




ERJU SYSTEM PILLAR

TCCS - Data Model_11_OPP



TCCS - Data Model_11_OPP

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Abstract	This document extends the CCS/TMS data model with the content required for TMS / SCI-OP use case.
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SPT2TS-127385 - Disclaimer: The data model defined here is a DRAFT version, developed from bottom up inputs as per approaches defined in previous European projects, and from ongoing implementations in Innovation Pillar FPs. The content defined here shall not be considered as 'finalized' and is still a work in progress with the respective system pillar domains.  Content to be approved]


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2 Package Operational Plan

2.1 Header

SPT2TS-125325 - Package specification

```
{
  "$schema": "ERJU meta-model.json",
  "isDefinedBy": "http://ERJU/datamodel/1.3/operationalPlan",
  "name": "OperationalPlan",
  "prefix": "opp",
  "intId": 6,
  "version": "1.3",
  "info": "Operational-plan-package of the SCI-OP model",
  "containerStruct": "TrafficPlan",
  "structs": [], "enums": []
} [ Open ]
```

2.2 Introduction

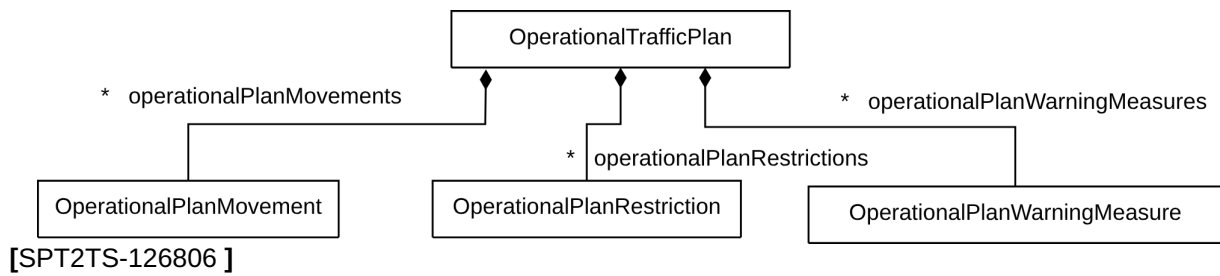


Figure 1 General domain structure.

OperationalTrafficPlan

Defines a container class for all OperationalPlans [SPMS-7590,

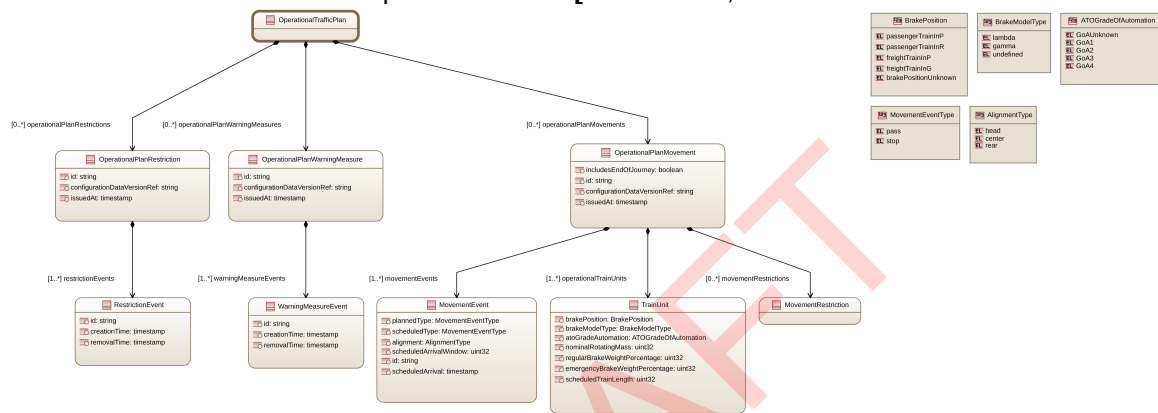


Figure 2 Tree View of OperationalTrafficPlan

]

Formal Specification "Operational Plan"

```

{
  "structs": [
    {
      "name": "OperationalTrafficPlan",
      "info": "Defines a container class for all OperationalPlans",
      "attrs": [
        {
          "intId": 1, "name": "operationalPlanMovements", "composition": "OperationalPlanMovement", "multiplicity":
            "*", "ordered": "byKey", "info": "Composes of operational plan movements"},
        {
          "intId": 2, "name": "operationalPlanRestrictions", "composition": "OperationalPlanRestriction",
            "multiplicity": "*", "ordered": "byKey", "info": "Composes of operational plan restrictions"},
        {
          "intId": 3, "name": "operationalPlanWarningMeasures", "composition": "OperationalPlanWarningMeasure",
            "multiplicity": "*", "ordered": "byKey", "info": "Composes of operational plan warning measures"}
      ]
    }
  ]
}

```

[SPT2TS-124421]

2.3 Operational Plan Movement

OperationalPlanMovement

Defines a train run with a dedicated train number. [SPMS-7591,

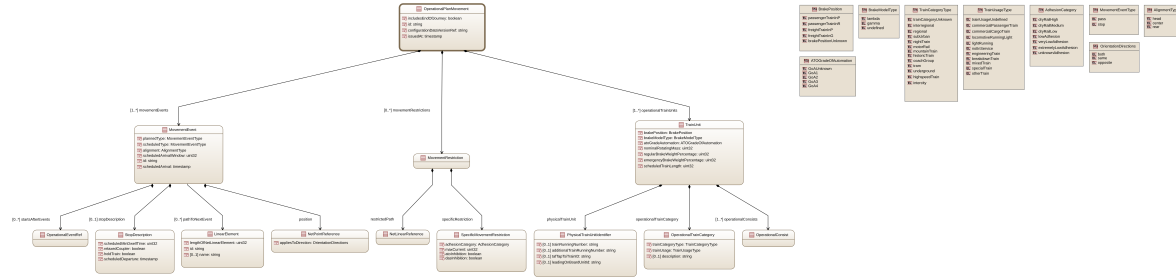


Figure 3 Tree View of OperationalPlanMovement

]

Class "OperationalPlanMovement"

```
{
  "structs": [
    {
      "name": "OperationalPlanMovement",
      "info": "Defines a train run with a dedicated train number.",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used for referencing"},
        {"intId": 2, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 3, "name": "configurationDataVersionRef", "dataType": "string", "info": "Defines the configuration data version for which the operational plan is valid"},
        {"intId": 4, "name": "includesEndOfJourney", "dataType": "boolean", "info": "Defines if the operational plan movement include the end of journey. if true, the movementEvents contains entire remaining path including the end position, otherwise the journey will continue after the last movementEvent of this object"},
        {"intId": 5, "name": "operationalTrainUnits", "composition": "TrainUnit", "multiplicity": "1..*", "info": "Defines the set of train units, which are active during some paths of the train movement. The same train unit can be used in not connected parts of the path"},
        {"intId": 6, "name": "movementEvents", "composition": "MovementEvent", "multiplicity": "1..*", "ordered": "byIndex", "info": "Defines times/operational activities sequence along the movement"},
        {"intId": 7, "name": "movementRestrictions", "composition": "MovementRestriction", "multiplicity": "*", "info": "Defines train specific restrictions, which are active along its path-sections"}
      ]
    }
  ]
}
```

[SPT2TS-124419]

Class "TrainUnit"

```
{
  "structs": [
    {
      "name": "TrainUnit",
      "info": "Defines rolling stock, which is used to implement part of a train movement.",
      "attrs": [
        {"intId": 1, "name": "physicalTrainUnit", "composition": "PhysicalTrainUnitIdentifier",
          "info": "Defines the physical train unit to be used in Plan Execution user interface of Workbench (fallback
```

```

level for TMS)"),
{"intId": 2, "name": "operationalTrainCategory", "composition": "OperationalTrainCategory",
"info": "Defines the category type for the train in operational plan. To be used in Plan Execution user
interface of Workbench (fallback level for TMS)"},
{"intId": 3, "name": "operationalConsists", "composition": "OperationalConsist", "multiplicity": "1..*",
"ordered": "byIndex", "info": "Defines operational consists building the TrainUnit starting from the train-
head."},
{"intId": 4, "name": "nominalRotatingMass", "dataType": "uint32", "unit": "kg", "info": "Defines the nominal
rotating mass of the train, special value 0=unknown"},
{"intId": 5, "name": "regularBrakeWeightPercentage", "dataType": "uint32", "unit": "permill", "info": "Defines
the regular brake weight percentage. Use 0 if undefined"},
{"intId": 6, "name": "emergencyBrakeWeightPercentage", "dataType": "uint32", "unit": "permill", "info":
"Defines the emergency brake weight percentage. Use zero if undefined"},
{"intId": 7, "name": "brakePosition", "enumType": "BrakePosition", "info": "Defines the active brake position
for the train"},
{"intId": 8, "name": "brakeModelType", "enumType": "BrakeModelType", "info": "Defines the applicable
brake model type for the train"},
{"intId": 9, "name": "atoGradeAutomation", "enumType": "ATOGradeOfAutomation", "info": "Defines the ato
grade of automation for the train"},
{"intId": 10, "name": "scheduledTrainLength", "dataType": "uint32", "unit": "m", "info": "Defines the
scheduled train length in meters", "ontology": {"subPropertyOf": "http://data.europa.eu/949/length"}}
]
}

```

[SPT2TS-125299]

Class OperationalTrainCategory

```

{"structs": [
{
"name": "OperationalTrainCategory",
"info": "Defines usage category for an OperationalTrain",
"attrs": [
{"intId": 1, "name": "trainCategoryType", "enumType": "TrainCategoryType"},
{"intId": 2, "name": "description", "dataType": "string", "multiplicity": "0..1", "info": "Provides a description of
the operational train category for user interface display, used as a fallback for manual route setting."},
{"intId": 3, "name": "trainUsage", "enumType": "TrainUsageType", "info": "Defines the train usage type for
UI-purposes, used as a fallback for manual route setting."}
]
}
]

```

[SPT2TS-125301]

Class "OperationalConsist"

```

{"structs": [
{
"name": "OperationalConsist",
"info": "Defines a rolling-stock consist unit identified by the installed onboard equipment.",
"attrs": [
{"intId": 1, "name": "supportedOnBoardEquipment", "composition": "SupportedOnBoardEquipment", "info":
"Defines the list of supported onboard equipment for an operational consist"}
]
}
]

```

[SPT2TS-125305]

Class SupportedOnBoardEquipment

```

{"structs": [

```


```
{
  "name": "SupportedOnBoardEquipment",
  "info": "Defines Onboard equipment installed and active on a train",
  "attrs": [
    {"intId": 1, "name": "trainProtectionType", "enumType": "TrainProtectionType", "info": "Defines the train protection type supported by the on board equipment"},
    {"intId": 2, "name": "etcsSystemVersions", "dataType": "string", "multiplicity": "1..*", "regex": "\\d+\\.\\d+", "info": "Defines the supported etcs system versions"},
    {"intId": 3, "name": "onboardExtensions", "composition": "OnBoardExtension", "multiplicity": "*"}
  ]
}
} [SPT2TS-125306 ]
```

Class "OnBoardExtension"

```
{"structs": [
  {
    "name": "OnBoardExtension",
    "info": "A container class for a non-standard key-value-property. Messages need sometimes IM-specific information.",
    "attrs": [
      {"intId": 1, "name": "contentType", "dataType": "string", "info": "Defines the key-attribute in a key-value-pair. Used for annotation of IM-specific onboard-equipment"},
      {"intId": 2, "name": "content", "dataType": "bytes", "info": "Defines the value-attribute in a key-value-pair. Used for annotation of IM-specific onboard-equipment"}
    ]
  }
]} [SPT2TS-125307 ]
```

SPT2TS-131487 - Class: SpeedRestriction

Name	Type	Multiplicity
maxSpeed	uint32	1
restrictionEndsAtTrainFront	boolean	1

 Open]

Class "SpeedRestriction"

```
{"structs": [
  {
    "name": "SpeedRestriction",
    "attrs": [
      {"intId": 1, "name": "maxSpeed", "unit": "km/h", "dataType": "uint32", "info": "defines maximum speed"},
      {"intId": 2, "name": "restrictionEndsAtTrainFront", "dataType": "boolean", "info": "normally false, but for disturbed level crossings, the train can accelerate as soon as the train-front passed the level crossing. In this case should be true"}
    ]
  }
]} [SPT2TS-130619 ]
```

Class "MovementRestriction"

```
{"structs": [
  {
    "name": "MovementRestriction",
    "info": "Defines train specific restriction along its path.",
    "attrs": [
      {"intId": 1, "name": "restrictedPath", "composition": "infra.NetLinearReference", "info": "Defines the restricted path associated to a restriction of an operational plan movement"},
    ]
  }
]}
```

```
{
  "intId": 2, "name": "specificRestriction", "composition": "SpecificMovementRestriction", "info": "Defines the
specific restriction on the restriction path associated to an operational plan movement"}
}
} [SPT2TS-125302 ]
```

Class SpecificMovementRestriction

```
{
  "structs": [
    {
      "name": "SpecificMovementRestriction",
      "info": "Defines single aspect of the train specific restriction",
      "union": true,
      "attrs": [
        {
          "intId": 1, "name": "speedRestriction", "composition": "SpeedRestriction"},
        {
          "intId": 2, "name": "adhesionCategory", "enumType": "AdhesionCategory", "info": "Defines the different
adhesion categories applicable for the train as per track conditions"},
        {
          "intId": 3, "name": "maxCurrent", "dataType": "uint32", "unit": "A", "info": "Defines max current value, s.
item 0.33 in SS126"},
        {
          "intId": 4, "name": "atoInhibition", "dataType": "boolean", "info": "train section is not constantly monitored, or
stimulate driver's attention, or approaching overcrowded station"},
        {
          "intId": 5, "name": "dasInhibition", "dataType": "boolean", "info": "Defines the Driver advisory system
inhibition zone"},
        {
          "intId": 6, "name": "excludedSwitchableTracksideAssetsForFlankProtection", "reference":
"tp.SwitchableTracksideAsset", "multiplicity": "0..*", "info": "Defines the list of SwitchableTracksideAssets
to be excluded from flank protection calculation."}
      ]
    }
  ]
} [SPT2TS-125303 ]
```

