TCCS - Data Model_11_OI

SPT2TS-127386 - 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 "OI Data"

2.1 Package Header

SPT2TS-122299 - {
"$schema": "ERJU meta-model.json",
"isDefinedBy": "http://ERJU/datamodel/0.4/oi",
"name": "OnBoardInfrastructureData",
"containerStruct": "OI",
"prefix": "oi",
"intId": 10,
"version": "1.0",
"info": "Data Model needed for On-Board Infrastructure Data use case",
"structs": [], "enums": []
} **[** Open **]**

2.2 On-Board Infrastructure Data

SPT2TS-63830 -

- **OI (domain)** encapsulates several On-Board static infrastructure data related objects for application in Localisation and GoA2-4.
- **OI Area** defines an On-Board Infrastructure Data area containing 1..* Segments confined to it.
- **OI Segment** contains topological reference data (like start location, end location, and direction) for the segment profiles. Each OI Segment contains one Segment profile.
- **Segment Profiles** are a set of static infrastructure data required by the on-board applications like Localisation, ATO, Perception, Automatic Processing Modules.

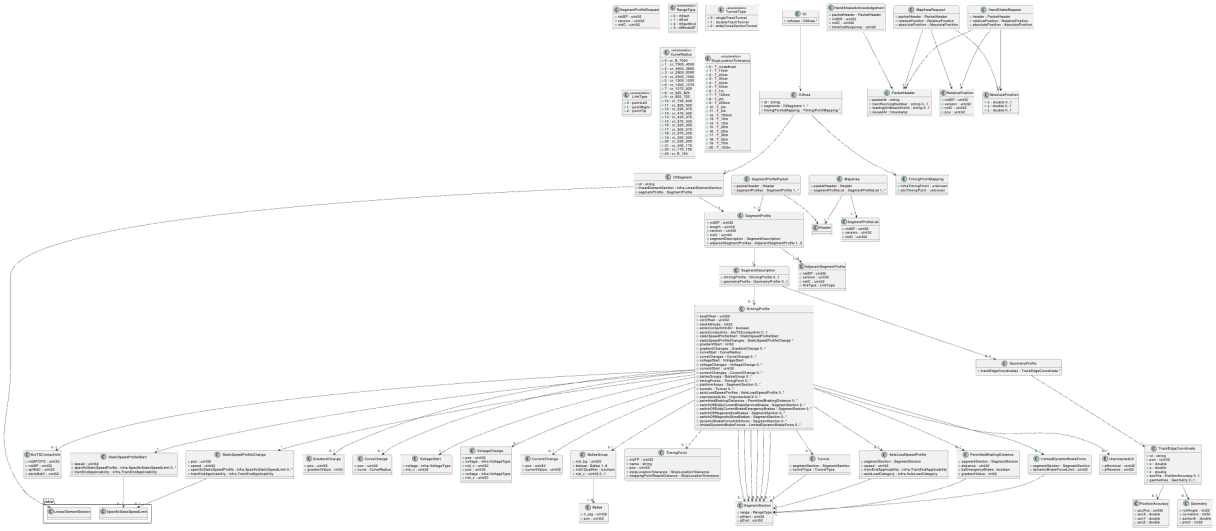

Figure 1 Class diagram OI Domain

[Open **]**

SPT2TS-48890 - OI

{
"structs":
[
{
"name": "OI",
"attrs": [
{"intId": 1, "name": "oiAreas", "composition": "OIArea", "multiplicity": "*", "ordered": "byKey", "info": "composes of OI areas"}
]
},
{
"name": "OIArea",
"info": "Defines OI Area with collection of OI segments with boarder of the infra.Area",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Identity of the object; used for referencing"},
{"intId": 2, "name": "segments", "composition": "OISegment", "ordered": "byKey", "multiplicity": "1..*", "info": "composes of segments"},
{"intId": 3, "name": "timingPointsMapping", "composition": "TimingPointMapping", "multiplicity": "*", "ordered": "byKey", "info": "composes of segments"}
]
}]
}

SPT2TS-125401 - TimingPointMapping

{

"structs":
[
{
"name": "TimingPointMapping",
"info": "main Use-Case map from infra (timetable) to ato (journeyProfile)",
"attrs": [
{"intId": 1, "name": "infraTimingPoint", "reference": "infra.TimingPoint", "key": "global", "info": "refers to infra timing point"},
{"intId": 2, "name": "atoTimingPoint", "reference": "TimingPoint", "info": "refers to ato timing point"}
]
}]
}

SPT2TS-125399 - OISegment

{
"structs":
[
{
"name": "OISegment",
"info": "Defines the topology reference information for a segment profile.",
"attrs": [
{"intId": 1, "name": "id", "dataType": "string", "key": "global", "info": "Identity of the object; used for referencing"},
{"intId": 2, "name": "linearElementSection", "composition": "infra.LinearElementSection", "info": "composes of LinearElementSection. The direction is defined by startsAt -> endsAt"},
{"intId": 3, "name": "segmentProfile", "composition": "SegmentProfile", "info": "composes of segment profiles"}
]
}]
}

