormalTrafficType>slowTraffic</ql:abnormalTrafficType>
      <ql:queueLength>2000</ql:queueLength>
    </ql:situationRecord>
  </ql:situation>
```

In the above example the version "1" of situation "ASFINAGTM_T_1_2_2114100" contains two situation records: 1) Accident (multipleVehicleAccident) and 2) AbnormalTraffic (slowTraffic).

```

<ql:situation id="ASFINAGTM_T_1_2_2114100">
  <ql:overallSeverity>high</ql:overallSeverity>
  <ql:headerInformation>


---


    <ql:situationRecord dipl:type="q1:AbnormalTraffic" id="ASFINAGTM_T_1_2_2114100_116_1" version="2">
      <ql:situationRecordCreationReference>2114100</ql:situationRecordCreationReference>
      <ql:situationRecordCreationTime>2022-11-24T10:15:15+01:00</ql:situationRecordCreationTime>
      <ql:situationRecordVersionTime>2022-11-24T14:07:37+01:00</ql:situationRecordVersionTime>
      <ql:severity>high</ql:severity>
      <ql:source>


---


      <ql:validity>


---


      <ql:impact>


---


      <ql:generalPublicComment>
        <ql:comment>
          <values xmlns="http://levelC/schema/3/common">
            <value lang="de-at">A23 Autobahn Südosttangente Wien, Kagran Richtung Inzersdorf, zwischen Gürtel-Landstraßer Hauptstraße (km 9)
              und Knoten Inzersdorf (km 2) bei km 5, Unfallstelle geräumt, 1 km zähfließender Verkehr</value>
            <value lang="en">A23 Autobahn Südosttangente Wien, Kagran direction Inzersdorf, between Gürtel-Landstraßer Hauptstraße (km 9)
              and Knoten Inzersdorf (km 2) at km 5, Stationary traffic due to earlier accident, 1 km slow-moving traffic</value>
          </values>
        </ql:comment>
        <ql:commentDateTime>2022-11-24T14:07:37+01:00</ql:commentDateTime>
        <ql:commentType>description</ql:commentType>
      </ql:generalPublicComment>


---


      <ql:locationReference xmlns:q2="http://levelC/schema/3/locationReferencing" dipl:type="q2:SingleRoadLinearLocation">


---


      <ql:situationRecordExtension>
        <ql:abnormalTrafficType>slowTraffic</ql:abnormalTrafficType>
        <ql:queueLength>1000</ql:queueLength>
      </ql:situationRecord>
    </ql:situation>

```

After an update the situation "ASFINAGTM_T_1_2_2114100" has version "2" and the traffic information has also been updated. Since the accident has been cleared, the situation has only one situation record of type "AbnormalTraffic". Moreover, the queue length of the traffic jam has changed (2km to 1km).

A.2 Traffic Situation Types

All the unplanned events are provided within the DATEX II *situation* element. The situation element contains the attributes *id* and *version*. Furthermore, it also contains an arbitrary number of *situationRecord* sub-elements which contain the actual traffic information. The *situationRecord* is an abstract class and contains several sub types. Each situation record sub type describes the class of the unplanned event. An overview about the provided *situationRecord* sub types (the abstract types are not shown) is shown in **Table 1**.

situationRecord type	Description
AbnormalTraffic	A traffic condition which is not normal. Used in case of stationary or slow traffic. Further information is provided by the elements <i>abnormalTrafficType</i> and <i>queueLength</i> .
Accident	Accidents are events where one or more vehicles are involved in collisions or in leaving the roadway. These include collisions between vehicles or with other road users or obstacles. Further information on the type of accident is provided by the element <i>accidentType</i> .
AnimalPresenceObstruction	An obstruction on the road resulting from the presence of animals.
AuthorityOperation	Authority initiated operation or activity that could disrupt traffic.
Conditions	Any conditions which have the potential to degrade normal driving conditions.
DisturbanceActivity	Deliberate human action of either a public disorder nature or of a situation alert type which could disrupt traffic.
EnvironmentalObstruction	An obstruction on the road resulting from an environmental cause, such as flooding, fallenTrees or avalanches. Further information on the type of environmental obstruction is provided by the element <i>environmentalObstructionType</i> .