Enums

```
{
  "enums": [
    {
      "name": "BrakePosition",
      "enumLiterals": [
        {
          "intId": 0, "name": "passengerTrainInP"},
        {
          "intId": 1, "name": "passengerTrainInR"},
        {
          "intId": 2, "name": "freightTrainInP"},
        {
          "intId": 3, "name": "freightTrainInG"},
        {
          "intId": 4, "name": "brakePositionUnknown"}
      ]
    },
    {
      "name": "BrakeModelType",
      "enumLiterals": [
        {
          "intId": 0, "name": "lambda"},
        {
          "intId": 1, "name": "gamma"},
        {
          "intId": 2, "name": "undefined"}
      ]
    },
    {
      "name": "ATOGradeOfAutomation",
      "enumLiterals": [
        {
          "intId": 0, "name": "GoAUnknown"},
        {
          "intId": 1, "name": "GoA1"},
        {
          "intId": 2, "name": "GoA2"},
        {
          "intId": 3, "name": "GoA3"},
        {
          "intId": 4, "name": "GoA4"}
      ]
    }
  ]
}
```

```

]
},
{
  "name": "TrainCategoryType",
  "enumLiterals": [
    {"intId": 0, "name": "trainCategoryUnknown"},
    {"intId": 1, "name": "interregional"},
    {"intId": 2, "name": "regional"},
    {"intId": 3, "name": "subUrban"},
    {"intId": 4, "name": "nightTrain"},
    {"intId": 5, "name": "motorRail"},
    {"intId": 6, "name": "mountainTrain"},
    {"intId": 7, "name": "historicTrain"},
    {"intId": 8, "name": "coachGroup"},
    {"intId": 9, "name": "tram"},
    {"intId": 10, "name": "underground"},
    {"intId": 11, "name": "highspeedTrain"},
    {"intId": 12, "name": "intercity"}
  ]
},
{
  "name": "TrainUsageType",
  "enumLiterals": [
    {"intId": 0, "name": "trainUsageUndefined"},
    {"intId": 1, "name": "commercialPassengerTrain"},
    {"intId": 2, "name": "commercialCargoTrain"},
    {"intId": 3, "name": "locomotiveRunningLight"},
    {"intId": 4, "name": "lightRunning"},
    {"intId": 5, "name": "notInService", "info": "betriebsfahrt"},
    {"intId": 6, "name": "engineeringTrain"},
    {"intId": 7, "name": "breakdownTrain", "info": "Hilfszug"},
    {"intId": 8, "name": "mixedTrain"},
    {"intId": 9, "name": "specialTrain"},
    {"intId": 10, "name": "otherTrain"}
  ]
},
{
  "name": "TrainProtectionType",
  "enumLiterals": [
    {"intId": 0, "name": "Etcs"}
  ]
},
{
  "name": "AdhesionCategory",
  "enumLiterals": [
    {"intId": 0, "name": "dryRailHigh", "info": "Conditions where 100% of the brake force of the vehicle can be applied with no axle sliding of more than 2% (adhesion level typically above 0.15μ)"},
    {"intId": 1, "name": "dryRailMedium", "info": "Conditions where the wheel/rail adhesion is in the range 0.15 – 0.10 (Damp rails with some contamination)"},
    {"intId": 2, "name": "dryRailLow", "info": "Conditions where the wheel/rail adhesion is in the range 0.10 – 0.08 (Typical autumn mornings due to dew/dampness often combined with light overnight rust)"},
    {"intId": 3, "name": "lowAdhesion", "info": "Conditions where the wheel/rail adhesion is in the range 0.08 –

```

```

0.05"},
{"intId": 4, "name": "veryLowAdhesion", "info": "Conditions where the wheel/rail adhesion is in the range
0.05-0.03"},
{"intId": 5, "name": "extremelyLowAdhesion", "info": "Conditions where the wheel/rail adhesion is below
0.03"},
{"intId": 255, "name": "unknownAdhesion"}
]
}
]
} [SPT2TS-125304 ]

```

2.3.1 Movement Event

MovementEvent

Defines an operational activity on a specific point in space and time for a train run. [SPMS-7601,

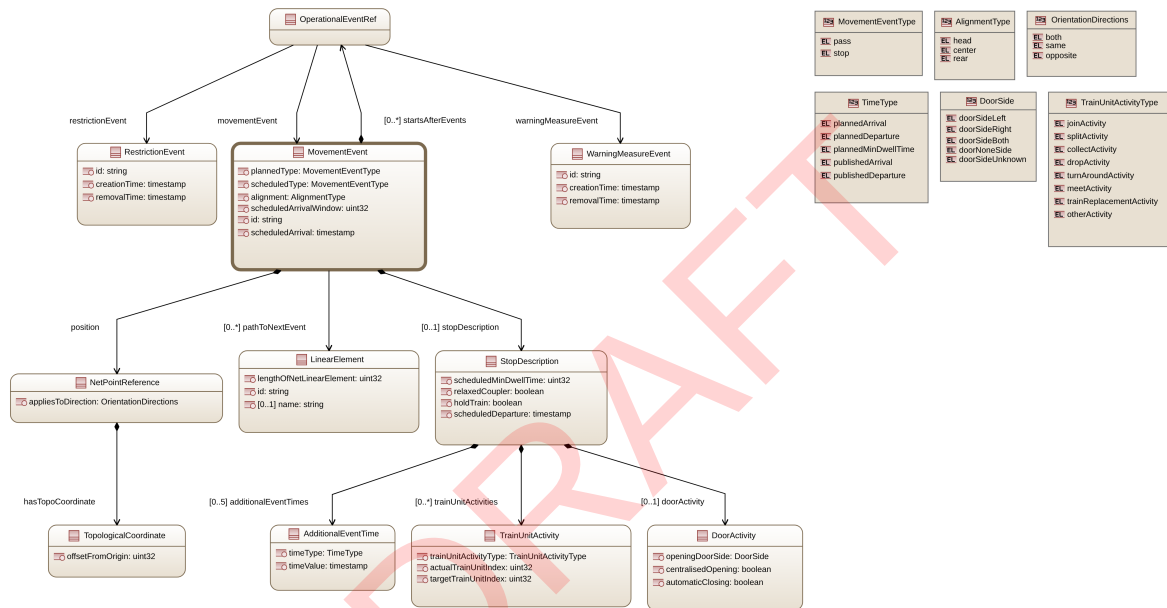


Figure 4 Tree View of MovementEvent

]

Class "Movement Event"

```

{
"structs": [
{
"name": "MovementEvent",
"info": "Defines an operational activity on a specific point in space and time for a train run.",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used
for referencing"},
{"intId": 2, "name": "plannedType", "enumType": "MovementEventType", "info": "Defines if stopping or
passing was planned"},
{"intId": 3, "name": "scheduledType", "enumType": "MovementEventType", "info": "Defines if stopping or
passing is scheduled"},
{"intId": 4, "name": "alignment", "enumType": "AlignmentType", "info": "Defines the train-alignment at
position-attribute (head, center, end)"},
{"intId": 5, "name": "position", "composition": "infra.NetPointReference", "info": "Defines position on a

```

```

linearElement for the movement event"},
{"intId": 6, "name": "pathToNextEvent", "reference": "infra.LinearElement", "multiplicity": "0..*", "ordered":
"byIndex", "info": "Defines the path-part after the LinearElement of the position-value and before the linear
element of the nextEvent (excluding). The path must be reconstructable without graph-search algorithms.
The path remains empty, if 1) same linearElement in both events, 2) no driving activity in between e.g. in
Joining, Splitting, turnAround, trainReplacement."},
{"intId": 7, "name": "stopDescription", "composition": "StopDescription", "multiplicity": "0..1", "info": "Defines
the stop description in case of a stop of the train"},
{"intId": 8, "name": "scheduledArrival", "dataType": "timestamp", "info": "Defines the scheduled arrival time.
equal to scheduledDeparture for a passing train, see latestArrival in SS126. In the first station it is time of
'start of mission', in UTC"},
{"intId": 9, "name": "scheduledArrivalWindow", "dataType": "uint32", "unit": "s", "info": "Defines the
scheduled arrival window. scheduledEarliestArrival = scheduledArrival - scheduledArrivalWindow. For
passing trains scheduledEarliestDeparture = scheduledEarliestArrival, see arrivalWindow in SS126. In the
first station it is a time window for 'start of mission'."},
{"intId": 10, "name": "startsAfterEvents", "composition": "OperationalEventRef", "multiplicity": "0..*", "info":
"Defines the set of operational events, which must be finished before the current event starts."}
]
},
{
"name": "OperationalEventRef",
"info": "Defines a reference to one of possible OperationalEvents (as a unit)",
"union": true,
"attrs": [
{"intId": 1, "name": "movementEvent", "reference": "MovementEvent", "info": "refers a movement event
including the movement plan"},
{"intId": 2, "name": "restrictionEvent", "reference": "RestrictionEvent", "info": "Refers a restriction event
including restriction plan"},
{"intId": 3, "name": "warningMeasureEvent", "reference": "WarningMeasureEvent", "info": "Refers a
warning measure event including the warning plan"}
]
}
]
} [SPT2TS-124423 ]

```

Class StopDescription

```

{
"structs": [
{
"name": "StopDescription",
"info": "Defines activities to be implemented by the train when it stops.",
"attrs": [
{"intId": 1, "name": "trainUnitActivities", "composition": "TrainUnitActivity", "multiplicity": "*", "ordered":
"byIndex", "info": "Defines the sequence of changes of TrainUnit during the stop"},
{"intId": 2, "name": "doorActivity", "composition": "DoorActivity", "multiplicity": "0..1", "info": "Defines the
door activity. If the attribute is not provided, the doors remain closed"},
{"intId": 3, "name": "relaxedCoupler", "dataType": "boolean", "info": "Defines the state of coupler. true -
request for coupler relaxation, false -not, see Q_Relaxed_Coupler in SS126"},
{"intId": 4, "name": "holdTrain", "dataType": "boolean", "info": "Defines, if the train shall be hold until the
next update. See JP in SS126"},
{"intId": 5, "name": "scheduledDeparture", "dataType": "timestamp", "info": "Defines the scheduled
departure time. see departure in SS126. In the last station it is 'end of mission', in UTC."},
{"intId": 6, "name": "scheduledMinDwellTime", "dataType": "uint32", "unit": "s", "info": "Defines if the train
has to wait after actual arrival this number of seconds before departure. ActualEarliestDeparture =

```

max(departure, arrival + minDwellTime) will be calculated by ATO-OB, see minDwellTime in SS126"},
 {"intId": 7, "name": "additionalEventTimes", "composition": "AdditionalEventTime", "multiplicity": "0..5"}
],
 {
 "name": "AdditionalEventTime",
 "info": "Defines times not required for ATO, but useful for CDAS (e.g. published arrival, plannedArrival
 etc.)",
 "attrs": [
 {"intId": 1, "name": "timeValue", "dataType": "timestamp", "info": "Defines the time value in UTC"},
 {"intId": 2, "name": "timeType", "enumType": "TimeType", "info": "Defines the time type for a stop
 description"}
],
 },
 "enums": [
 {
 "name": "TimeType",
 "enumLiterals": [
 {"intId": 0, "name": "plannedArrival"},
 {"intId": 1, "name": "plannedDeparture"},
 {"intId": 2, "name": "plannedMinDwellTime"},
 {"intId": 3, "name": "publishedArrival"},
 {"intId": 4, "name": "publishedDeparture"}
],
 },
],
 } [SPT2TS-125298]

Class DoorActivity

```
{
  "structs": [
    {
      "name": "DoorActivity",
      "info": "Defines which doors shall be open and how they shall be open.",
      "attrs": [
        {"intId": 1, "name": "openingDoorSide", "enumType": "DoorSide", "info": "Defines the door opening side.  

        noneSide if the doors are kept closed. noneSide if the doors are kept closed"},
        {"intId": 2, "name": "centralisedOpening", "dataType": "boolean", "info": "Defines if the doors can be  

        centrally opened. true - centralised opening, false - opening by passengers/driver"},
        {"intId": 3, "name": "automaticClosing", "dataType": "boolean", "info": "Defines if automatic closing of doors  

        is performed by ATO or not. True by ATO, false - without ATO"}
      ],
    },
  ],
}
```

[SPT2TS-126732]

Class TrainUnitActivity

```
{
  "structs": [
    {
      "name": "TrainUnitActivity",
      "info": "Defines, what happens with the rolling stock at this location.",
      "attrs": [
        {"intId": 1, "name": "trainUnitActivityType", "enumType": "TrainUnitActivityType", "info": "Defines the train  

        unit activity type"},
      ],
    },
  ],
}
```



```
{
  "intId": 2, "name": "actualTrainUnitIndex", "dataType": "uint32", "info": "Defines the index of TrainUnit in OperationalMovement. operationalTrainUnits before the activity. Index starts with 0"},
  "intId": 3, "name": "targetTrainUnitIndex", "dataType": "uint32", "info": "Defines the index of TrainUnit in OperationalMovement. operationalTrainUnits after the activity. Index starts with 0"}
}
}
} [SPT2TS-125313 ]
```