2.3 Packets for data flow between Train CS and Traffic CS

SPT2TS-130069 - The packet description here are defined as per the needs coming from the Task 27.4 of WP27 FA2 Demonstrator. Also see SPT2TS-127386 **[** Open **]**

2.3.1 Segment Profile

SPT2TS-130070 - This sections details the structure of the Segment Profile **[** Open **]**

SPT2TS-125403 - SegmentProfile


```
{
   "structs":[
{
      "name": "SegmentProfile",
      "info": "Defines base properties of a segment profile",
      "belongsToSubPackage": "OIArea",
      "attrs":[
        {"intId": 1, "name": "nidSP", "dataType": "uint32", "key": "local", "info": "defines national identifier for the segment profile"},
        {"intId": 2, "name": "length", "dataType": "uint32", "unit": "m","exp": -2, "info": "defines the length of the segment profile"},
        {"intId": 3, "name": "version", "dataType": "uint32", "info": "defines the version of the segment profile"},
        {"intId": 4, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the segment profile"},
        {"intId": 5, "name": "segmentDescription", "composition": "SegmentDescription",  "info": "contains segment profile descriptions"},
        {"intId": 6, "name": "adjacentSegmentProfiles", "composition": "AdjacentSegmentProfile",
 "multiplicity":"1..4", "info": "contains adjacent segment profile links"}
   ]
 }]
}
```


SPT2TS-129315 - Adjacent Segment Profile


```
{
   "structs":[
{
      "name": "AdjacentSegmentProfile",
      "info": "Defines properties of adjacent segment profile",
      "belongsToSubPackage": "OIArea",
      "attrs":[
        {"intId": 1, "name": "nidSP", "dataType": "uint32", "key": "local", "info": "defines national identifier for the segment profile"},
        {"intId": 2, "name": "version", "dataType": "uint32", "info": "defines the version of the segment profile"},
        {"intId": 3, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the segment profile"},
        {"intId": 4,"name": "linkType", "enumType": "LinkType", "info": "Defines the type of link associated with the segment profile"}
   ]
```

```
 }]
}
```


SPT2TS-129305 - Segment Description


```
{
   "structs":[
{
      "name": "SegmentDescription",
      "info": "Defines the segment profile description for all the layers of the segment profiles ",
      "belongsToSubPackage": "OIArea",
      "attrs":[
          {"intId": 1, "name": "drivingProfile", "composition": "DrivingProfile", "multiplicity":"0..1", "info":
"Defines the Driving Profile Layer"},
          {"intId": 2, "name": "geometryProfile", "composition": "GeometryProfile", "multiplicity":"0..1",
"info": "Defines the Geometry Profile Layer"}
   ]
 }]
}
```


SPT2TS-129306 - Driving Profile


```
{
   "structs":[
{
      "name": "DrivingProfile",
      "info": "Defines the driving profile description for the Segment Profile",
      "belongsToSubPackage": "OIArea",
      "attrs":[
        {"intId": 1, "name": "eoaOffset", "dataType": "uint32", "unit": "m","exp": -2, "info": "defines EoA
offset for the segment profile"},
        {"intId": 2, "name": "utcOffset", "dataType": "uint32", "unit": "minute", "info": "UTC time offset in
minutes ; Resolution in15 min"},
        {"intId": 3, "name": "startAltitude", "dataType": "int32", "unit": "m","exp": -2, "info": "Altitude at the
beginning of the SP in ETRS89"},
        {"intId": 4, "name": "atotsContactInfoDir", "dataType": "boolean", "info": "true if contact info exists
for nominal direction ; false if contact info exists for reverse direction ; undefined if no contact info exists"
},
        {"intId": 5, "name": "atotsContactInfo", "composition": "AtoTSContactInfo", "multiplicity":"0..1",
"info": "Is only defined when 'atotsContactInfoDir' is true or false"},
        {"intId": 6, "name": "staticSpeedProfileStart", "composition": "StaticSpeedProfileStart", "info":
"composes of static speed profile"},
        {"intId": 7, "name": "staticSpeedProfileChanges", "composition": "StaticSpeedProfileChange", "mul
tiplicity":"*", "info": "composes of static speed profile changes"},
        {"intId": 8, "name": "gradientStart", "dataType": "int32", "unit": "permill", "exp":-1, "info": "Required
resolution is 0.1 permill; positiv: uphill, negative: downhill"},
```