EquipmentOrSystemFault	Equipment or system which is faulty, malfunctioning or not in a fully operational state that may be of interest or concern to road operators and road users. For example: in the case of a malfunctioning tunnel ventilation, the <i>faultyEquipmentOrSystemType</i> element is set to "tunnelVentilation" and the <i>equipmentOrSystemFaultType</i> is set to "notWorking".

GeneralObstruction	Any stationary or moving obstacle of a physical nature, other than of an animal, vehicle, environmental, or damaged equipment nature. For example lane closures, road closures, recovery and rescue operations. Additional information is provided using the element <i>roadOrCarriagewayOrLaneManagementType</i> .
InfrastructureDamageObstruction	An obstruction on the road resulting from the failure or damage of infrastructure on, under, above or close to the road.
MaintenanceWorks	Roadworks involving the maintenance or installation of infrastructure. Optionally, also provides the information about the subjects on which the works are carried out. For example: the element <i>subjectTypeOfWorks</i> is set to "bridge" if the roadworks involves the maintenance or installation of a bridge.
NonWeatherRelatedRoadConditions	Road surface conditions that are not related to the weather but which may affect driving conditions.
PoorEnvironmentConditions	Any environmental conditions which may be affecting the driving conditions on the road, such as heavy rain, snowfall or dense fog. Further information is provided by the element <i>poorEnvironmentType</i> .
RoadOrCarriagewayOrLaneManagement	Road, carriageway or lane management action that is instigated by the network/road operator. Further information is provided by the element <i>roadOrCarriagewayOrLaneManagementType</i> .
VehicleObstruction	An obstruction on the road caused by one or more vehicles such as a broken down vehicle, broken down heavy lorry or vehicle on fire. Further information is provided by the element <i>vehicleObstructionType</i> .
WeatherRelatedRoadConditions	Road surface conditions that are related to the weather which may affect the driving conditions, such as ice, snow or water. Further information is provided by the element <i>weatherRelatedRoadConditionType</i> .

Table 1: Situation record types supported by the Austrian unplanned events profile

A.3 Location Referencing

ASFINAG provides a number of location referencing methods for locating the unplanned events as described in Table 2. All locations are provided as linear by two points (start point and end point). Note, that in case of single point locations the end point contains the same value as the start point (i.e., start=end). An overview about the provided location referencing methods is shown in Table 2.

Location Referencing	DATEX II element	Description
AlertC location codes	alertCLinear	The <i>alertCLinear</i> element contains the primary location code, secondary location code, AlertC direction, and offset distances of the corresponding primary and secondary location.
ASFINAG road km	directionRelativeOnLinearSection	The <i>directionRelativeOnLinearSection</i> element contains the road km location as referenced by ASFINAG. Any point on the ASFINAG road network is described by road number, direction and road km provided in meters.
WGS84	linearByCoordinates	The <i>linearByCoordinates</i> element contains the latitude/longitude values of start and end points.
GIP	GIPLink	Location reference of GIP (Graph Integration Platform). GIP provides a digital map of Austria's transport network to all authorities.

Table 2: Location referencing

A.4 Alert-C to DATEX II Mapping

Alert-C event codes are frequently used for transmitting traffic messages over TMC. So for events that contain Alert-C event codes, we have provided a mapping file to map an Alert-C event code to relevant data elements in the SituationRecord. Please refer to the file "Alert-C_EventCode_DATEXII.xlsx" file for the mappings. Note that some of the Alert-C event codes, are mapped to two DATEX II situation records. This is also indicated in the mapping file.

A.5 Extensions

The Level B extensions for Austrian extensions profile are summarised in this section.

A.5.1 SituationExtensions

Some of the planned events for example roadworks, bicycle races, etc. may contain very detailed data, such as the phase and restriction data. These detailed data for planned events may not be of interest to all kind of customers. Therefore, for customers who are interested in an overview rather than the very details of an event, a summary is provided. This summary describes the most general information of an event (and of its phases). They are provided in the “*situation*” element via the level b extensions.