Class "PhysicalTrainUnitIdentifier"

```
{
  "structs": [
    {
      "name": "PhysicalTrainUnitIdentifier",
      "info": "Defines a set of possible identifiers for a physical train (ETCS-trainRunningNumber, OBU-ID etc).",
      "attrs": [
        {
          "intId": 1, "name": "trainRunningNumber", "dataType": "string", "multiplicity": "0..1", "info": "Defines the Train Running Number for ETCS same as SS026.NID_OPERATIONAL. To be usable for ETCS must contain an integer [0..99999999]. Mapping to uint32 by filling with F: '1233' -> 0x1233FFFF"},
          {
            "intId": 2, "name": "additionalTrainRunningNumber", "dataType": "string", "multiplicity": "0..1", "info": "Defines the distinction between Operational Train Units with the same trainRunningNumber. This may occur if a trainRunningNumber is reused for different spare trains."},
          {
            "intId": 3, "name": "tafTapTsiTrainID", "dataType": "string", "multiplicity": "0..1", "info": "refers to taf tap tsi train id"},
          {
            "intId": 4, "name": "leadingOnBoardUnitId", "dataType": "string", "multiplicity": "0..1", "info": "Defines NID_ENGINE. To be usable with ETCS must contain an integer [0..16.777.215]"}
        ]
      }
    ]
  }
} [SPT2TS-125308 ]
```

Enums

```
{
  "enums": [
    {
      "name": "MovementEventType",
      "enumLiterals": [
        {
          "intId": 0, "name": "pass", "info": "if the speed != 0 at the movement event position"},
        {
          "intId": 1, "name": "stop", "info": "if the speed == 0 at the movement event position"}
      ]
    },
    {
      "name": "AlignmentType",
      "enumLiterals": [
        {
          "intId": 0, "name": "head"},
        {
          "intId": 1, "name": "center"},
        {
          "intId": 2, "name": "rear"}
      ]
    },
    {
      "name": "TrainUnitActivityType",
      "enumLiterals": [
        {
          "intId": 0, "name": "joinActivity", "info": "uncouple vehicles/parts for self-propelling train parts"},
        {
          "intId": 1, "name": "splitActivity", "info": "uncouple vehicles/parts for self-propelling train parts"},
        {
          "intId": 2, "name": "collectActivity", "info": "couple vehicles/parts"},
        {
          "intId": 3, "name": "dropActivity", "info": "uncouple vehicles/trainParts"},
        {
          "intId": 4, "name": "turnAroundActivity", "info": "stop to change driving direction of a train. After TurnAround a new MovementEvent with changed train position will be inserted into the Movement"},
        {
          "intId": 5, "name": "meetActivity", "info": "Relevant for PE to request restricted MP in advance"},
        {
          "intId": 6, "name": "trainReplacementActivity", "info": "a trainUnit is replaced by another one on another netElement. The new position is provided in the next movementEvent. The pathToNextEvent in the current event remains empty."},
        {
          "intId": 7, "name": "otherActivity", "info": "the change must be calculated by comparing TrainUnits before"}
      ]
    }
  ]
}
```

```

and after the activity"}
]
}
]
} [SPT2TS-125311 ]

```

2.4 Operational Plan Restriction

OperationalPlanRestriction

Defines a temporary infrastructure restriction [SPMS-7608,

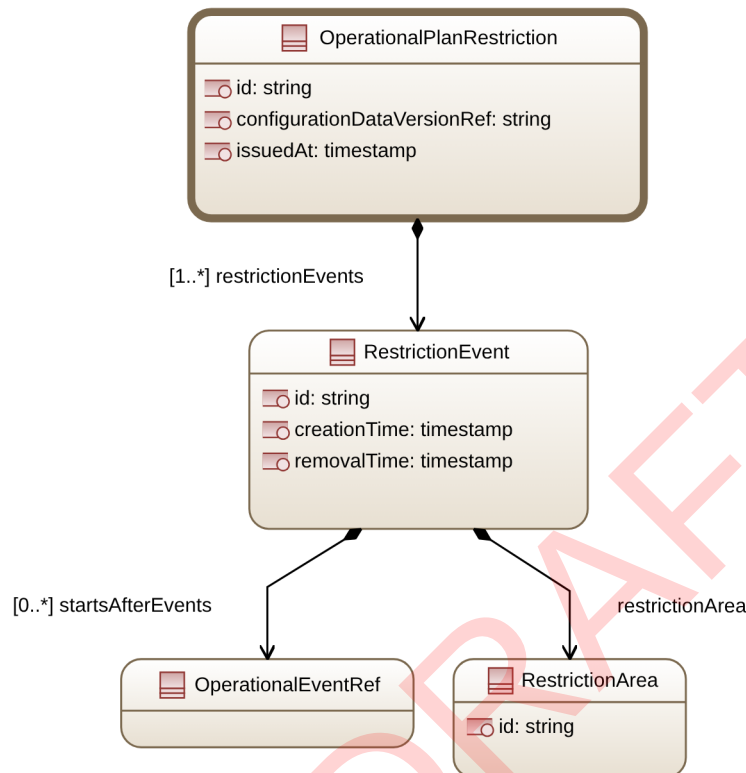


Figure 5 Tree View of OperationalPlanRestriction

]

Class "Restriction"

```

{
  "structs": [
    {
      "name": "OperationalPlanRestriction",
      "info": "Defines a temporary infrastructure restriction",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used for referencing"},
        {"intId": 2, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 3, "name": "configurationDataVersionRef", "dataType": "string", "info": "Defines the configuration data version for which the operational plan is valid"},
        {"intId": 5, "name": "restrictionEvents", "composition": "RestrictionEvent", "multiplicity": "1..*", "info": "Defines a set of restriction events assigned the the operational plan restriction"}
      ]
    }
  ]
}

```

```
]
}}
}[SPT2TS-124447 ]
```


Class RestrictionEvent

```
{
  "structs": [
    {
      "name": "RestrictionEvent",
      "info": "Defines a part of temporary infrastructure restriction, especially if one Restriction plan contains several areas to be activate to different times.",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used for referencing"},
        {"intId": 2, "name": "creationTime", "dataType": "timestamp", "info": "Defines the time when the restrictionArea shall be created=implemented=activated in interlocking, in UTC"},
        {"intId": 3, "name": "removalTime", "dataType": "timestamp", "info": "Defines the removal time in UTC. E.g. removal 10:04:20 means, that restriction is active until 10:04:19.999999. The relation is creationTime <= active < removalTime"},
        {"intId": 4, "name": "restrictionArea", "composition": "RestrictionArea", "info": "Defines the restriction area associated to a restriction event"},
        {"intId": 5, "name": "startsAfterEvents", "composition": "OperationalEventRef", "multiplicity": "0..*", "info": "Defines the set of operational events, which must be finished before the current event starts."}
      ]
    }
  ]
}
```

[SPT2TS-126703]

SPT2TS-131489 - Class: RestrictionArea

Name	Type	Multiplicity	Info
id	String	1	Id of Restriction Area, used for referencing
linearElementSections	Infra.LinearElementSection	1..*	Composes of linear element sections
specificRestrictions	SpecificRestriction	1..*	List of specific restrictions

[ Open]

Class "RestrictionArea"

```
{"structs": [
  {
    "name": "RestrictionArea",
    "info": "Defines a topological area, in which the restrictions must be applied.",
    "attrs": [
      {"intId": 1, "name": "linearElementSections", "composition": "infra.LinearElementSection", "multiplicity": "1..*", "info": "composes of linear element sections"},
      {"intId": 2, "name": "specificRestrictions", "composition": "SpecificRestriction", "multiplicity": "1..*", "info": "Defines the list of specific restrictions"},
      {"intId": 3, "name": "id", "dataType": "string", "key": "global", "info": "Id of Restriction Area, used for referencing"}
    ]
  }
]
```

```
]
} [SPT2TS-125318 ]
```

SPT2TS-131486 - Class: TrainGroupSpec

Name	Type	Multiplicity	Info
axleLoadCategories	infra.LoadCapabilityLineCategories	0..*	Trains with the listed Axle-Load-Category belong to the TrainGroup.
cantDeficiencyCategories	infra.CantDeficiencyCategory	0..*	Trains with the listed Cant Deficiency Category belong to the TrainGroup.

[ Open]

Class "TrainGroupSpec"

```
{ "structs": [
{
"name": "TrainGroupSpec",
"info": "Defines the train aspects, which define if the train belongs to the restricted group.",
"attrs": [
{ "intId": 1, "name": "axleLoadCategories", "enumType": "infra.LoadCapabilityLineCategories", "multiplicity":
"*", "info": "Trains with the listed Axle-Load-Category belong to the TrainGroup." },
{ "intId": 2, "name": "cantDeficiencyCategories", "enumType": "infra.CantDeficiencies", "multiplicity": "*",
"info": "Trains with the listed Cant Deficiency Category belong to the TrainGroup." }
]
}
]
} [SPT2TS-125319 ]
```

SPT2TS-131488 - Union: RestrictedAspects

Name	Type	Multiplicity	Info
speedRestriction	SpeedRestriction	1	Defines the allowed speed
allowedDrivingModes	OnboardOperatingMode	0..*	Defines the allowed driving modes
maxAdhesion	AdhesionCategory	1	Defines the maximum adhesion
maxCurrent	uint32	1	Defines max current value. For ATO, SS126. Ignored by TrafficCS
operationallyNonStandstill	boolean	1	Defines the operationally non stopping area. If true, the trains defined in trainGroupSpec should not stop within restriction area due to operational reasons.
nonStandstill	boolean	1	Defines the non stopping area. If true, the trains defined in trainGroupSpec shall not stop within restriction area.
trackClosure	boolean	1	

Name	Type	Multiplicity	Info
			Defines track closure information. If true, the trains defined in trainGroupSpec shall not enter restriction area
operationalRadioHole	boolean	1	Defines the presence of operational radio holes. if true radio communication is restricted within restriction area
soundHorn	boolean	1	Defines that approaching trains needs to sound horn
nonSwitchability	boolean	1	Defines that Switchable Trackside Asset cannot be switched
safetyCriticalCommandOnly	boolean	1	Defines that only safety critical commands are allowed
manualOperationOnly	boolean	1	Defines that only manual operation by operator or maintainer is allowed (no automatic operation by PES)
atoInhibition	boolean	1	Defines the ato inhibition zones. Exmaples: train section is not contantly monitored, or stimulate driver's attention, or approaching overcrouded station

[ Open]

Class RestrictedAspect

```
{
  "structs": [
    {
      "name": "RestrictedAspect",
      "info": "Defines single aspects of the infrastructure restriction",
      "union": true,
      "attrs": [
        {
          "intId": 1, "name": "speedRestriction", "composition": "SpeedRestriction", "info": "Defines the allowed speed",
        },
        {
          "intId": 2, "name": "allowedDrivingModes", "enumType": "OnboardOperatingMode", "multiplicity": "*",
          "info": "Defines the allowed driving modes",
        },
        {
          "intId": 3, "name": "nonStandstill", "dataType": "boolean", "info": "Defines the non stopping area. If true, the trains defined in trainGroupSpec shall not stop within restriction area.",
        },
        {
          "intId": 4, "name": "trackClosure", "dataType": "boolean", "info": "Defines track closure information. If true, the trains defined in trainGroupSpec shall not enter restriction area",
        },
        {
          "intId": 5, "name": "operationalRadioHole", "dataType": "boolean", "info": "Defines the presence of operational radio holes. if true radio communication is restricted within restriction area",
        },
        {
          "intId": 6, "name": "maxAdhesion", "enumType": "AdhesionCategory", "info": "Defines the maximum adhesion",
        },
        {
          "intId": 7, "name": "atoInhibition", "dataType": "boolean", "info": "Defined the ato inhibition zones. Exmaples: train section is not contantly monitored, or stimulate driver's attention, or approaching overcrouded station",
        },
        {
          "intId": 8, "name": "maxCurrent", "dataType": "uint32", "unit": "A", "info": "Defines max current value. For ATO, SS126. Ignored by TrafficCS",
        },
        {
          "intId": 9, "name": "soundHorn", "dataType": "boolean", "info": "Defines that approaching trains needs to"
        }
      ]
    }
  ]
}
```


```

sound horn"},
{"intId": 10, "name": "nonSwitchability", "dataType": "boolean", "info": "Defines that Switchable Trackside
Asset cannot be switched. To be clarified."},
{"intId": 11, "name": "safetyCriticalCommandOnly", "dataType": "boolean", "info": "Defines that only safety
critical commands are allowed"},
{"intId": 12, "name": "manualOperationOnly", "dataType": "boolean", "info": "Defines that only manual
operation by operator or maintainer is allowed (no automatic operation by PES)"},
{"intId": 13, "name": "operationallyNonStandstill", "dataType": "boolean", "info": "Defines the operationally
non stopping area. If true, the trains defined in trainGroupSpec should not stop within restriction area due
to operational reasons."}
]
} [SPT2TS-125320 ]

```

SPT2TS-131485 - Class: SpecificRestriction

Name	Type	Multiplicity	Info
appliedToTrains	TrainGroupSpec	0..1	Defines the applicable trains that are affected by the specific restriction
restrictedAspects	RestrictedAspects	1..*	Defines the restricted aspects associated to a specific restriction

[ Open]