{"intId": 9, "name": "gradientChanges", "composition": "GradientChange", "multiplicity":"0..*", "info": "composes of gradient changes"},
{"intId": 10, "name": "curveStart", "enumType": "CurveRadius", "info": "defines the curve radius at start of segment profile"},
{"intId": 11, "name": "curveChanges", "composition": "CurveChange", "multiplicity":"0..*", "info": "composes of curve changes"},
{"intId": 12, "name": "voltageStart", "composition": "VoltageStart", "info": "composes of voltage start"},
{"intId": 13, "name": "voltageChanges", "composition": "VoltageChange", "multiplicity":"0..*" , "info": "composes of voltage changes"},
{"intId": 14, "name": "currentStart", "dataType": "uint32", "unit": "A", "info": "Defined current limitation in Ampere ; Resolution as defined in SS126 = 10A"},
{"intId": 15, "name": "currentChanges", "composition": "CurrentChange", "multiplicity":"0..*", "info": "composes of current limitation changes"},
{"intId": 16, "name": "baliseGroups", "composition": "BaliseGroup", "multiplicity":"0..*", "info": "Defines the balise groups"},
{"intId": 17, "name": "timingPoints", "composition": "TimingPoint", "multiplicity":"0..*", "info": "Defines the set of timing points"},
{"intId": 18, "name": "platformAreas", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of platform areas"},
{"intId": 19, "name": "tunnels", "composition": "Tunnel", "multiplicity":"0..*", "info": "Defines the set of tunnels"},
{"intId": 20, "name": "axleLoadSpeedProfiles", "composition": "AxleLoadSpeedProfile", "multiplicity":"0..*", "info": "composes of axle load speed profiles"},
{"intId": 21, "name": "unprotectedLXs", "composition": "UnprotectedLX", "multiplicity":"0..*", "info": "composes of unprotected level crossings"},
{"intId": 22, "name": "permittedBrakingDistances", "composition": "PermittedBrakingDistance", "multiplicity":"0..*", "info": "composes of permitted braking distances"},
{"intId": 23, "name": "switchOffEddyCurrentBrakeServiceBrakes", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of switch Off Eddy Current Brake Service Brakes"},
{"intId": 24, "name": "switchOffEddyCurrentBrakeEmergencyBrakes", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of switch Off Eddy Emergency Brake Service Brakes"},
{"intId": 25, "name": "switchOffRegenerativeBrakes", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of switch Off Regenerative Brakes"},
{"intId": 26, "name": "switchOffMagneticShoeBrakes", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of switch Off Magnetic Shoe Brakes"},
{"intId": 27, "name": "dynamicBrakeForceInhibitions", "composition": "SegmentSection", "multiplicity":"0..*", "info": "composes of Dynamic Brake Force Inhibitions"},
{"intId": 28, "name": "limitedDynamicBrakeForces", "composition": "LimitedDynamicBrakeForce", "multiplicity":"0..*", "info": "composes of Limited Dynamic Brake Forces"}
]
}]
}

SPT2TS-129307 - Geometry Profile


```
{
   "structs":[
{
      "name": "GeometryProfile",
      "info": "Defines the geometry profile description for the Segment Profile",
      "belongsToSubPackage": "OIArea",
      "attrs":[
        {"intId": 1, "name": "linearElementCoordinates", "composition": "map.LinearElementCoordinate", "multiplicity":"*", "info": "composes of linear element coordinates"},
       {"intId": 2, "name": "attitudes", "composition": "Attitude", "multiplicity":"0..1", "info": "composes of geometry values for the linear element coordinates"}
 ]
}]
}
```


SPT2TS-129328 - Attitude


```
{
  "structs": [
   {
    "name": "Attitude",
    "attrs": [
     {"intId": 1, "name": "rollAngle", "dataType": "int32", "unit": "rad", "range": "0..360", "info": "Defines roll angle at a position in radians as the difference between the right rail minus the left rail. Right/left with respect to the direction of the linear element."},
     {"intId": 2, "name": "curvature", "dataType": "int32", "unit": "1/m", "exp": -3,
     "info": "curvature at pos, negative-counter-clockwise/left-curve, positive-clockwise/right-curve"},
     {"intId": 3, "name": "azimuth", "dataType": "double", "unit": "degree", "range": "0..360", "info": "The azimuth at pos, i.e. bearing measured clockwise with respect to geographic north"},
     {"intId": 4, "name": "pitch", "dataType": "int32", "unit": "rad", "range": "0..360", "info": "Defines pitch in radians at a point as a height difference between current point and the next"}
    ]
  }]
}
```


SPT2TS-125404 - AtoTSContactInfo


```
{
   "structs":
[
{
   "name": "AtoTSContactInfo",
   "info": "Defines the ATO-TS contact information for a segment profile",
   "belongsToSubPackage": "OIArea",
   "attrs": [
```

{"intId": 1, "name": "nidATOTS", "dataType": "uint32", "info": "defines national identifier for the ATO-TS"},
{"intId": 2, "name": "nidSP", "dataType": "uint32", "info": "defines national identifier for the ATO-TS"},
{"intId": 3, "name": "spNidC", "dataType": "uint32", "info": "defines country identifier for the segment profile"},
{"intId": 4, "name": "atotsNidC", "dataType": "uint32", "info": "defines county identifier for the segment profile"}
]
}]
}

SPT2TS-125402 - StaticSpeedProfileStart

{
"structs":
[
{
"name": "StaticSpeedProfileStart",
"info": "Defines the static speed profile for a section of track",
"belongsToSubPackage": "functionalArea",
"attrs": [
{"intId": 1, "name": "speed", "dataType": "uint32", "unit": "km/h", "info": "Defines the applicable speed for the section of track ; Resolution as defined in SS126 = 5 km/h"},
{"intId": 2, "name": "specificStaticSpeedProfile", "composition": "infra.SpecificStaticSpeedLimit", "multiplicity": "0..*", "info": "composes of specific static speed profiles"},
{"intId": 3, "name": "trainEndApplicability", "enumType": "infra.TrainEndApplicability", "info": "Indicates if a speed limit given for a profile element is to be applied until the front of the train (no train length delay) or the end of the train (train length delay) has left the element."}
]
}]
}