The summary of a planned event (via *overallSituation*) includes the following details:

- ID of the event
- Overall start and end time of the event
- The spatial coverage of the event (or location of the event)
- Textual description of the event (in English and German), and
- The type of the event (e.g. maintenance work, repair work, construction work, etc.)

If the event contains phases (e.g. roadwork phase), then the summaries of the phases are also provided (via *overallPhaseSituation*). It includes the following details:

- Phase reference id
- Overall start and end time of the phase
- The spatial coverage of the phase (or location of the phase)
- Textual description of the roadwork (in English and German), and
- The type of the event (e.g. maintenance work, repair work, construction work, etc.)

Figure A.5.1.1 illustrates the data structure of the “*overallSituation*” and “*overallPhaseSituation*” extensions. They are just instances of “*SituationRecord*”.

class SituationExtensions

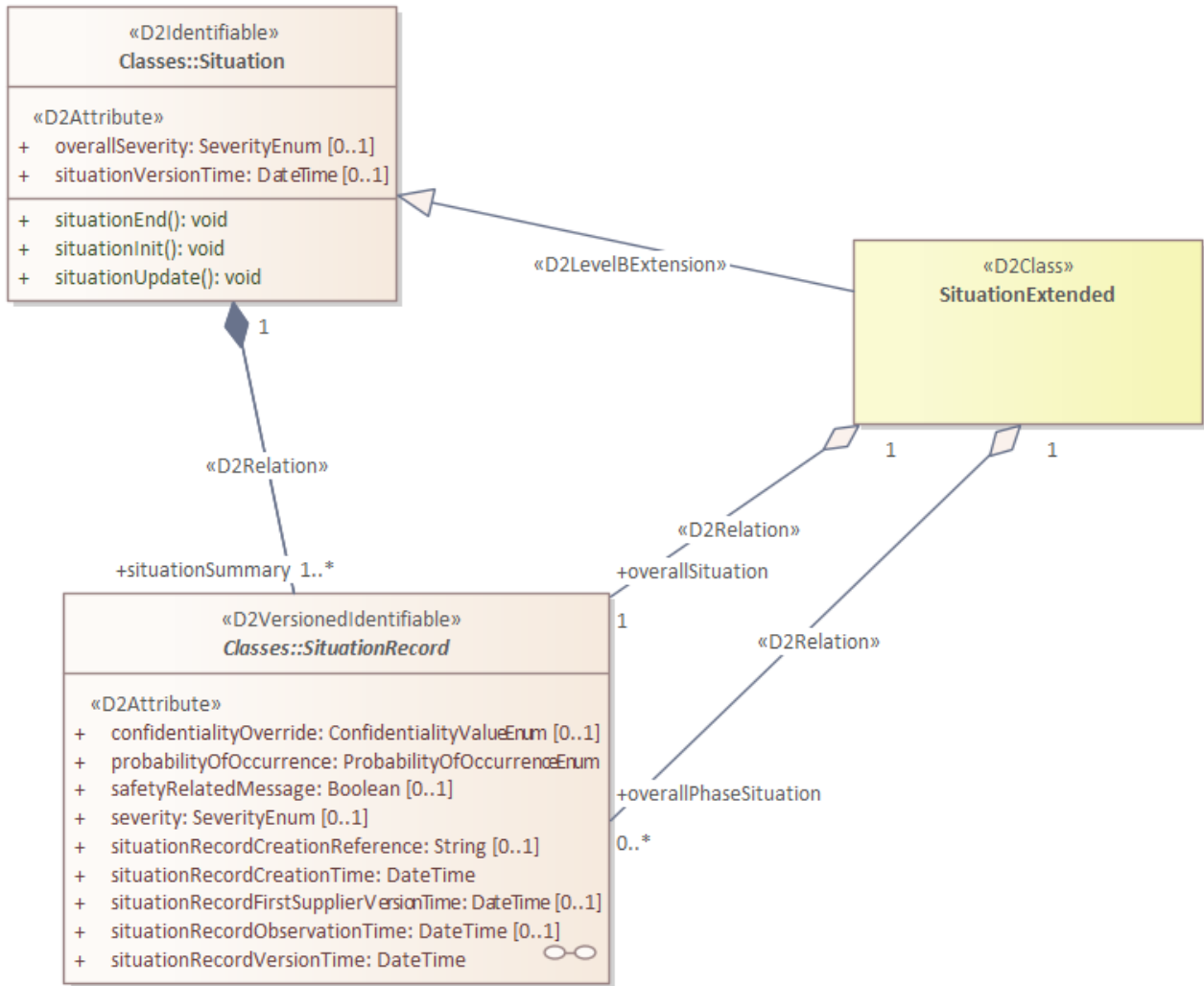


Figure A.5.1.1 Extension for Situation

A.5.2 OperatorActionExtensions

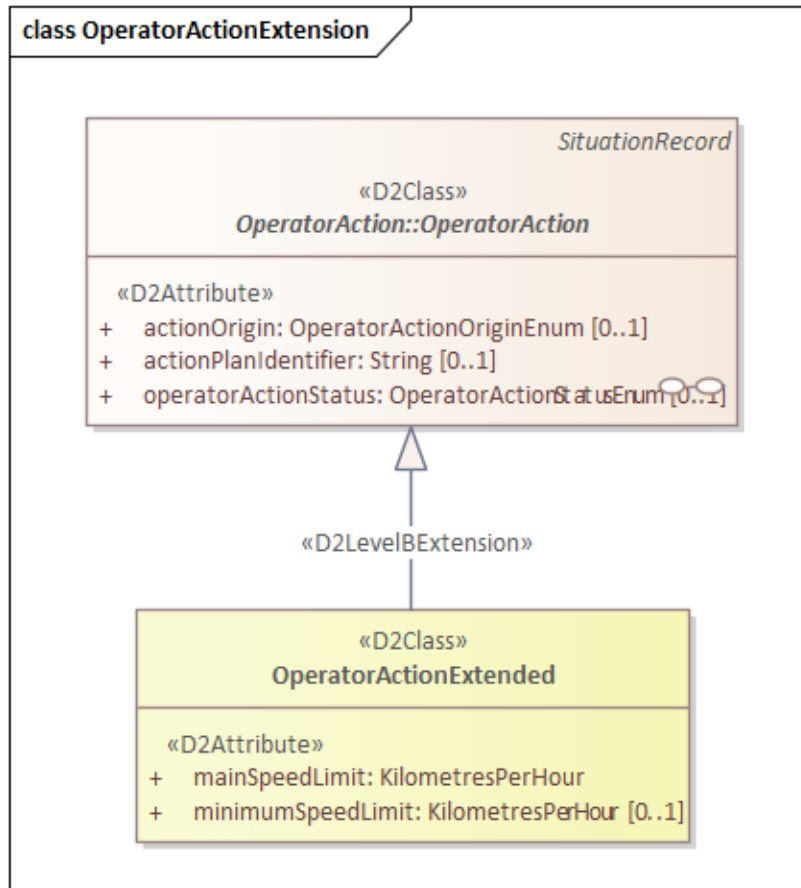


Figure A.5.2.1 Extension for OperatorAction

The following attributes are added to the OperatorActionClass using the OperatorActionExtended subclass:

- **mainSpeedLimit:** The speed limit that covers the longest distance within the road works zone (i.e. there might be higher as well as lower speed limits in this roadworks zone, but for lower distances).
- **minimumSpeedLimit:** The minimum speed limit within the roadworks zone (i.e. there might be segments with a higher speed limit).