Class SpecificRestriction

```

{"structs": [
{
"name": "SpecificRestriction",
"info": "Defines single aspect of the infrastructure restriction.",
"attrs": [
{"intId": 1, "name": "appliedToTrains", "composition": "TrainGroupSpec", "multiplicity": "0..1", "info":
"Defines the applicable trains that are affected by the specific restriction"},
{"intId": 2, "name": "restrictedAspects", "composition": "RestrictedAspect", "multiplicity": "1..*", "info":
"Defines the restricted aspects associated to a specific restriction"}
]
}
]
} [SPT2TS-125315 ]

```

2.5 Operational Plan Warning Measure

OperationalPlanWarningMeasure

Defines a temporary warning area, required for e.g. a possession. [SPMS-7614,

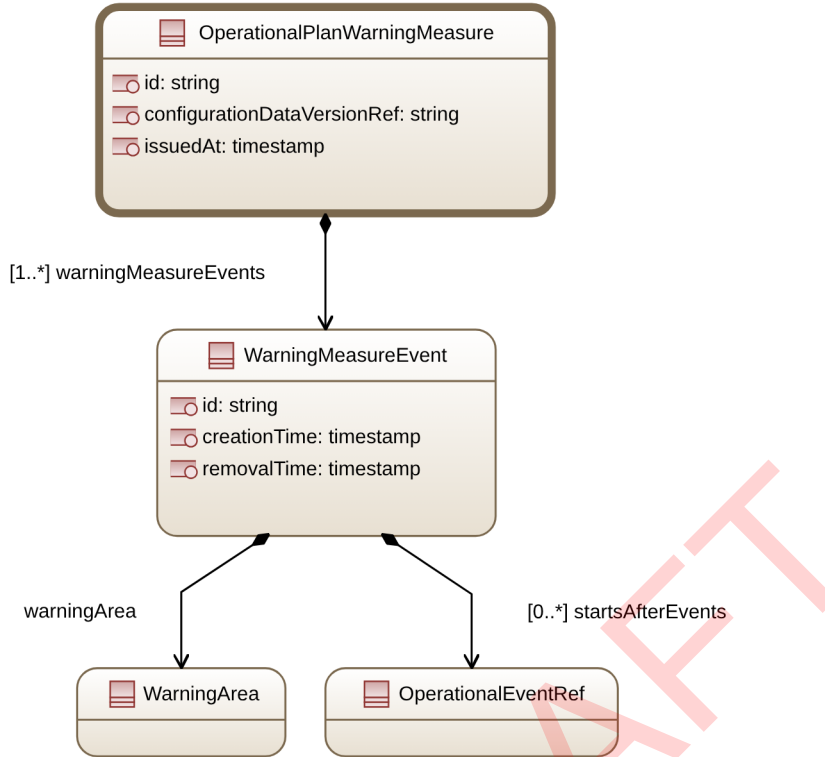


Figure 6 Tree View of OperationalPlanWarningMeasure

]

Class "Warning Measure"

```

{
  "structs": [
    {
      "name": "OperationalPlanWarningMeasure",
      "info": "Defines a temporary warning area, required for e.g. a possession.",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used for referencing"},
        {"intId": 2, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 3, "name": "configurationDataVersionRef", "dataType": "string", "info": "Defines the configuration data version for which the operational plan is valid"},
        {"intId": 4, "name": "warningMeasureEvents", "composition": "WarningMeasureEvent", "multiplicity": "1..*", "info": "Defines the list of warning measures events"}
      ]
    }
  ]
} [SPT2TS-124453 ]
  
```

Class WarningArea

```

{"structs": [
  {
  
```

```

"name": "WarningArea",
"info": "Defines area in which Warning measures shall be implemented.",
"attrs": [
{"intId": 1, "name": "trackArea", "composition": "infra.NetAreaReference", "info": "protected area"},
{"intId": 2, "name": "warningDevices", "composition": "WarningDevice", "multiplicity": "1..*", "info": "Defines
the list of warning devices"}
]
}}
} [SPT2TS-125322 ]

```

Class WarningDevice

```

{"structs": [
{
"name": "WarningDevice",
"info": "Defines functional warning device which must be activated to implement warning measure",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used
for referencing"},
{"intId": 2, "name": "deviceType", "enumType": "DeviceType", "info": "Defines a functional warning device
type used for securing the warning area"}
]
}}
} [SPT2TS-125323 ]

```

Class "WarningMeasureEvent"

```

{"structs": [
{
"name": "WarningMeasureEvent",
"info": "Defines planned activation/removal of warning area",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Defines the Identity of the object; used
for referencing"},
{"intId": 2, "name": "creationTime", "dataType": "timestamp", "info": "Defines the time when the
warningArea shall be created=implemented=activated in interlocking, in UTC"},
{"intId": 3, "name": "removalTime", "dataType": "timestamp", "info": "Defines the removal time in UTC"},
{"intId": 4, "name": "warningArea", "composition": "WarningArea"},
{"intId": 5, "name": "startsAfterEvents", "composition": "OperationalEventRef", "multiplicity": "0..*", "info":
"Defines the set of operational events, which must be finished before the current event starts."}
]
}}
} [SPT2TS-125324 ]

```

Enums

```

{"enums": [
{
"name": "DeviceType",
"enumLiterals": [
{"intId": 0, "name": "acousticalIndicator"},
{"intId": 1, "name": "opticalIndicator"},
{"intId": 2, "name": "hapticIndicator"}
]
}}
} [SPT2TS-125321 ]

```


3 Dataflow TrafficCS to TMS

3.1 Operational Plan Execution Response

ExecutionResponse

Defines the result of evaluation of an operational plan from the TrafficCS (accepts/rejects) [SPMS-7618,

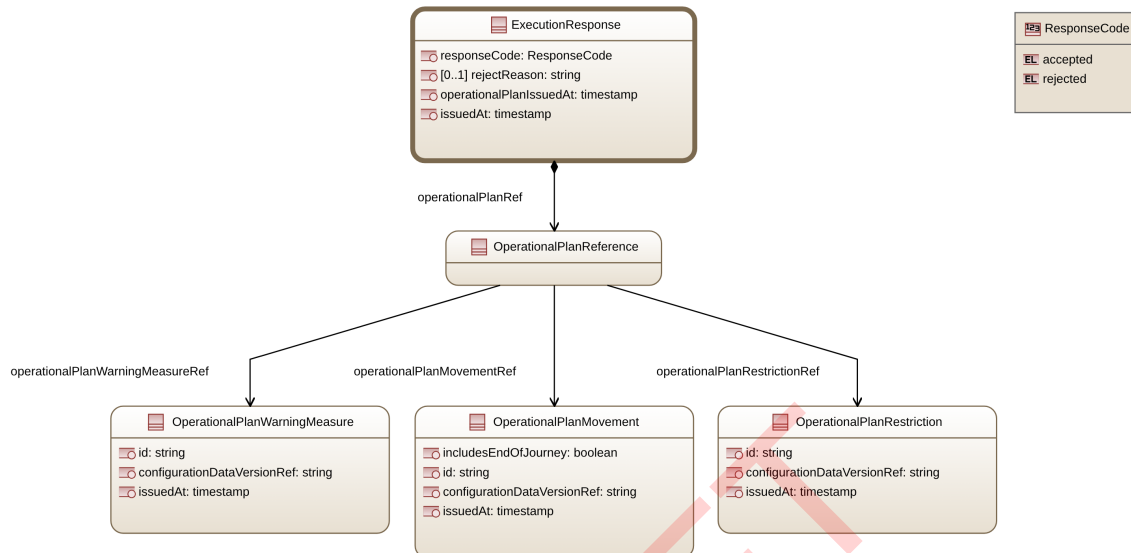


Figure 7 Tree View of ExecutionResponse

]

Class ExecutionResponse

```

{
  "structs": [
    {
      "name": "ExecutionResponse",
      "info": "Defines the result of evaluation of an operational plan from the TrafficCS (accepts/rejects)",
      "attrs": [
        {"intId": 1, "name": "operationalPlanRef", "composition": "OperationalPlanReference", "info": "Refers to an operational plan"},
        {"intId": 2, "name": "operationalPlanIssuedAt", "dataType": "timestamp", "info": "refers to the issuedAt-value of the operational plan request, in UTC"},
        {"intId": 3, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 4, "name": "responseCode", "enumType": "ResponseCode", "info": "Defines the response code associated with the event execution request"},
        {"intId": 5, "name": "rejectReason", "dataType": "string", "multiplicity": "0..1", "info": "Defines the reject reason for an event execution request"}
      ]
    }
  ]
} [SPT2TS-125683 ]
  
```

Class PlanIdentifier

```

{
  "structs": [
    {
      "name": "OperationalPlanReference",
    }
  ]
}
  
```

```

"info": "Defines a reference to one of possible OperationalPlans (movement, restriction, warning)",
"union": true,
"attrs": [
  {"intId": 1, "name": "operationalPlanMovementRef", "reference": "OperationalPlanMovement", "info":
    "Refers the operational plan movement"},
  {"intId": 2, "name": "operationalPlanRestrictionRef", "reference": "OperationalPlanRestriction", "info":
    "Refers the operational plan restriction"},
  {"intId": 3, "name": "operationalPlanWarningMeasureRef", "reference": "OperationalPlanWarningMeasure",
    "info": "Refers the operational plan warning measure"}
]
},
],
"enums": [
{
  "name": "ResponseCode",
  "enumLiterals": [
    {"intId": 0, "name": "accepted"},
    {"intId": 1, "name": "rejected"}
  ]
}
]
} [SPT2TS-125685 ]

```

3.2 Operational Plan Execution Report

3.2.1 Event Execution Report

EventExecutionReport

Defines states of start/end of an event (success/failure, timestamp etc.) [SPMS-7620,

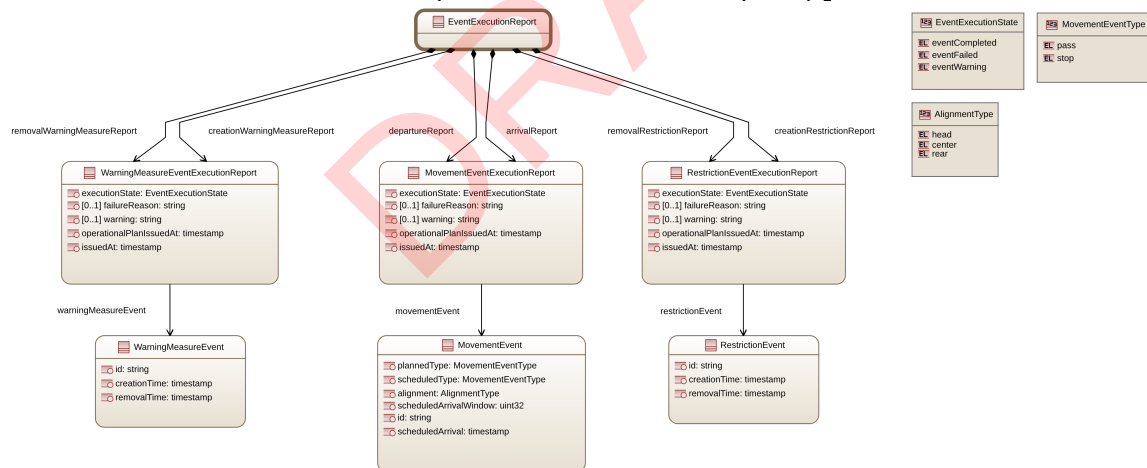


Figure 8 Tree View of EventExecutionReport

]

Class EventExecutionReport

```

{
"structs": [
{
  "name": "EventExecutionReport",
  "info": "Defines states of start/end of an event (success/failure, timestamp etc.)",
  "union": true,

```

```

"attrs": [
{"intId": 1, "name": "arrivalReport", "composition": "MovementEventExecutionReport", "info": "Defines the
arrival reports. For passing only the departure reports are to be sent"},
{"intId": 2, "name": "departureReport", "composition": "MovementEventExecutionReport", "info": "Defines
the result of departure attempt"},
{"intId": 3, "name": "creationRestrictionReport", "composition": "RestrictionEventExecutionReport", "info":
"Defines the result of creation of a restriction"},
{"intId": 4, "name": "removalRestrictionReport", "composition": "RestrictionEventExecutionReport", "info":
"Defines the result of removal of a restriction"},
{"intId": 5, "name": "creationWarningMeasureReport", "composition":
"WarningMeasureEventExecutionReport", "info": "Defines the result of creation of a warning measure"},
{"intId": 6, "name": "removalWarningMeasureReport", "composition":
"WarningMeasureEventExecutionReport", "info": "Defines the result of removal of warning measure"}
],
{
"name": "MovementEventExecutionReport",
"info": "Defines state of execution of a warning measure event (completed, failed, warning).",
"attrs": [
{"intId": 1, "name": "movementEvent", "reference": "MovementEvent", "info": "refers to a movement event.
In json is a string with planId/eventId"},
{"intId": 2, "name": "operationalPlanIssuedAt", "dataType": "timestamp", "info": "in UTC"},
{"intId": 3, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with
microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
{"intId": 4, "name": "executionState", "enumType": "EventExecutionState", "info": "Defines the type of
execution result of the event"},
{"intId": 5, "name": "failureReason", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal
error message in English"},
{"intId": 6, "name": "warning", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal warning
message in English"}
],
{
"name": "RestrictionEventExecutionReport",
"info": "Defines how the restriction event was executed (success, failure ...)",
"attrs": [
{"intId": 1, "name": "restrictionEvent", "reference": "RestrictionEvent", "info": "refers to a restriction event
including operational plan restriction"},
{"intId": 2, "name": "operationalPlanIssuedAt", "dataType": "timestamp", "info": "in UTC"},
{"intId": 3, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with
microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
{"intId": 4, "name": "executionState", "enumType": "EventExecutionState", "info": "Defines the type of
execution result of the event"},
{"intId": 5, "name": "failureReason", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal
error message in English"},
{"intId": 6, "name": "warning", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal warning
message in English"}
],
{
"name": "WarningMeasureEventExecutionReport",
"attrs": [
{"intId": 1, "name": "warningMeasureEvent", "reference": "WarningMeasureEvent", "info": "in json is a
string with planId/eventId"},
{"intId": 2, "name": "operationalPlanIssuedAt", "dataType": "timestamp", "info": "in UTC"},
{"intId": 3, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with