SPT2TS-125405 - StaticSpeedProfileChange

{
"structs":
[
{
"name": "StaticSpeedProfileChange",
"info": "Defines the static speed profile for a section of track",
"belongsToSubPackage": "functionalArea",
"attrs": [
{"intId": 1, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "position on the associated segment profile"},
{"intId": 2, "name": "speed", "dataType": "uint32", "unit": "km/h", "info": "Defines the applicable speed for the section of track ; Resolution as defined in SS126 = 5 km/h"},

{"intId": 3, "name": "specificStaticSpeedProfile", "composition": "infra.SpecificStaticSpeedLimit", "multiplicity": "0..*", "info": "composes of specific static speed profiles"},
{"intId": 4, "name": "trainEndApplicability", "enumType": "infra.TrainEndApplicability", "info": "Indicates if a speed limit given for a profile element is to be applied until the front of the train (no train length delay) or the end of the train (train length delay) has left the element."}
]
}]
}

SPT2TS-125406 - AxleLoadSpeedProfile

{
"structs":
[
{
"name": "AxleLoadSpeedProfile",
"info": "Defines the axle load speed profile for a section of SegmentProfile",
"belongsToSubPackage": "functionalArea",
"attrs": [
{"intId": 1, "name": "segmentSection", "composition": "SegmentSection", "info": "composes of segment sections"},
{"intId": 2, "name": "speed", "dataType": "uint32", "unit": "km/h", "info": "Defines the applicable speed for the section of track ; Resolution as defined in SS126 = 5 km/h"},
{"intId": 3, "name": "trainEndApplicability", "enumType": "infra.TrainEndApplicability", "info": "Indicates if a speed limit given for a profile element is to be applied until the front of the train (no train length delay) or the end of the train (train length delay) has left the element."},
{"intId": 4,"name": "axleLoadCategory", "enumType": "infra.LoadCapabilityLineCategories", "info": "value indicating the suitable Axle load category."}
]
}]
}

SPT2TS-125407 - GradientChange

{
"structs":
[
{
"name": "GradientChange",
"info": "Defines the gradient at a given location in segment profile",
"belongsToSubPackage": "OIArea",
"attrs":
[
{"intId": 1, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the associated segment profile"},
{"intId": 2, "name": "gradientValue", "dataType": "int32", "unit": "permill", "exp":-1, "info": "Required resolution is 0.1 permill; positiv: uphill, negative: downhill"}

```
    ]
}]
}
```


SPT2TS-125408 - CurveChange


```
{
    "structs":
[
{
    "name": "CurveChange",
    "info": "Defines the curve at a given location in segment profile",
    "belongsToSubPackage": "OIArea",
    "attrs":
    [
        {"intId": 1, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the
associated segment profile"},
        {"intId": 2, "name": "curve", "enumType": "CurveRadius", "info": "defines curve radius"}
    ]
}]
}
```


SPT2TS-125410 - TimingPoint


```
{
    "structs":
[
{
    "name": "TimingPoint",
    "info": "Defines a fixed point on the infrastructure",
    "belongsToSubPackage": "OIArea",
    "attrs":
    [
        {"intId": 1, "name": "nidTP", "dataType": "uint32", "key": "local", "info": "defines national identifier for
the timing point"},
        {"intId": 2, "name": "name", "dataType": "string", "info": "User-friendly name, only if different from
id"},
        {"intId": 3, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the
associated segment profile"},
        {"intId": 4, "name": "stopLocationTolerance", "enumType": "StopLocationTolerance", "info": "Defines
the required stopping tolerance for a Timing Point"},
        {"intId": 5, "name": "stoppingPointReachDistance", "enumType": "StopLocationTolerance", "info": "
Defines the distance from a stopping point to consider it as reached"}
    ]
}]
}
```

SPT2TS-125412 - BaliseGroup


```
{
   "structs":
[
{
   "name": "BaliseGroup",
   "info": "Defines a technical device group on the railway trackbed",
   "belongsToSubPackage": "OIArea",
   "attrs":[
      {"intId": 1, "name": "nid_bg", "dataType": "uint32", "info": "defines national identifier for the balise group"},
      {"intId": 2, "name": "balises", "composition": "Balise", "multiplicity":"1..8", "info":"Defines the balises within the balise group"},
      {"intId": 3, "name": "nidCQualifier", "dataType": "boolean", "info": "true if same NID_C as in segment profile is to be used; false if new country id is to be used for the balise"},
      {"intId": 4, "name": "nid_c", "dataType": "uint32", "multiplicity":"0..1", "info": "to be defined when countyIdQualifier is false ; defines the new NID_C for the balise group"}
   ]
}]
}
```