A.5.3 SituationRecordExtensions

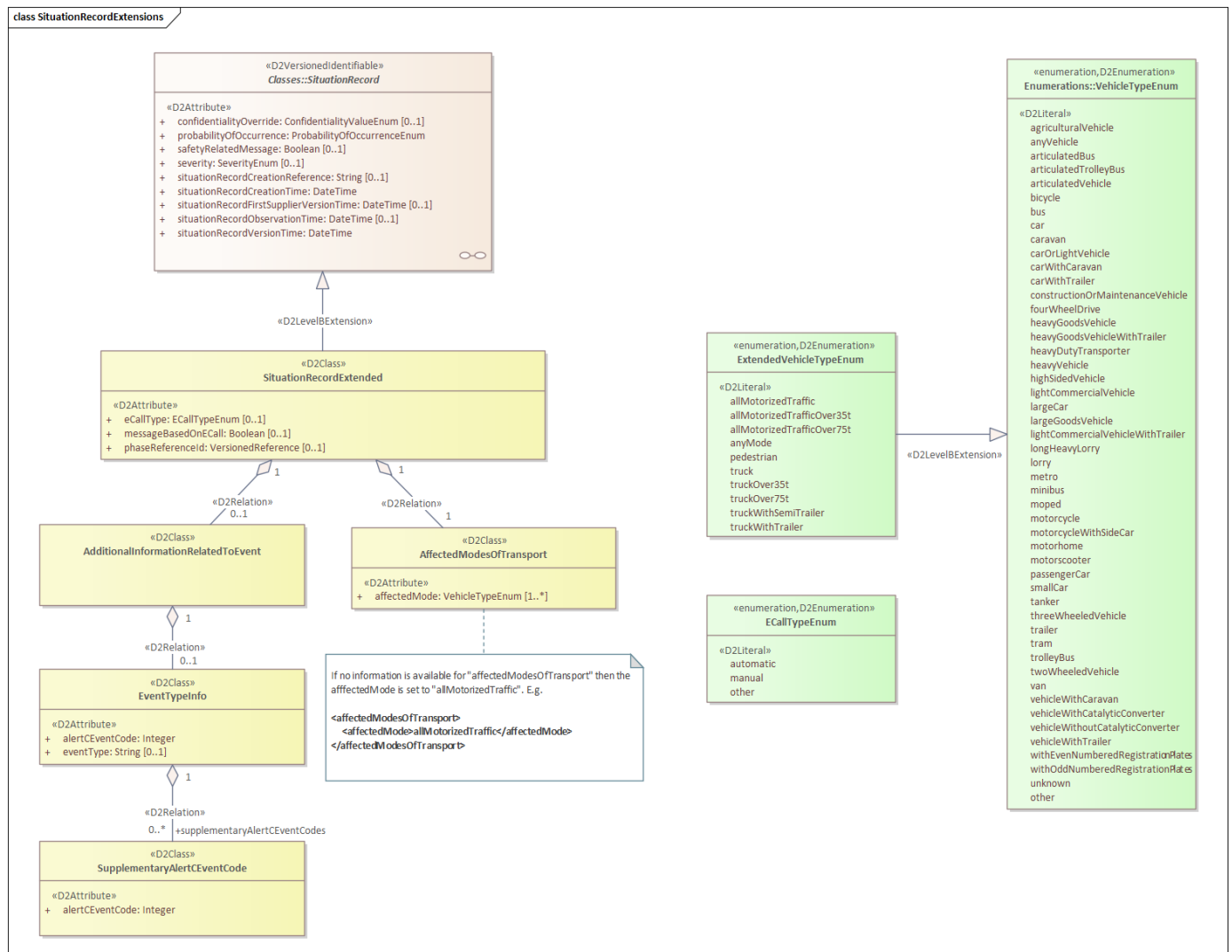


Figure A.5.3.1 Extensions for SituationRecord

The enum `VehicleTypeEnum` is extended with ten new entries. Also, a new enum `ECallTypeEnum` is added, which lists the different kinds of e-calls. The `SituationRecordExtended` class also marks all messages that are generated based on e-calls. Furthermore is also contains a reference to the `ECallTypeEnum`, describing which kind of e-call triggered the message.

The following classes are added to the `SituationRecord` class:

- **AdditionalInformationRelatedToEvent:** - Specifies the additional details of an event that are not covered by the data elements of the `SituationRecord`. Information such as Alert-C event codes and supplementary Alert-C event codes are specified.
- **AffectedModesOfTransport:** - Specifies the modes of transportation that are affected by the event. Such as trucks, cars, buses, trucks over 7.5 tons, etc.,

A.5.4 GipLinkExtensions

To add the GIP location referencing the `Linear`, `Point`, and the `ItineraryByIndexedLocations` classes are extended. The GIP location referencing method is composed of one or more GIP nodes. Each GIP node is represented as a `GIPLink`, which contains an id, reference direction, a begin offset (in percentage) and an end offset (in percentage). Note that

the GIP is a proprietary standard used by multiple stake holders within Austria. In addition to these details clients also require the shape files of the GIP digital map to interpret the location.