```

```
microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
{"intId": 4, "name": "executionState", "enumType": "EventExecutionState", "info": "Defines the type of
execution result of the event"},
{"intId": 5, "name": "failureReason", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal
error message in English"},
{"intId": 6, "name": "warning", "dataType": "string", "multiplicity": "0..1", "info": "Defines an informal warning
message in English"}
]
},
],
"enums": [
{
"name": "EventExecutionState",
"enumLiterals": [
{"intId": 0, "name": "eventCompleted"},
{"intId": 1, "name": "eventFailed"},
{"intId": 2, "name": "eventWarning"}
]
}
]
} [SPT2TS-125664 ]
```

3.3 Train Unit Report

3.3.1 Train Unit Report PE

TrainUnitReportPE

Defines train report (position, capabilities, permission) coming from PlanExecution system. [SPMS-7624,

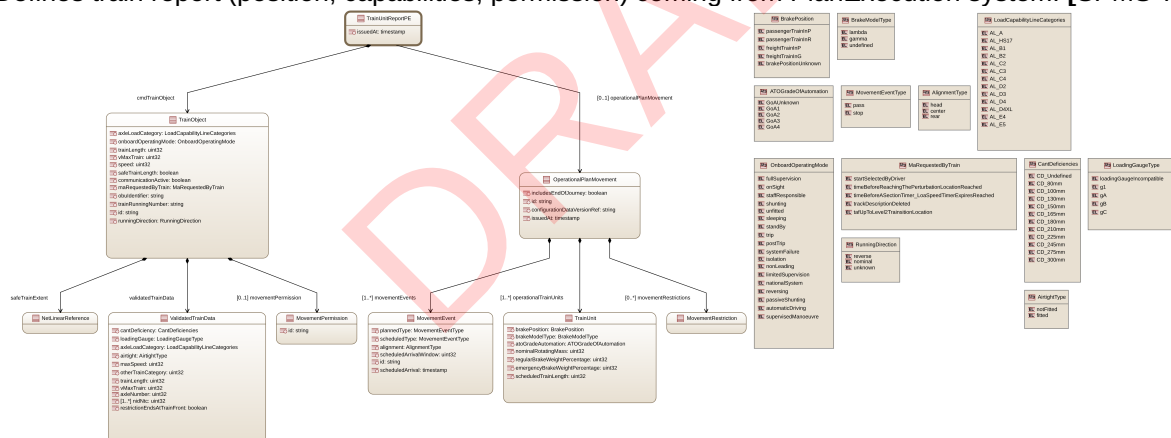


Figure 9 Tree View of TrainUnitReportPE

1

Class TrainUnitReportPE and it's constituents


```
{
  "structs": [
    {
      "name": "TrainUnitReportPE",
      "info": "Defines train report (position, capabilities, permission) coming from PlanExecution system.",
      "attrs": [
        { "intId": 1, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC" },

```

```
{
  "intId": 2, "name": "operationalPlanMovement", "reference": "OperationalPlanMovement", "multiplicity":
  "0..1", "info": "Refers to the operational plan movement. If the new train was created in TrafficCS it does
  not have an operationalPlan (Movement) yet"},
  {
    "intId": 3, "name": "cmdTrainObject", "composition": "TrainObject", "info": "Defines the train object
    information"
  }
}
}}} [SPT2TS-125679 ]
```

SPT2TS-131481 - Class TrainObject

Name	Type	Multiplicity	Info
id	String	1	Id of Train Object generated by ETPS; used for referencing
trainRunningNumber	String	1	see ss026, 7.5.1.92 NID_OPERATIONAL
obuldentifier	String	1	see ss026, 7.5.1.88 NID_ENGINE
validatedTrainData	ValidatedTrainData	1	see ss026, 7.4.3.5 Packet Number 11: Validated train data
safeTrainLength	Boolean	1	see ss026, 7.5.1.112 Q_LENGTH
onboardOperatingMode	Enum<OnboardOperatingMode>	1	see ss026, 7.5.1.72 M_MODE
safeTrainExtent	Infra.NetLinearReference	1	Defines the safe train extent as provided by ETPS
movementPermission	MovementPermission	0..1	Movement Permission associated to Train Object
communicationActive	Boolean	1	see ss026, 7.5.1.127 Q_RBC
speed	Int	1	see ss026, 7.5.1.172 V_TRAIN
runningDirection	Enum<RunningDirection>	1	see ss026, 7.5.1.105 Q_DIRTRAIN
maRequestedByTrain	Enum<MaRequestedByTrain>	1	see ss026, 7.5.1.118.3 Q_MARQSTREASON

[ Open]

Class TrainObject

```
{
  "structs": [
    {
      "name": "TrainObject",
      "info": "Defines a train report generated by TrafficCS including its position, length, speed etc.",
      "attrs": [
        {
          "intId": 1, "name": "obuldentifier", "dataType": "string", "info": "Defines the onboard-unit identifier, see
          ss026, 7.5.1.88 NID_ENGINE"},
        {
          "intId": 3, "name": "movementPermission", "composition": "MovementPermission", "multiplicity": "0..1",
          "info": "Movement Permission associated to Train Object"},
        {
          "intId": 5, "name": "safeTrainLength", "dataType": "boolean", "info": "Defines if the trainLength-value is
          safe, see ss026, 7.5.1.112 Q_LENGTH"},
        {
          "intId": 6, "name": "communicationActive", "dataType": "boolean", "info": "Defines the communication state"
        }
      ]
    }
  ]
}
```


```

for the train object, see ss026, 7.5.1.127 Q_RBC"},
{"intId": 7, "name": "trainRunningNumber", "dataType": "string", "info": "see
PhysicalTrainUnitIdentifier.trainRunningNumber; see ss026, 7.5.1.92 NID_OPERATIONAL"},
{"intId": 9, "name": "onboardOperatingMode", "enumType": "OnboardOperatingMode", "info": "Defines the
on-board operating mode of the train, see ss026, 7.5.1.72 M_MODE"},
{"intId": 10, "name": "safeTrainExtent", "composition": "infra.NetLinearReference", "info": "train extent
starting with the train head (opposite to the train-movement-direction); defines the safe train extent as
provided by ETPS"},
{"intId": 11, "name": "id", "dataType": "string", "key": "global", "info": "Id of Train Object generated by ETPS;
used for referencing"},
{"intId": 12, "name": "maRequestedByTrain", "enumType": "MaRequestedByTrain", "info": "see ss026,
7.5.1.118.3 Q_MARQSTREASON"},
{"intId": 13, "name": "speed", "dataType": "uint32", "unit": "km/h", "info": "Defines current speed of the train,
see ss026, 7.5.1.172 V_TRAIN"},
{"intId": 14, "name": "validatedTrainData", "composition": "ValidatedTrainData", "info": "see ss026, 7.4.3.5
Packet Number 11: Validated train data"},
{"intId": 15, "name": "runningDirection", "enumType": "RunningDirection", "info": "see ss026, 7.5.1.105
Q_DIRTRAIN"}
]
}}} [SPT2TS-131447 ]

```

SPT2TS-131474 - Class: ValidatedTrainData

Name	Type	Multiplicity	Info
cantDeficiencyCategory	infra.CantDeficiencies	1	see ss026, 7.5.1.82.2 NC_CDTRAIN
otherTrainCategory	uint32	1	see ss026, 7.5.1.84 NC_TRAIN
trainLength	uint32	1	see ss026, 7.5.1.56 L_TRAIN
vMaxTrain	uint32	1	see ss026, 7.5.1.160 V_MAXTRAIN
loadingGauge	infra.LoadingGaugeType	1	see ss026, 7.5.1.68 M_LOADINGGAUGE
axleLoadCategory	infra.LoadCapabilityLineCategories	1	see ss026, 7.5.1.62 M_AXLELOADCAT
airtight	airtightType	1	see ss026, 7.5.1.61 M_AIRTIGHT
axleNumber	uint32	1	This gives the number of axles of the single unit (fixed train set or locomotive) in which the onboard equipment is fitted. See ss026, 7.5.1.79.1 N_AXLE
voltage	VoltageSystem	0..*	see ss026, 7.4.3.5 Identity of the traction system NID_CTRACTION(k) given only if M_VOLTAGE(k) ≠ 0
nidNtc	uint32	1..*	see ss026, 7.5.1.98 NID_NTC

[ Open]

Class Validated Train Data

```

{"structs": [
{

```


```

"name": "ValidatedTrainData",
"attrs": [
{"intId": 1, "name": "cantDeficiency", "enumType": "infra.CantDeficiencies", "info": "see ss026, 7.5.1.82.2 NC_CDTRAIN"},
{"intId": 2, "name": "otherTrainCategory", "dataType": "uint32", "info": "see ss026, 7.5.1.84 NC_TRAIN"},
{"intId": 3, "name": "trainLength", "dataType": "uint32", "unit": "m", "info": "see ss026, 7.5.1.56 L_TRAIN"},
{"intId": 4, "name": "vMaxTrain", "dataType": "uint32", "unit": "km/h", "info": "see ss026, 7.5.1.160 V_MAXTRAIN"},
{"intId": 5, "name": "loadingGauge", "enumType": "infra.LoadingGaugeType", "info": "see ss026, 7.5.1.68 M_LOADINGGAUGE"},
{"intId": 6, "name": "axleLoadCategory", "enumType": "infra.LoadCapabilityLineCategories", "info": "see ss026, 7.5.1.62 M_AXLELOADCAT"},
{"intId": 7, "name": "airtight", "enumType": "AirtightType", "info": "see ss026, 7.5.1.61 M_AIRTIGHT"},
{"intId": 8, "name": "axleNumber", "dataType": "uint32", "info": "This gives the number of axles of the single unit (fixed train set or locomotive) in which the onboard equipment is fitted. See ss026, 7.5.1.79.1 N_AXLE"},
{"intId": 9, "name": "voltage", "composition": "VoltageSystem", "multiplicity": "0..*", "info": "see ss026, 7.4.3.5 Identity of the traction system NID_CTRACTION(k) given only if M_VOLTAGE(k) ≠ 0"},
{"intId": 10, "name": "nidNtc", "dataType": "uint32", "multiplicity": "1..*", "info": "see ss026, 7.5.1.98 NID_NTC"}
]
}] [SPT2TS-131448 ]

```

SPT2TS-131476 - Class: VoltageSystem

Name	Type	Multiplicity	Info
voltage	infra.EnergySupplySystems	1	see ss026, 7.5.1.78 M_VOLTAGE
countryTractionId	uint32	1	see ss026, 7.5.1.86.1 NID_CTRACTION

[ Open]

Class Voltage system

```

{"structs": [
{
"name": "VoltageSystem",
"attrs": [
{"intId": 1, "name": "voltage", "enumType": "infra.EnergySupplySystems", "info": "see ss026, 7.5.1.78 M_VOLTAGE"},
{"intId": 2, "name": "countryTractionId", "dataType": "uint32", "info": "see ss026, 7.5.1.86.1 NID_CTRACTION"}
]
}
]
}] [SPT2TS-131451 ]

```

SPT2TS-131478 - Class: MovementPermission

Name	Type	Multiplicity	Info
id	String	1	Id of Movement Permission; used for referencing
mpExtent		1	Extent of the Movement Permission

Name	Type	Multiplicity	Info
	Infra.NetLinearReference		
riskBuffer	Infra.NetLinearReference	1	Extent risk buffer for a Movement Permission
riskPaths	Collection<infra.NetLinearReference>	1	Collection of applied Risk Paths of Movement Permission
excludedSTAForFlankProtection	Set<String>	1	Set of Switchable Trackside Assets excluded from flank protection
currentEoA	Infra.NetPointReference	1	Current End of Authority of associated Movement Authority
mpSpeeds	List<MpSpeed>	1	Applied speed profile
mpOnboardOperatingModes	List<MpOnboardOperatingMode>	1	Applied mode profile
pendingCooperativeShorteningRequests	List<CooperativeShorteningRequest>	1	Pending requests for cooperative shortening of Movement Authority

[ Open]


Class Movement permission

```
{
  "structs": [
    {
      "name": "MovementPermission",
      "info": "Defines path and speed profiles assigned to a train for its next movement.",
      "attrs": [
        {
          "intId": 1, "name": "id", "dataType": "string", "info": "Defines the Identity of the object; used for referencing"},
        {
          "intId": 2, "name": "riskBuffer", "composition": "infra.NetLinearReference", "info": "Defines the risk buffer for a movement permission = overlap after MP. Extent risk buffer for a Movement Permission."},
        {
          "intId": 3, "name": "riskPaths", "composition": "infra.NetLinearReference", "multiplicity": "*", "info": "Defines flank protection area on the neighbouring tracks. Collection of applied Risk Paths of Movement Permission"},
        {
          "intId": 4, "name": "mpExtent", "composition": "infra.NetLinearReference", "info": "Extent of the Movement Permission"},
        {
          "intId": 5, "name": "mpOnboardOperatingModes", "composition": "MpOnboardOperatingMode", "multiplicity": "0..*", "info": "Applied mode profile"},
        {
          "intId": 6, "name": "mpSpeeds", "composition": "MpSpeed", "multiplicity": "1..*", "info": "Applied speed profile"},
        {
          "intId": 7, "name": "excludedSTAForFlankProtection", "reference": "tp.SwitchableTracksideAsset", "multiplicity": "*", "info": "Set of Switchable Trackside Assets excluded from flank protection"},
        {
          "intId": 8, "name": "currentEoA", "composition": "infra.NetPointReference", "info": "Current End of Authority of associated Movement Authority"},
        {
          "intId": 9, "name": "pendingCooperativeShorteningRequests", "composition": "CooperativeShorteningRequest", "multiplicity": "0..*", "info": "Pending requests for cooperative shortening of Movement Authority"}
      ]
    }
  ]
}
```