SPT2TS-125425 - Balise


```
{
   "structs":
[
{
   "name": "Balise",
   "info": "Defines a technical device on the railway trackbed",
   "belongsToSubPackage": "OIArea",
   "attrs":[
      {"intId": 1, "name": "n_pig", "dataType": "uint32", "range":"0..7", "info": "Defines the position of a balise in a balise group"},
      {"intId": 2,"name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the associated segment profile"}
   ]
}]
}
```


SPT2TS-125414 - PermittedBrakingDistance


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

"info": "Defines the permitted braking distance information for a segment profile",
"belongsToSubPackage": "OIArea",
"attrs": [
{"intId": 1, "name": "segmentSection", "composition": "SegmentSection", "info": "composes for segment sections"},
{"intId": 2, "name": "distance", "dataType": "uint32", "unit": "m","exp": -2, "info": "defines the permitted braking distance value"},
{"intId": 3, "name": "byEmergencyBrake", "dataType": "boolean", "info": "true if Braking is to be achieved using Emergency brake ; false if braking is to be achieved by service brake"},
{"intId": 4, "name": "gradientValue", "dataType": "int32", "unit": "permill", "exp": -1, "info": "defines gradient value to be used for permitted braking distance"}
]
}]
}

SPT2TS-125416 - VoltageStart

{
"structs":
[
{
"name": "VoltageStart",
"info": "Defines the power voltage information for a segment profile",
"belongsToSubPackage": "OIArea",
"attrs": [
{"intId": 1, "name": "voltageType", "enumType": "infra.EnergySupplySystems", "info": "defines the voltage type"},
{"intId": 2, "name": "nid_c", "dataType": "uint32", "info": "defines the country identifier for voltage"}
]
}]
}

SPT2TS-125418 - VoltageChange

{
"structs":
[
{
"name": "VoltageChange",
"info": "Defines the power voltage information for a segment profile",
"belongsToSubPackage": "OIArea",
"attrs": [
{"intId": 1, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the associated segment profile"},
{"intId": 2, "name": "voltageType", "enumType": "infra.EnergySupplySystems", "info": "defines the voltage type"},
{"intId": 3, "name": "nid_c", "dataType": "uint32", "info": "defines the country identifier for voltage"}

```
    ]
  }]
}
```

SPT2TS-125417 - CurrentChange

```
{
    "structs":
[
 {
    "name": "CurrentChange",
     "info": "Defines the current limitation information for a segment profile",
     "belongsToSubPackage": "OIArea",
    "attrs": [
        {"intId": 1, "name": "pos", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the
associated segment profile"},
        {"intId": 2, "name": "currentValue", "dataType": "uint32", "unit": "A", "info": "Defined current limitation
in Ampere ; Resolution as defined in SS126 = 10A"}
    ]
  }]
}
```

SPT2TS-125415 - Tunnel

```
{
    "structs":
[
  {
    "name": "Tunnel",
    "info": "Defines the tunnel information for a segment profile",
    "belongsToSubPackage": "OIArea",
    "attrs": [
        {"intId": 1, "name": "segmentSection", "composition": "SegmentSection", "info": "composes of
segment sections"},
        {"intId": 2, "name": "tunnelType", "enumType": "TunnelType", "info": "defines the tunnel type"}
    ]
}]
}
```

SPT2TS-125413 - UnprotectedLX

```
{
    "structs":
[
{
    "name": "UnprotectedLX",
    "info": "Defines the unprotected LX information for a segment profile",
    "belongsToSubPackage": "OIArea",
```

"attrs": [
{"intId": 1, "name": "pNominal", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the segment profile associated for nominal direction of Segment profile"},
{"intId": 2, "name": "pReverse", "dataType": "uint32", "unit": "m","exp": -2, "info": "Position on the segment profile associated for reverse direction of Segment profile"}
]
}]
}

SPT2TS-125411 - LimitedDynamicBrakeForce

{
"structs":
[
{
"name": "LimitedDynamicBrakeForce",
"info": "Defines the limited dynamic brake force information for a segment profile",
"belongsToSubPackage": "OIArea",
"attrs": [
{"intId": 1, "name": "segmentSection", "composition": "SegmentSection", "info": "composes of segment sections"},
{"intId": 2, "name": "dynamicBrakeForceLimit", "dataType": "uint32", "unit": "N", "range": "0..3000", "info": "the defined range corresponds to the constraints from SS126"}
]
}]
}

SPT2TS-125409 - SegmentSection

{
"structs":
[
{
"name": "SegmentSection",
"info": "Defines sections with start and end references for use in segment profile",
"belongsToSubPackage": "OIArea",
"attrs": [
{"intId": 1, "name": "range", "enumType": "RangeType", "info": "defines range type"},
{"intId": 2, "name": "pStart", "dataType": "uint32", "unit": "m","exp": -2, "info": "Start Position on the segment profile"},
{"intId": 3, "name": "pEnd", "dataType": "uint32", "unit": "m", "exp": -2, "info": "End Position on the segment profile"}
]
}]
}