A.5.4.1 GipLinkLinearExtension

This extension specifies the linear location by one or more GIP links.

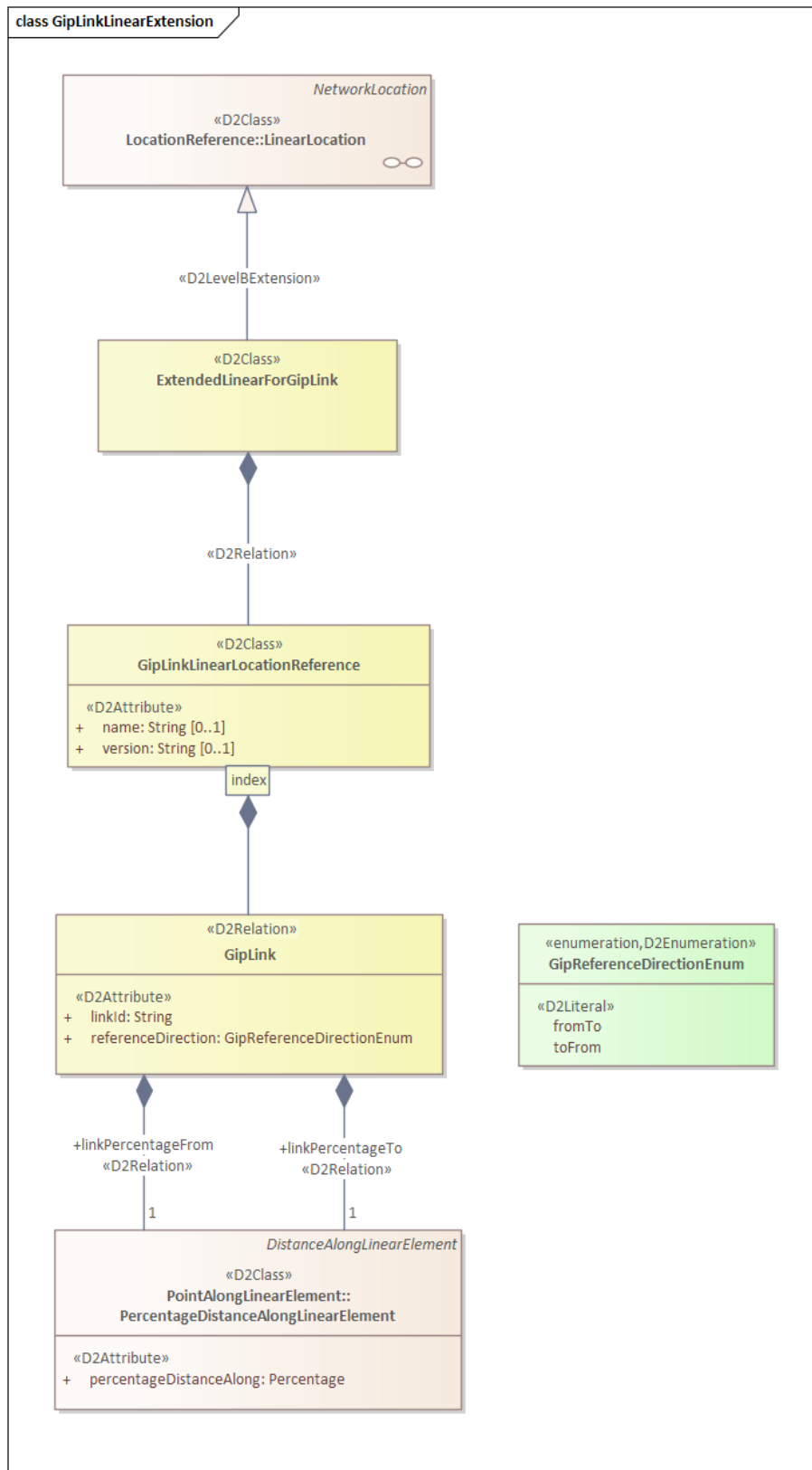


Figure A.5.4.1.1 GipLinkLinear extension

A.5.4.2 GipLinkItineraryExtension

This extension specifies the itinerary or a route by an arbitrary number of GIP links.