}} [SPT2TS-131449]

SPT2TS-131477 - Class: MPSpeed

Name	Type	Multiplicity	Info
vMax	Int	1	Maximum applicable speed for movement permission along the assigned path
linkedPath	Infra.NetLinearReference	1	Refers the applicable path

[ Open]**Class MpSpeed**

```

{"structs": [
{
"name": "MpSpeed",
"info": "Defines speed-restriction section of the path defined in a movement permission.",
"attrs": [
{"intId": 1, "name": "vMax", "dataType": "uint32", "unit": "km/h", "info": "Defines the maximum applicable speed for movement permission along the assigned path"},
{"intId": 2, "name": "linkedPath", "composition": "infra.NetLinearReference", "info": "refers the applicable path"}
]
}] [SPT2TS-131443 ]

```

SPT2TS-131475 - Class: MpOnboardOperatingMode

Name	Type	Multiplicity	Info
onboardOperatingMode	Enum<OnboardOperatingMode>	1	Applicable driving mode along the associated path
linkedPath	Infra.NetLinearReference	1	Refers the applicable path

[ Open]**Class MpOnboardOperatingMode**

```

{"structs": [
{
"name": "MpOnboardOperatingMode",
"info": "Defines inside of a movement permission, which parts of the reserved path can be driven in which ETCS mode.",
"attrs": [
{"intId": 1, "name": "onboardOperatingMode", "enumType": "OnboardOperatingMode", "info": "Defines the applicable driving mode along the associated path"},
{"intId": 2, "name": "linkedPath", "composition": "infra.NetLinearReference", "info": "refers the applicable path"}
]
}] [SPT2TS-131462 ]

```

Class CooperativeShorteningRequest

```

{"structs": [
{
"name": "CooperativeShorteningRequest",
"attrs": [
]
}
}] [SPT2TS-131453 ]

```

SPT2TS-131479 - Enum: OnboardOperatingMode

Value
fullSupervision
onSight
staffResponsible
shunting
infitted
sleeping
standBy
trip
postTrip
systemFailure
isolation
nonLeading
limitedSupervision
nationalSystem
reversing
passiveShunting
automaticDriving
supervisedManoeuvre

[ Open]**Enum Onboard operating mode**

```

{
  "enums": [
    {
      "name": "OnboardOperatingMode",
      "enumLiterals": [
        {"intId": 0, "name": "fullSupervision"},
        {"intId": 1, "name": "onSight"},
        {"intId": 2, "name": "staffResponsible"},
        {"intId": 3, "name": "shunting"},
        {"intId": 4, "name": "unfitted"},
        {"intId": 5, "name": "sleeping"},
        {"intId": 6, "name": "standBy"},
        {"intId": 7, "name": "trip"},
        {"intId": 8, "name": "postTrip"},
        {"intId": 9, "name": "systemFailure"},
        {"intId": 10, "name": "isolation"},
        {"intId": 11, "name": "nonLeading"},
        {"intId": 12, "name": "limitedSupervision"},
        {"intId": 13, "name": "nationalSystem"},
        {"intId": 14, "name": "reversing"},
        {"intId": 15, "name": "passiveShunting"},
        {"intId": 16, "name": "automaticDriving"},
        {"intId": 17, "name": "supervisedManoeuvre"}
      ]
    }
  ]
}

```

```
]
}} [SPT2TS-131444 ]
```

SPT2TS-131482 - Enum: RunningDirection

Value
reverse
nominal
unknown


[ Open]

Enum Running direction

```
{
  "enums": [
    {
      "name": "RunningDirection",
      "enumLiterals": [
        {"intId": 0, "name": "reverse"},
        {"intId": 1, "name": "nominal"},
        {"intId": 2, "name": "unknown"}
      ]
    }
  ]
} [SPT2TS-131445 ]
```

SPT2TS-131480 - Enum: MaRequestedByTrain

Value
startSelectedByDriver
timeBeforeReachingThePerturbationLocationReached
timeBeforeASectionTimer_LoaSpeedTimerExpiresReached
trackDescriptionDeleted
tafUpToLevel2TrainsitionLocation


[ Open]

Enum MaRequested by train

```
{
  "enums": [
    {
      "name": "MaRequestedByTrain",
      "enumLiterals": [
        {"intId": 0, "name": "startSelectedByDriver"},
        {"intId": 1, "name": "timeBeforeReachingThePerturbationLocationReached"},
        {"intId": 2, "name": "timeBeforeASectionTimer_LoaSpeedTimerExpiresReached"},
        {"intId": 3, "name": "trackDescriptionDeleted"},
        {"intId": 4, "name": "tafUpToLevel2TrainsitionLocation"}
      ]
    }
  ]
} [SPT2TS-131446 ]
```

SPT2TRAFFIC-15817 - Enum: AirtightType

Value
NOT_FITTED
FITTED

[ Open]

Enum AirtightType

```
{
  "enums": [
    {
      "name": "AirtightType",
      "info": "indicates whether the train is fitted with an airtight system or not.",
      "enumLiterals": [
        {"intId": 0, "name": "notFitted"},
        {"intId": 1, "name": "fitted"}
      ]
    }
  ]
}
```

3.3.2 Train Unit Report ATO Status

TrainUnitReportAtoStatus

Defines train position report from ATO with additional info (driverId, speed, etc.). Source is SS126.STR.
[SPMS-7629,

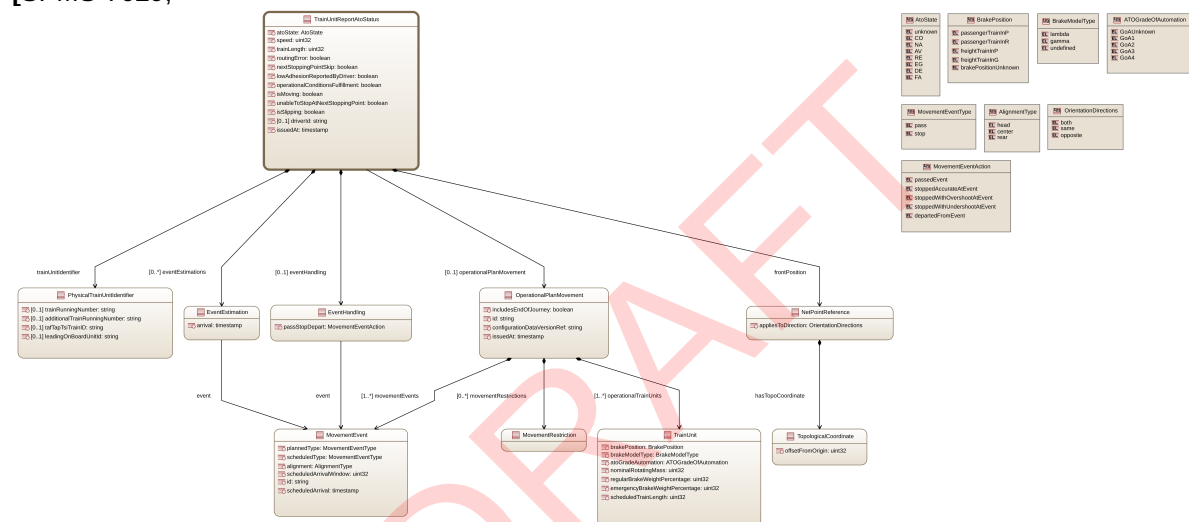


Figure 10 Tree View of TrainUnitReportAtoStatus

Class TrainUnitReportAtoState

```
{
  "structs": [
    {
      "name": "TrainUnitReportAtoStatus",
      "info": "Defines train position report from ATO with additional info (driverId, speed, etc.). Source is SS126.STR.",
      "attrs": [
        {
          "intId": 1, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {
          "intId": 2, "name": "operationalPlanMovement", "reference": "OperationalPlanMovement", "multiplicity": "0..1", "info": "Refers to the operational plan movement. If the new train was created in TrafficCS it does not have an operationalPlan (Movement) yet"},
        {
          "intId": 3, "name": "trainUnitIdentifier", "composition": "PhysicalTrainUnitIdentifier"},
        {
          "intId": 4, "name": "atoState", "enumType": "AtoState", "info": "Defines the current ATO On-Board state"},
        {
          "intId": 5, "name": "routingError", "dataType": "boolean", "info": "Defines if a routing error has occurred"}
      ]
    }
  ]
}
```

```

(inconsistent path")},
{"intId": 6, "name": "nextStoppingPointSkip", "dataType": "boolean", "info": "Defines the wish of the train
driver to skip the next stop. "},
{"intId": 7, "name": "lowAdhesionReportedByDriver", "dataType": "boolean", "info": "Defines any low
adhesion is reported by the driver"},
{"intId": 8, "name": "operationalConditionsFulfillment", "dataType": "boolean", "info": "Defines if the
operational conditions are fulfilled for ATO"},
{"intId": 9, "name": "isMoving", "dataType": "boolean", "info": "Defines if the train is moving or not (v != 0)"},
{"intId": 10, "name": "unableToStopAtNextStoppingPoint", "dataType": "boolean", "info": "Defines if the the
train is too close and/or too fast for stopping"},
{"intId": 11, "name": "isSlipping", "dataType": "boolean", "info": "Defines if the wheel slip occurs. bit7 from
SS126"},
{"intId": 12, "name": "speed", "dataType": "uint32", "unit": "km/h", "info": "current speed of the train"},
{"intId": 13, "name": "trainLength", "dataType": "uint32", "unit": "m", "info": "Defines the train length",
"ontology": {"subPropertyOf": "http://data.europa.eu/949/length"}},
{"intId": 14, "name": "driverId", "dataType": "string", "multiplicity": "0..1", "info": "Defines the driver id for the
train unit"},
{"intId": 15, "name": "frontPosition", "composition": "infra.NetPointReference", "info": "Defines the train
front position with respect to the track edge direction. This direction can be deduced from JP and STR in
SS 126"},
{"intId": 16, "name": "eventHandling", "composition": "EventHandling", "multiplicity": "0..1", "info": "defines
how the previous event was handled"},
{"intId": 17, "name": "eventEstimations", "composition": "EventEstimation", "multiplicity": "*", "ordered":
"byIndex", "info": "Refers to event estimations"}
],
{
  "name": "EventHandling",
  "info": "Defines, how the previous event was handled.",
  "attrs": [
    {"intId": 1, "name": "event", "reference": "MovementEvent", "info": "refers a movement event including the
movement plan"},
    {"intId": 2, "name": "passStopDepart", "enumType": "MovementEventAction", "info": "Defines the result of
the event handling action"}
  ],
  {
    "name": "EventEstimation",
    "info": "Defines forecast for events coming from ATO-Onboard",
    "attrs": [
      {"intId": 1, "name": "event", "reference": "MovementEvent", "info": "refers a movement event including the
movement plan"},
      {"intId": 2, "name": "arrival", "dataType": "timestamp", "info": "Defines the arrival time in UTC"}
    ],
    {
      "name": "MovementEventAction",
      "enumLiterals": [
        {"intId": 0, "name": "passedEvent"},
        {"intId": 1, "name": "stoppedAccurateAtEvent"},

```

```

{"intId": 2, "name": "stoppedWithOvershootAtEvent"},
{"intId": 3, "name": "stoppedWithUndershootAtEvent"},
{"intId": 4, "name": "departedFromEvent"}
],
},
{
  "name": "AtoState",
  "enumLiterals": [
    {"intId": 0, "name": "unknown"},
    {"intId": 1, "name": "CO", "info": "State Configuration"},
    {"intId": 2, "name": "NA", "info": "State Not Available"},
    {"intId": 3, "name": "AV", "info": "State Available"},
    {"intId": 4, "name": "RE", "info": "State Ready"},
    {"intId": 5, "name": "EG", "info": "State Engaged"},
    {"intId": 6, "name": "DE", "info": "State Disengaged"},
    {"intId": 7, "name": "FA", "info": "State Failure"}
  ]
}
]
}
]
} [SPT2TS-125680 ]