SPT2TS-125423 - RangeType

{
"enums": [
{
"name": "RangeType",
"info":"List defining range types for segment profile",
"enumLiterals": [
{"intId": 0, "name": "rtStart", "info": "starts in a SP"},
{"intId": 1, "name": "rtEnd", "info": "ends in a SP"},
{"intId": 2, "name": "rtStartEnd", "info": "start and ends in a SP"},
{"intId": 3, "name": "rtWholeSP", "info": "covers the entire SP"}
]
}]
}

SPT2TS-125422 - TunnelType

{
"enums": [
{
"name": "TunnelType",
"info":"List defining tunnel types for segment profile",
"enumLiterals": [
{"intId": 0, "name": "singleTrackTunnel", "info": "defines a single track tunnel"},
{"intId": 1, "name": "doubleTrackTunnel", "info": "defines a double track tunnel"},
{"intId": 2, "name": "wideCrossSectionTunnel", "info": "defines tunnel with more than two tracks"}
]
}]
}

SPT2TS-129316 - LinkType

{
"enums": [
{
"name": "LinkType",
"info":"List defining link types for segment profile",
"enumLiterals": [
{"intId": 0, "name": "pointLeft", "info": "Link is associated to point left"},
{"intId": 1, "name": "pointRight", "info": "Link is associated to point right"},
{"intId": 2, "name": "pointTip", "info": "Link is associated to point tip"},
{"intId": 3, "name": "simpleConnector", "info": "Link is a connection between two split segment profiles"}
]
}]
}

SPT2TS-125421 - CurveRadius

{
"enums": [
{
"name": "CurveRadius",
"info":"List defining different curve radii for segment profile",
"enumLiterals": [
{"intId": 0, "name": "cr_R_7000", "info": "R>7000"},
{"intId": 1, "name": "cr_7000_4500", "info": "7000>=R>4500"},
{"intId": 2, "name": "cr_4500_2800", "info": "4500>=R>2800"},
{"intId": 3, "name": "cr_2800_2000", "info": "2800>=R>2000"},
{"intId": 4, "name": "cr_2000_1500", "info": "2000>=R>1500"},
{"intId": 5, "name": "cr_1500_1250", "info": "1500>=R>1250"},
{"intId": 6, "name": "cr_1250_1075", "info": "1250>=R>1075"},
{"intId": 7, "name": "cr_1075_925", "info": "1075>=R>925"},
{"intId": 8, "name": "cr_925_825", "info": "925>=R>825"},
{"intId": 9, "name": "cr_825_725", "info": "825>=R>725"},
{"intId": 10, "name": "cr_725_625", "info": "725>=R>625"},
{"intId": 11, "name": "cr_625_525", "info": "625>=R>525"},
{"intId": 12, "name": "cr_525_475", "info": "525>=R>475"},
{"intId": 13, "name": "cr_475_425", "info": "475>=R>425"},
{"intId": 14, "name": "cr_425_375", "info": "425>=R>375"},
{"intId": 15, "name": "cr_375_325", "info": "375>=R>325"},
{"intId": 16, "name": "cr_325_300", "info": "325>=R>300"},
{"intId": 17, "name": "cr_300_275", "info": "300>=R>275"},
{"intId": 18, "name": "cr_275_250", "info": "275>=R>250"},
{"intId": 19, "name": "cr_250_225", "info": "250>=R>225"},
{"intId": 20, "name": "cr_225_200", "info": "225>=R>200"},
{"intId": 21, "name": "cr_200_175", "info": "200>=R>175"},
{"intId": 22, "name": "cr_175_150", "info": "175>=R>150"},
{"intId": 23, "name": "cr_R_150", "info": "R=<150"}
]
}]
}

SPT2TS-125420 - StopLocationTolerance

{
"enums": [
{
"name": "StopLocationTolerance",
"info":"List defining different stop location tolerances for a timing point of type stopping point. Warning: intId differ from SS126 by 1",
"enumLiterals": [
{"intId": 0, "name": "T_Undefined", "info": "tolerance is undefind"},
{"intId": 1, "name": "T_10cm", "info": "10cm tolerance"},

{"intId": 2, "name": "T_20cm", "info": "20cm tolerance"},
{"intId": 3, "name": "T_30cm", "info": "30cm tolerance"},
{"intId": 4, "name": "T_40cm", "info": "40cm tolerance"},
{"intId": 5, "name": "T_50cm", "info": "50cm tolerance"},
{"intId": 6, "name": "T_1m", "info": "1m tolerance"},
{"intId": 7, "name": "T_150cm", "info": "150cm tolerance"},
{"intId": 8, "name": "T_2m", "info": "2m tolerance"},
{"intId": 9, "name": "T_250cm", "info": "250m tolerance"},
{"intId": 10, "name": "T_3m", "info": "3m tolerance"},
{"intId": 11, "name": "T_5m", "info": "5m tolerance"},
{"intId": 12, "name": "T_750cm", "info": "750cm tolerance"},
{"intId": 13, "name": "T_10m", "info": "10m tolerance"},
{"intId": 14, "name": "T_15m", "info": "15m tolerance"},
{"intId": 15, "name": "T_20m", "info": "20m tolerance"},
{"intId": 16, "name": "T_25m", "info": "25m tolerance"},
{"intId": 17, "name": "T_30m", "info": "30m tolerance"},
{"intId": 18, "name": "T_50m", "info": "50m tolerance"},
{"intId": 19, "name": "T_75m", "info": "75m tolerance"},
{"intId": 20, "name": "T_100m", "info": "100m tolerance"}
]
}]
}