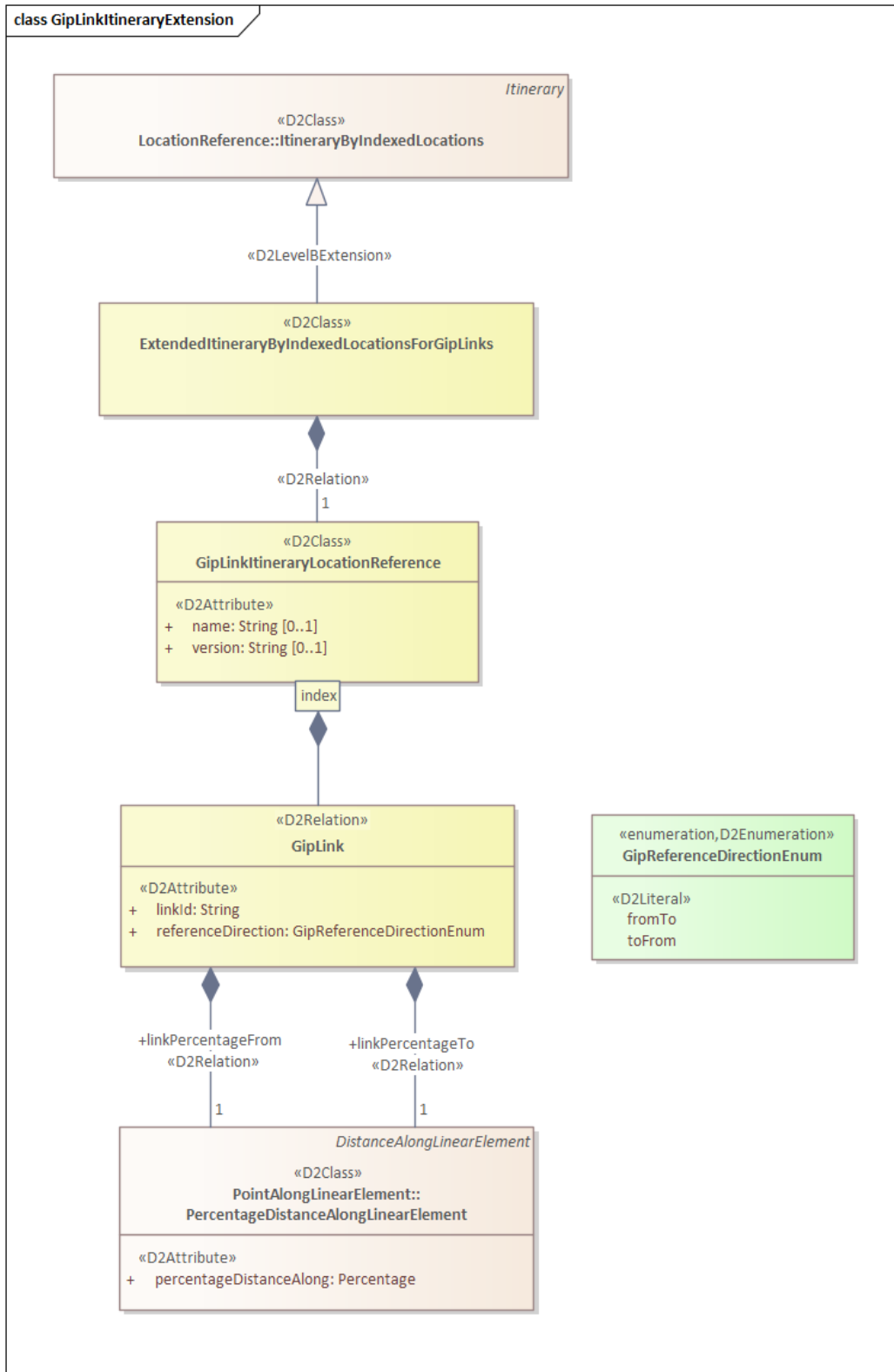


Figure A.5.4.2.1 GipLinkItinerary extension

A.5.4.3 GipLinkPointExtension

This extension specifies the point location by one or more GIP links. In most cases one GIP link is sufficient to represent the point location, however for a point at intersection there may be more than one GIP link.