```

3.3.3 Train Unit Report ATO Capabilities

TrainUnitReportAtoCapabilities

Defines train capabilities reported by ATO from the train. [SPMS-7632,

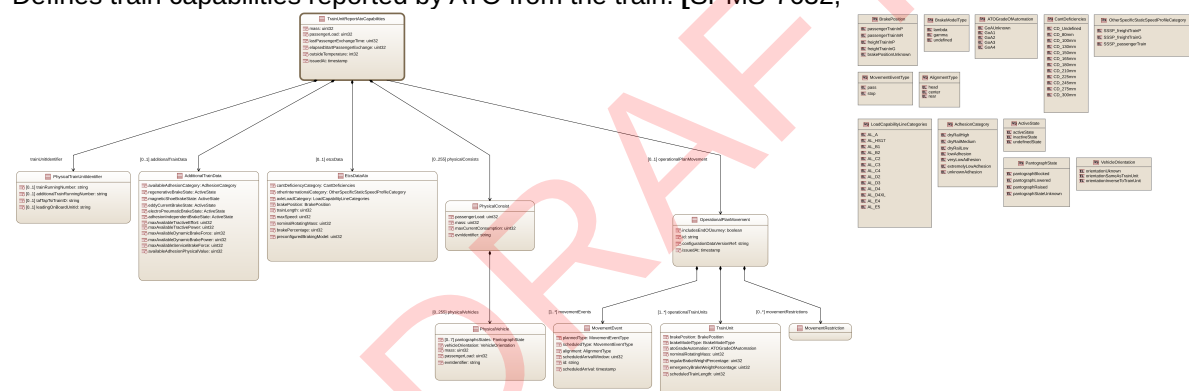


Figure 11 Tree View of TrainUnitReportAtoCapabilities

1

Class TrainUnitCapabilitiesReport and its constituents

```
{
  "structs": [
    {
      "name": "TrainUnitReportAtoCapabilities",
      "info": "Defines train capabilities reported by ATO from the train.",
      "attrs": [
        {"intId": 1, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 2, "name": "operationalPlanMovement", "reference": "OperationalPlanMovement", "multiplicity": "0..1", "info": "Refers to the operational plan movement. If the new train was created in TrafficCS it does not have an operationalPlan (Movement) yet"},
        {"intId": 3, "name": "trainUnitIdentifier", "composition": "PhysicalTrainUnitIdentifier"},
        {"intId": 4, "name": "mass", "dataType": "uint32", "unit": "kg", "exp": 2, "info": "train mass including load, 0 if unknown"}
      ]
    }
  ]
}
```

```
{
  "intId": 5, "name": "outsideTemperature", "dataType": "int32", "unit": "degree", "info": "Defines the outside
  temperature. Use 127 if unknown"},
  "intId": 6, "name": "etcsData", "composition": "EtcsDataAto", "multiplicity": "0..1", "info": "Defines the valid
  ETCS Data for the train. Not provided if invalid"},
  "intId": 7, "name": "passengerLoad", "dataType": "uint32", "unit": "percent", "range": "0..255", "info": "255
  unknown"},
  "intId": 8, "name": "lastPassengerExchangeTime", "dataType": "uint32", "unit": "s", "info": "65535:
  unknown"},
  "intId": 9, "name": "elapsedStartPassengerExchange", "dataType": "uint32", "unit": "s",
  "info": "Defines the time elapsed between standstill and the doors are released for operation or opening;
  4096: unknown"},
  "intId": 10, "name": "additionalTrainData", "composition": "AdditionalTrainData", "multiplicity": "0..1", "info":
  "Defines additional train data as part of ATO capabilities report"},
  "intId": 11, "name": "physicalConsists", "composition": "PhysicalConsist", "multiplicity": "0..255", "ordered":
  "byIndex", "info": "Defines the list of physical consists. Empty if unknown"}
}
}
} [SPT2TS-125671 ]
```

Class EtcsDataAto

```
{
  "structs": [
    {
      "name": "EtcsDataAto",
      "info": "Defines static train capability data reported by ATO",
      "attrs": [
        {
          "intId": 1, "name": "trainLength", "dataType": "uint32", "unit": "m", "info": "Defines the train length, 0 if
          unknown", "ontology": {
            "subPropertyOf": "http://data.europa.eu/949/length"
          }
        },
        {
          "intId": 2, "name": "maxSpeed", "dataType": "uint32", "unit": "km/h", "info": "Defines the maximum
          applicable speed, use 0 if unknown"},
        {
          "intId": 3, "name": "cantDeficiencyCategory", "enumType": "infra.CantDeficiencies", "info": "Defines the
          cant deficiency category of the train"},
        {
          "intId": 4, "name": "otherInternationalCategory", "enumType":
          "infra.OtherSpecificStaticSpeedProfileCategory", "info": "Defines other international static speed profile
          category ; represents NC_DIFF as per Subset 026-7"},
        {
          "intId": 5, "name": "axleLoadCategory", "enumType": "infra.LoadCapabilityLineCategories"},
        {
          "intId": 6, "name": "nominalRotatingMass", "dataType": "uint32", "unit": "kg", "info": "relates to total train
          weight. 16 if unknown"},
        {
          "intId": 7, "name": "brakePercentage", "dataType": "uint32", "unit": "percent", "info": "Defines the brake
          percentage. 255 if unknown"},
        {
          "intId": 8, "name": "preconfiguredBrakingModel", "dataType": "uint32", "info": "Defines preconfigured
          braking model for the train. Use 255 if unknown"},
        {
          "intId": 9, "name": "brakePosition", "enumType": "BrakePosition", "info": "Defines the active brake position
          for the train"}
      ]
    }
  ]
} [SPT2TS-125694 ]
```

Class DoorData

```
{
  "structs": [
    {
      "name": "DoorData",
```

```

"info": "Defines availability of a door and last open time.",
"attrs": [
{"intId": 1, "name": "doorState", "enumType": "DoorState", "info": "Defines the door state"},
{"intId": 2, "name": "lastPassengerExchangeTime", "dataType": "uint32", "unit": "s", "info": "Defines the last
passenger exchange time. Use 65535 if unknown"}
]
}}
} [SPT2TS-125695 ]

```

Class AdditionalTrainData

```

{
"structs": [
{
"name": "AdditionalTrainData",
"info": "Defines dynamic train characteristics, which are not primary for the timetable (therefore
'additional')",
"attrs": [
{"intId": 1, "name": "maxAvailableTractiveEffort", "dataType": "uint32", "unit": "N", "exp": 3, "range":
"0..3000", "info": "Defines the maximum available traction effort. Use 65535 if unknown"},
{"intId": 2, "name": "maxAvailableTractivePower", "dataType": "uint32", "unit": "W", "exp": 3, "range":
"0..32000", "info": "Defines the maximum available traction power. Use 65535 if unknown"},
{"intId": 3, "name": "maxAvailableDynamicBrakeForce", "dataType": "uint32", "unit": "N", "exp": 3, "range":
"0..3000", "info": "Defines the maximum available dynamic brake force. Use 65535 if unknown"},
{"intId": 4, "name": "maxAvailableDynamicBrakePower", "dataType": "uint32", "unit": "W", "exp": 3, "range":
"0..32000", "info": "Defines the maximum available dynamic brake power. Use 65535 if unknown"},
{"intId": 5, "name": "maxAvailableServiceBrakeForce", "dataType": "uint32", "unit": "N", "exp": 3, "range":
"0..3000", "info": "Defines the maximum available service brake force. Use 65535 if unknown"},
{"intId": 6, "name": "regenerativeBrakeState", "enumType": "ActiveState", "info": "Defines the state of the
regenerative brake"},
{"intId": 7, "name": "magneticShoeBrakeState", "enumType": "ActiveState", "info": "Defines the state of
magnetic shoe brake "},
{"intId": 8, "name": "eddyCurrentBrakeState", "enumType": "ActiveState", "info": "Defines the state of eddy
current brake"},
{"intId": 9, "name": "electroPneumaticBrakeState", "enumType": "ActiveState", "info": "Defines the state of
electro pneumatic brake"},
{"intId": 10, "name": "adhesionIndependentBrakeState", "enumType": "ActiveState", "info": "Defines the
adhesion independent brake state"},
{"intId": 11, "name": "availableAdhesionCategory", "enumType": "AdhesionCategory", "info": "Defines the
available adhesion categories; 053 in Subset"},
{"intId": 12, "name": "availableAdhesionPhysicalValue", "dataType": "uint32", "exp": -3, "info": "Defines the
available adhesion value. 600 if unknown"}
]
}}
} [SPT2TS-125697 ]

```

Class PhysicalConsist

```

{
"structs": [
{
"name": "PhysicalConsist",
"info": "Defines an un-splittable part of the train",
"attrs": [
{"intId": 1, "name": "evnIdentifier", "dataType": "string", "info": "Defines the european vehicle number (EVN)

```



```

12 digits"},
{"intId": 2, "name": "passengerLoad", "dataType": "uint32", "unit": "percent", "info": "Defines hte passenger
load. Use 255 if unknown"},
{"intId": 3, "name": "mass", "dataType": "uint32", "unit": "kg", "exp": 2, "range": "0..150000", "info": "Defines
the train mass including load. Use 0 if unknown"},
{"intId": 4, "name": "maxCurrentConsumption", "dataType": "uint32", "unit": "A", "exp": 1, "range": "0..1023",
"info": "Defines the maximum current consumption. Use 1023 if unknown"},
{"intId": 5, "name": "physicalVehicles", "composition": "PhysicalVehicle", "multiplicity": "0..255", "ordered":
"byIndex", "info": "Defines the physical vehicles part of the physical consist. empty=unknown"}
}
}}
} [SPT2TS-125698 ]

```

Class PhysicalVehicle

```

{
"structs": [
{
"name": "PhysicalVehicle",
"info": "Defines a single carriage inside of a physical consist.",
"attrs": [
{"intId": 1, "name": "evnIdentifier", "dataType": "string", "info": "European vehicle number (EVN)
[2018/1614/EU] 12 digits"},
{"intId": 2, "name": "mass", "dataType": "uint32", "unit": "kg", "exp": 2, "range": "0..150000", "info": "2047:
unknown"},
{"intId": 3, "name": "vehicleOrientation", "enumType": "VehicleOrientation", "info": "Defines the orientation
of the vehicle with respect to the train unit"},
{"intId": 4, "name": "doorDataLeft", "composition": "DoorData", "multiplicity": "0..7", "ordered": "byIndex",
"info": "Defines the left door data. Left is with respect of normal orientation"},
{"intId": 5, "name": "doorDataRight", "composition": "DoorData", "multiplicity": "0..7", "ordered": "byIndex",
"info": "Defines the right door data. Right is with respect of normal orientation"},
{"intId": 6, "name": "passengerLoad", "dataType": "uint32", "unit": "percent", "info": "255=unknown"},
{"intId": 7, "name": "pantographsStates", "enumType": "PantographState", "multiplicity": "0..7", "ordered":
"byIndex", "info": "Defines the state of the pantograph"}
]
},
],
"enums": [
{
"name": "DoorState",
"enumLiterals": [
{"intId": 0, "name": "doorStateUnknown"},
{"intId": 1, "name": "doorStateBlocked", "info": "defect"},
{"intId": 2, "name": "doorStateAvailable"}
]
},
{
"name": "PantographState",
"enumLiterals": [
{"intId": 0, "name": "pantographBlocked", "info": "can not be used, defect"},
{"intId": 1, "name": "pantographLowered"},
{"intId": 2, "name": "pantographRaised"},
{"intId": 3, "name": "pantographStateUnknown"}
]
},
{
"name": "DoorSide",
"enumLiterals": [

```

```

{"intId": 0, "name": "doorSideLeft"},
{"intId": 1, "name": "doorSideRight"},
{"intId": 2, "name": "doorSideBoth"},
{"intId": 3, "name": "doorNoneSide"},
{"intId": 4, "name": "doorSideUnknown"}
],
{
  "name": "ActiveState",
  "enumLiterals": [
    {"intId": 0, "name": "activeState"},
    {"intId": 1, "name": "inactiveState"},
    {"intId": 2, "name": "undefinedState"}
  ]
},
{
  "name": "VehicleOrientation",
  "enumLiterals": [
    {"intId": 0, "name": "orientationUnknown"},
    {"intId": 1, "name": "orientationSameAsTrainUnit"},
    {"intId": 2, "name": "orientationInverseToTrainUnit"}
  ]
}
]
} [SPT2TS-125699 ]

```

3.4 Track Occupation State

UnresolvedTrackboundObject

Defines occupation state of a part of the infrastructure graph, sent by low-level system on each track occupation registered, contains CMD.UnresolvedTrackboundObject [SPMS-7638,

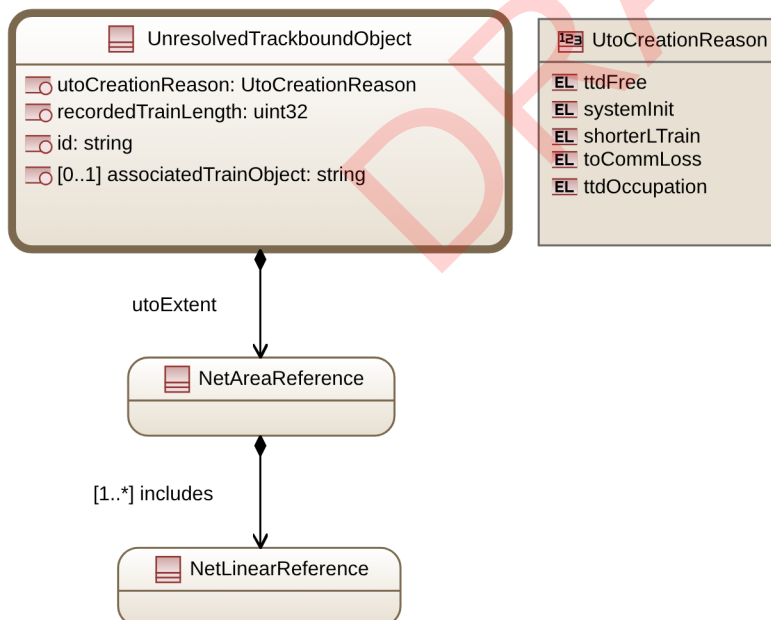


Figure 12 Tree View of UnresolvedTrackboundObject

]

SPT2TS-131483 - Class: UnresolvedTrackboundObject

Name	Type	Multiplicity	Info
id	String	1	

Name	Type	Multiplicity	Info
			Id of Unresolved Trackbound Object, used for referencing
utoExtent	Infra.NetAreaReference	1	Extent of Unresolved Trackbound Object
associatedTrainObject	String	1	Reference to Train Object associated to Unresolved Trackbound Object
recordedTrainLength	Int	1	Trainlength of the associated Train Object
utoCreationReason	Enum<UtoCreationReason>	1	Reason for creation of Unresolved Trackbound Object given by ETPS