2.3.2 Map Area Request (MAPAReq)

SPT2TS-130057 - This sections details the structure of a MAPAReq Packet sent by REP-OB to DR-TA. **[** Open **]**

SPT2TS-129311 - Map Area Request

{
"structs":
[
{
"name": "MapAreaRequest",
"info": "Defines structure of Map Area Request",
"attrs": [
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "mapAreaRadius", "dataType": "uint32", "info": "defines the radius value covering the requested map area"},
{"intId": 3, "name": "relativePosition", "composition": "RelativePosition", "info": "defines relative position of the train"},
{"intId": 4, "name": "absolutePosition", "composition": "AbsolutePosition", "info": "defines absolute position of the train"}
]
}]

}

SPT2TS-129318 - Relative Position

{
"structs":
[
{
"name": "RelativePosition",
"info": "Defines relative position description",
"attrs": [
{"intId": 1, "name": "nidSP", "dataType": "uint32", "key": "local", "info": "defines national identifier for the segment profile"},
{"intId": 2, "name": "version", "dataType": "uint32", "info": "defines the version of the segment profile"},
{"intId": 3, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the segment profile"},
{"intId": 4, "name": "pos", "dataType": "uint32", "unit": "m", "exp": -3, "info": "position on the associated on the segment profile"}
]
}]
}

SPT2TS-129317 - Absolute Position

{
"structs":
[
{
"name": "AbsolutePosition",
"info": "Defines absolute position description",
"attrs": [
{"intId": 1, "name": "x", "dataType": "double", "multiplicity":"0..1", "info": "x/latitude coordinate value as per ETRS89"},
{"intId": 2, "name": "y", "dataType": "double", "multiplicity":"0..1", "info": "y/longitude coordinate value as per ETRS89"},
{"intId": 3, "name": "z", "dataType": "double", "multiplicity":"0..1", "info": "z/altitude coordinate value as per ETRS89"}
]
}]
}

2.3.3 Map Area (MAPArea)

SPT2TS-130058 - This section details the structure of the MAPArea Packet sent by DR-TA to REP-OB **[** Open **]**

SPT2TS-129312 - Map Area


```
{
   "structs":
[
{
   "name": "MapArea",
   "info": "Defines structure of Map Area",
   "attrs": [
    {"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
    {"intId": 2, "name": "segmentProfileList", "composition": "SegmentProfileList", "multiplicity":"1..*", "info"
: "defines list of Segment Profiles"}
   ]
},
{
      "name": "SegmentProfileList",
      "info": "Defines List of Segment Profiles",
      "attrs":[
        {"intId": 1, "name": "nidSP", "dataType": "uint32", "key": "local", "info": "defines national identifier
for the segment profile"},
        {"intId": 2, "name": "version", "dataType": "uint32", "info": "defines the version of the segment
profile"},
        {"intId": 3, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the segment
profile"}
   ]
 }
]
}
```


2.3.4 Segment Profile Request (SPReq)

SPT2TS-130059 - This sections details the structure of a SPReq Packet sent by REP-OB to DR-TA. **[** Open **]**

SPT2TS-129586 - Segment Profile Request


```
{
   "structs":
[
{
      "name": "SegmentProfileRequest",
      "info": "Defines the Segment Profile Request",
```

"attrs":[
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "nidSP", "dataType": "uint32", "key": "local", "info": "defines national identifier for the segment profile"},
{"intId": 3, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the segment profile"}
]
}
]
}

2.3.5 Segment Profile Packet (SP)

SPT2TS-130060 - This sections details the structure of a SP Packet sent by DR-TA to REP-OB. **[** Open **]**

SPT2TS-129584 - Segment Profile Packet

{
"structs":
[
{
"name": "SegmentProfilePacket",
"info": "Defines the Segment Profile Packet",
"attrs":[
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "segmentProfiles", "composition": "SegmentProfile", "multiplicity":"1..*", "info": "defines segment profile"}
]
}
]
}

2.3.6 Digital Register Handshake Request (DR_HSReq)

SPT2TS-130051 - This section details the structure of a DR_HSReq Packet sent by REP-OB to DR-TA. **[** Open **]**

SPT2TS-129313 - Digital Register Handshake Request

{
"structs":
[
{
"name": "DigitalRegisterHandshakeRequest",
"info": "Defines structure of Handshake Request",

"attrs": [
{"intId": 1, "name": "trackTrainheader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "relativePosition", "composition": "RelativePosition", "info": "defines relative position of the train"},
{"intId": 3, "name": "absolutePosition", "composition": "AbsolutePosition", "info": "defines absolute position of the train"},
{"intId": 4, "name": "handingOver", "dataType": "boolean", "info": "True - Defines if the Handshake Request is due to a handing over DR-TA"}
]
}]
}

2.3.7 Digital Register Handshake Acknowledgement (DR_HSAck)

SPT2TS-130056 - This section details the structure of a DR_HSAck Packet sent by DR-TA to REP-OB. **[** Open **]**