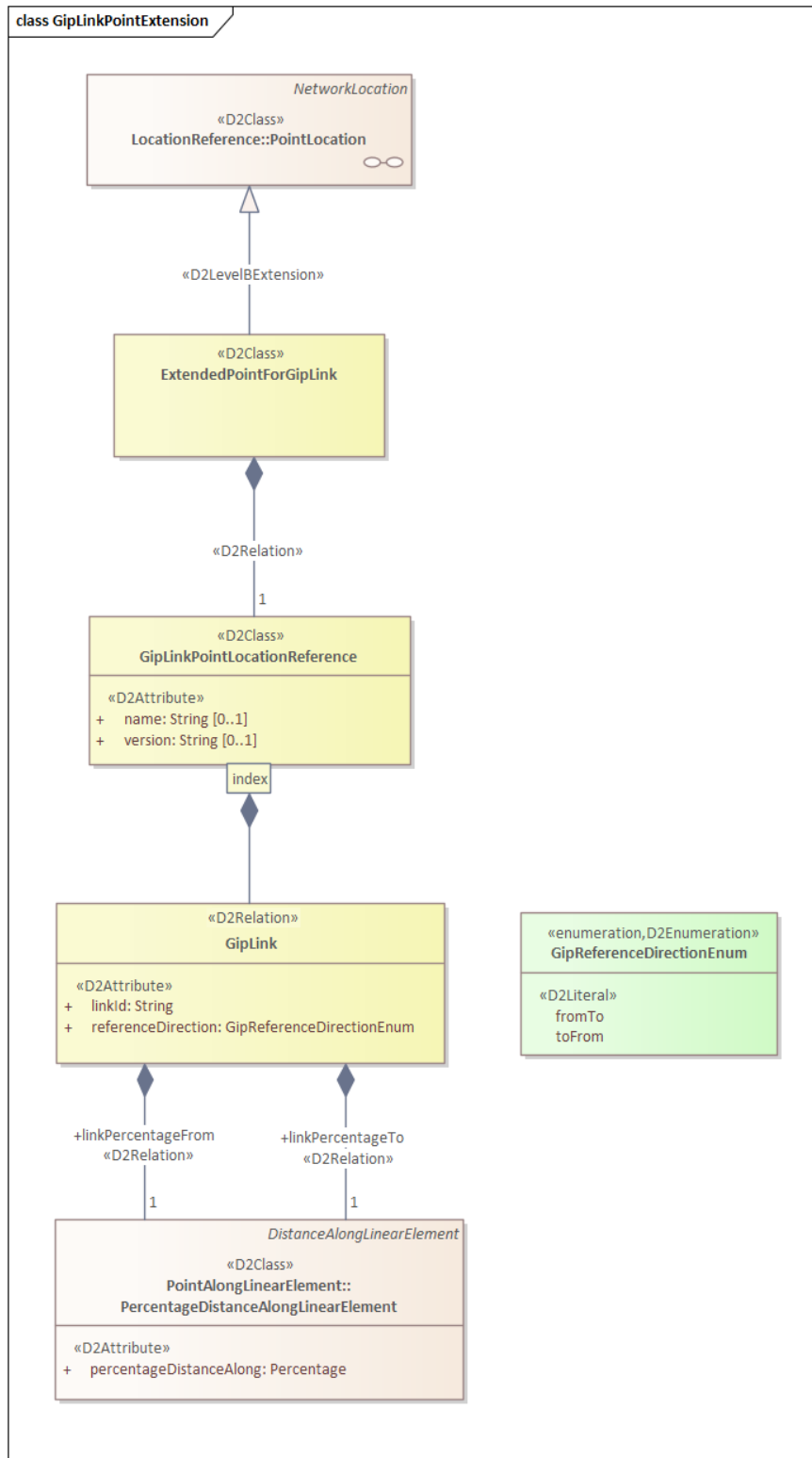


Figure A.5.4.3.1 GipLinkPoint extension