[ Open]


Class UnresolvedTrackboundObject

```
{
  "structs": [
    {
      "name": "UnresolvedTrackboundObject",
      "info": "Defines occupation state of a part of the infrastructure graph, sent by low-level system on each track occupation registered, contains CMD.UnresolvedTrackboundObject",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Id of Unresolved Trackbound Object, used for referencing"},
        {"intId": 2, "name": "utoExtent", "composition": "infra.NetAreaReference", "info": "Extent of Unresolved Trackbound Object"},
        {"intId": 3, "name": "associatedTrainObject", "dataType": "string", "multiplicity": "0..1", "info": "Reference to Train Object associated to Unresolved Trackbound Object"},
        {"intId": 4, "name": "recordedTrainLength", "dataType": "uint32", "unit": "m", "info": "Defines the recorded train length. Use 0 if undefined. Trainlength of the associated Train Object.", "ontology": {"subPropertyOf": "http://data.europa.eu/949/length"}},
        {"intId": 5, "name": "utoCreationReason", "enumType": "UtoCreationReason", "info": "Reason for creation of Unresolved Trackbound Object given by ETPS"}
      ]
    }
  ]
}
```

}} [SPT2TS-125672]

SPT2TS-131484 - Enum: UtoCreationReason

Value
ttdFree
systemInit
shorterLTrain
toCommLoss
ttdOccupation

[ Open]

Enum Uto creation reason

```
{
  "enums": [
    {
      "name": "UtoCreationReason",
```

```

"enumLiterals": [
  {"intId": 0, "name": "ttdFree"},
  {"intId": 1, "name": "systemInit"},
  {"intId": 2, "name": "shorterLTrain"},
  {"intId": 3, "name": "toCommLoss"},
  {"intId": 4, "name": "ttdOccupation"}
]
}
]
} [SPT2TS-131450 ]

```

3.5 Switchable trackside asset state

SwitchableTracksideAssetState

represents available, requested and current states of the asset [SPMS-7639,

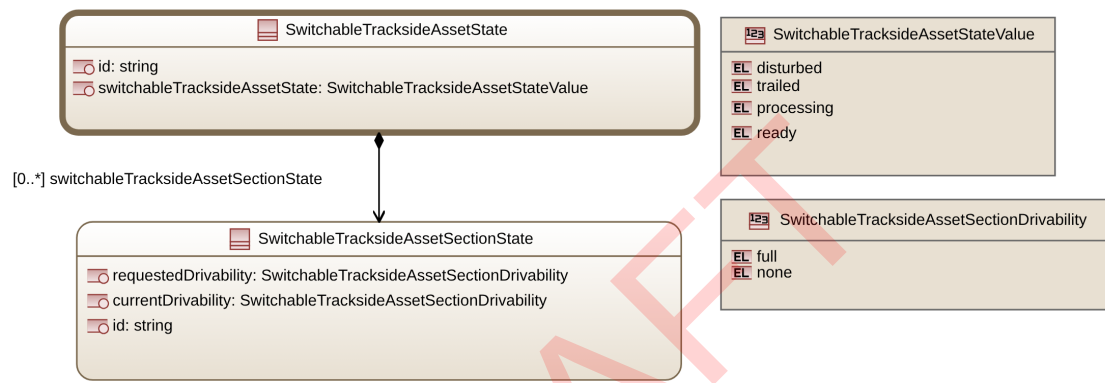



Figure 13 Tree View of SwitchableTracksideAssetState

]

SPT2TS-131470 - Class: SwitchableTracksideAssetState

Name	Type	Multiplicity	Info
id	String	1	Reference to Switchable Trackside Asset
switchableTrackside AssetState	Enum<SwitchableTracksideAssetStateValue>	1	Overall state of Switchable Trackside Asset
switchableTrackside AssetSectionsState	Set<SwitchableTracksideAssetSectionState>	1	Set of Switchable Trackside Asset Sections that are part of the Switchable Trackside Asset

[ Open]

Class Switchable Trackside Asset State

```


{
"structs": [
{
"name": "SwitchableTracksideAssetState",
"info": "represents available, requested and current states of the asset",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "sameKeyAs": "tp.SwitchableTracksideAsset",
"info": "Reference to Switchable Trackside Asset"},
{"intId": 2, "name": "switchableTracksideAssetState", "enumType": "SwitchableTracksideAssetStateValue",
"info": "Overall state of Switchable Trackside Asset"},
{"intId": 3, "name": "switchableTracksideAssetSectionState", "composition":
"SwitchableTracksideAssetSectionState", "multiplicity": "*", "info": "Set of Switchable Trackside Asset
Sections States that are part of the Switchable Trackside Asset"}
]
}
]
}

```

]
 }}} [SPT2TS-125700]

SPT2TS-131471 - Class: SwitchableTracksideAssetSectionState

Name	Type	Multiplicity	Info
id	String	1	Reference to Switchable Trackside Asset Section
requestedDrivability	Enum<SwitchableTracksideAssetSectionDrivability>	1	requested driveability of Switchable Trackside Asset Section
currentDrivability	Enum<SwitchableTracksideAssetSectionDrivability>	1	current driveability of Switchable Trackside Asset Section


[ Open]

Class Switchable Trackside Asset Section State

```
{ "structs": [
{
  "name": "SwitchableTracksideAssetSectionState",
  "attrs": [
    { "intId": 1, "name": "id", "dataType": "string", "key": "global", "sameKeyAs":
      "SwitchableTracksideAssetSection", "info": "Reference to Switchable Trackside Asset Section"},
    { "intId": 2, "name": "requestedDrivability", "enumType": "SwitchableTracksideAssetSectionDrivability",
      "info": "requested driveability of Switchable Trackside Asset Section"},
    { "intId": 3, "name": "currentDrivability", "enumType": "SwitchableTracksideAssetSectionDrivability", "info":
      "current driveability of Switchable Trackside Asset Section"}
  ]
}
]
}
} [SPT2TS-131440 ]
```

SPT2TS-131472 - Enum: SwitchableTracksideAssetStateValue

Value
disturbed
trailed
processing
ready


[ Open]

Enum SwitchableTracksideAssetStateValue

```
{ "enums": [
{
  "name": "SwitchableTracksideAssetStateValue",
  "enumLiterals": [
    { "intId": 0, "name": "disturbed"},
    { "intId": 1, "name": "trailed"},
    { "intId": 2, "name": "processing"},
    { "intId": 3, "name": "ready"}
  ]
}
]
} [SPT2TS-131441 ]
```

SPT2TS-131473 - Enum: SwitchableTracksideAssetSectionDrivability

Value
full
none

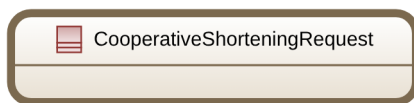
[ Open]

Enum Switchable Trackside Asset Section Drivability

```
{
  "enums": [
    {
      "name": "SwitchableTracksideAssetSectionDrivability",
      "enumLiterals": [
        {"intId": 0, "name": "full"},
        {"intId": 1, "name": "none"}
      ]
    }
  ]
} [SPT2TS-131442 ]
```

3.6 Restriction Area State

CooperativeShorteningRequest



[SPMS-7641,

Figure 14 Tree View of CooperativeShorteningRequest

]

Class Restriction Area State

```
{
  "structs": [
    {
      "name": "RestrictionAreaState",
      "info": "Defines if the restriction is activated(created)/removed",
      "attrs": [
        {"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "id of restrictionArea generated by interlocking"},
        {"intId": 2, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {"intId": 3, "name": "restrictionEvent", "reference": "RestrictionEvent", "multiplicity": "0..1", "info": "refers to planned restriction event inclusive the operational plan restriction"},
        {"intId": 4, "name": "restrictionState", "enumType": "RestrictionState", "info": "Defines if the area was created or removed"},
        {"intId": 5, "name": "restrictionArea", "composition": "RestrictionArea", "multiplicity": "0..1", "info": "Defines the restriction area associated to a restriction area state. Provided if created by PE or implemented differently than planned"}
      ]
    }
  ],
  "enums": [
    {
      "name": "RestrictionState",
      "enumLiterals": [
        {"intId": 0, "name": "created"},
        {"intId": 1, "name": "removed"}
      ]
    }
  ]
} [SPT2TS-127062 ]
```

3.7 Warning Area State

WarningAreaState

Defines the state of a WarningMeasureEvent (created/updated/removed). [SPMS-7642,

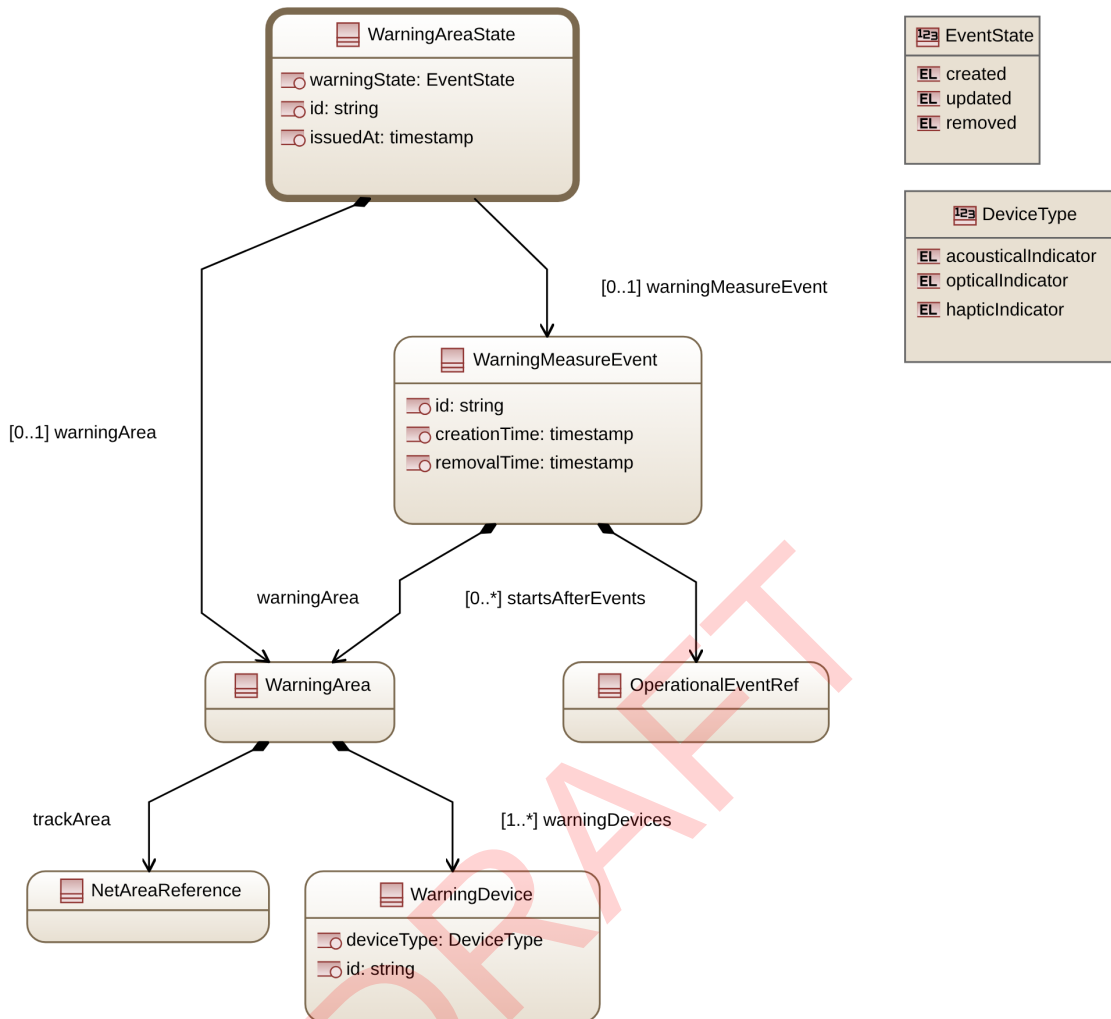


Figure 15 Tree View of WarningAreaState

]

Class WarningAreaState

```

{
  "structs": [
    {
      "name": "WarningAreaState",
      "info": "Defines the state of a WarningMeasureEvent (created/updated/removed).",
      "attrs": [
        {
          "intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "warningArea-id generated by interlocking"},
        {
          "intId": 2, "name": "issuedAt", "dataType": "timestamp", "info": "Defines the issue-point in time with microsecond-resolution builds a version-id for acknowledgements and validity-estimations, in UTC"},
        {
          "intId": 3, "name": "warningMeasureEvent", "reference": "WarningMeasureEvent", "multiplicity": "0..1", "info": "refers to planned warning measure event (if planned)"},
        {
          "intId": 4, "name": "warningState", "enumType": "EventState", "info": "Defines if the warning area was established or removed"},
        {
          "intId": 5, "name": "warningArea", "composition": "WarningArea", "multiplicity": "0..1", "info": "Defines the
  
```

warning area associated with the warning area state. Provided if differs from warningMeasureEvent.warningArea or unplanned"

```
]
}
]
} [SPT2TS-127063 ]
```

Enum EventState

```
{"enums": [
{
"name": "EventState",
"enumLiterals": [
{"intId": 0, "name": "created"},
{"intId": 1, "name": "updated"},
{"intId": 2, "name": "removed"}
]
}
]
}
```

[SPT2TS-131454]

DRAFT