SPT2TS-129309 - Digital Register Handshake Acknowledgement

{
"structs":
[
{
"name": "DigitalRegisterHandshakeAcknowledgement",
"info": "Defines structure of Handshake Acknowledgement",
"attrs": [
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "nidDRTA", "dataType": "uint32", "key": "local", "info": "defines national identifier for the Digital Register Transactor"},
{"intId": 3, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the Digital Register Transactor"},
{"intId": 4, "name": "timeOutResponse", "dataType": "uint32", "unit": "minute", "info": "defines the maximum time after which repository should consider that the request has not been answered "},
{"intId": 5, "name": "systemVersion", "dataType": "uint32", "info": "defines the system version to be used for DR Transactor"}
]
}]
}

2.3.8 Digital Register Handshake Rejection (DR_HSRej)

This section details the structure of a DR_HSRej Packet sent by DR-TA to REP-OB.

SPT2TS-130055 - Digital Register Handshake Rejection


```
{
   "structs":
[
{
   "name": "DigitalRegisterHandshakeRejection",
   "info": "Defines structure of Handshake Rejection",
   "attrs": [
         {"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
         {"intId": 2, "name": "rejectionReason", "enumType": "RejectReason", "info": "defines the rejection reason"},
         {"intId": 3, "name": "contactInformation", "composition": "ContactInformation", "multiplicity": "0..1", "info": "Defines the contact information of the DR Transactor ; To be defined when the reject reason states 'anotherDRTAInCharge'"}
   ]
}]
}
```


SPT2TS-130052 - Digital Register Transactor Contact Information


```
{
   "structs":
[
{
   "name": "ContactInformation",
   "info": "Defines structure of Digital Register Transactor Contact Information",
   "attrs": [
         {"intId": 1, "name": "nidDRTA", "dataType": "uint32", "key": "local", "info": "defines national identifier for the Digital Register Transactor"},
        {"intId": 2, "name": "nidC", "dataType": "uint32", "info": "defines country identifier for the Digital Register Transactor"}
   ]
}]
}
```


SPT2TS-130053 - Reject Reason


```
{
"enums": [
{
   "name": "RejectReason",
   "info":"List defining the rejection reasons for handshake",
```

"enumLiterals": [
{"intId": 0, "name": "incompatibleSystemVersion", "info": "System version between track and train is incompatible"},
{"intId": 1, "name": "anotherDRTAInCharge", "info": "Another DR Transactor is in charge"},
{"intId": 2, "name": "DRTAInChargeUnknown", "info": "DR Transactor in charge is unknown"}
]
}]
}

2.3.9 Digital Register Session Termination Request (DR_SESSTermReq)

SPT2TS-130067 - This section details the structure of a DR_SESSTermReqPacket sent by DR-TA to REP-OB. **[** Open **]**

SPT2TS-130066 - Digital Register Session Termination Request

{
"structs":
[
{
"name": "DigitalRegisterSessionTerminationRequest",
"info": "Defines structure of session termination request",
"attrs": [
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"}
]
}]
}

2.3.10 Digital Register Session Termination (DR_SESSTerm)

SPT2TS-130062 - This section details the structure of a DR_SESSTermReqPacket sent by REP-OB to DR-TA. **[** Open **]**

SPT2TS-130063 - Digital Register Session Termination

{
"structs":
[
{
"name": "DigitalRegisterSessionTermination",
"info": "Defines structure of session termination",
"attrs": [
{"intId": 1, "name": "trackTrainHeader", "composition": "TrackTrainHeader", "info": "defines header"},
{"intId": 2, "name": "terminationReason", "enumType": "TerminationReason", "info": "defines the termination reason"}
]

}]
}

SPT2TS-130064 - Termination Reason

{
"enums": [
{
"name": "TerminationReason",
"info":"List defining the termination reasons",
"enumLiterals": [
{"intId": 0, "name": "DRTATerminationRequest", "info": "Termination request was sent by DR-Ta"},
{"intId": 1, "name": "lastSPLeft", "info": "Termination since train left the last SP referenced in the JP"
},
{"intId": 2, "name": "DRTAHandoverCancelled", "info": "Termination since DR Transactor handover
is cancelled"}
]
}]
}

2.3.11 Track Train Header

SPT2TS-130068 - This section details the Track-Train header of a packet exchanged between the REP-OB and the Digital Register Transactor **[** Open **]**

SPT2TS-129310 - TrackTrain Header

{
"structs": [
{
"name": "TrackTrainHeader",
"attrs": [
{"intId": 1, "name": "packetId", "dataType": "string", "info": "defines the packet identifier"},
{"intId": 2, "name": "leadingOnBoardUnitId", "dataType": "string", "multiplicity": "0..1", "info": "see
NID_ENGINE. To be usable with ETCS must contain a decimal number [0..16.777.215]"},
{"intId": 3, "name": "issuedAt", "dataType": "timestamp", "info": "issue-point in time with
microsecond-precision builds a version-id for acknowledgements and validity-estimations, in UTC"}
]
}]
}