

# [ RoadXML 2.3.0 ]

## Road Network Description

### XML Format Specification

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Diffusion

OKTAL

CLIENT

**Historic**

Version	Data	Writer(s)	Adds to the previous version
0.1	23/06/2009	PhD	Creation
0.2	27/07/2009	TNT	Style update
0.3	30/07/2009	JC	Attribute TargetName in RoadSign
0.4	27/08/2009	JC	Attribute name in Light and attribute direction tags
0.5	16/09/2009	JC	Add LanePair element as a child of Intersection
0.6	04/02/2010	JC	Ground Element (RoadXML v2.1.0)
0.7	08/03/2010	JC	Lane types: roundabout, entry, exit
0.8	24/05/2010	JC	SZCurve modified. Polynomial function
0.9	21/06/2010	JC	Timer (RoadXML v2.1.1)
0.10	06/09/2010	JC	RoadXML v2.2.1: <ul style="list-style-type: none"> <li>• Marking Library</li> <li>• [X,Y,Z] sequences</li> <li>• ClippedData on intersection</li> <li>• Material on Intersection</li> <li>• BankingCurve</li> <li>• Intersection contours</li> <li>• Object mass</li> <li>• Suppress Extra</li> </ul>
0.11	05/12/2011	JC	RoadXML v2.3.0: <ul style="list-style-type: none"> <li>• LaneType: add "paved express" type.</li> <li>• Grounds, Markings, Profiles and surface file move under SubNetwork</li> <li>• RoadNetwork element in SubNetwork contains all the Elements specific to the road.</li> <li>• Add a parent element to all the Elements array. For example, Ground are stored in Grounds element.</li> <li>• ProxyFile element</li> <li>• endHeading attribute in Polyline</li> </ul>

## Summary

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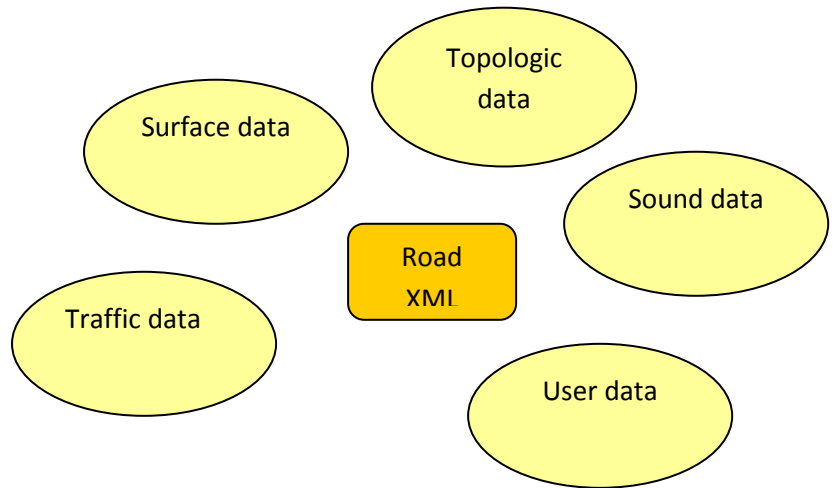
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## 1 INTRODUCTION

The RoadXML format (file extension .rnd) is the outcome of 15 years of research and development in collaboration with universities and industrial partners in the driving simulation domain.

It's an XML file format that contains several layers of data and is designed to answer the needs of many driving simulators applications:

- Traffic simulation
- Scenario control
- Car, Truck and Motorbike dynamics models
- Platform control model
- Sound control
- 3D road networks generation



## 2 GENERAL DESCRIPTION

### 2.1 CONTENT

A road network in the RoadXML file format is made of a patchwork of Sub-Network. Each Sub-Network is a collection of Tracks linked by Intersections. Each of these Intersections and Tracks are then enhanced with different layers of data:

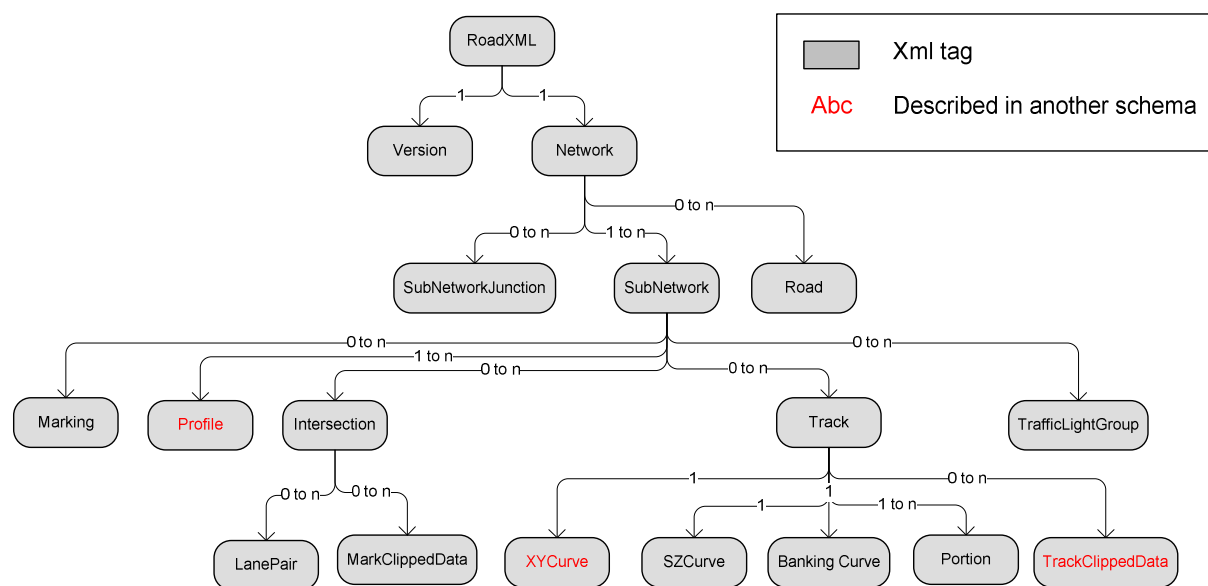
- The road profile is added on the track to define the pavement surface.
- Road Signs and other local cognitive elements are attached to the track.
- Traffic and 3D description is carried by the road profiles.

Since RoadXML file format is XML based, user data can be added anywhere inside the file, as long as it uses its private Element and Attribute names.

### 2.2 GRAPH OF THE ROADXML FILE

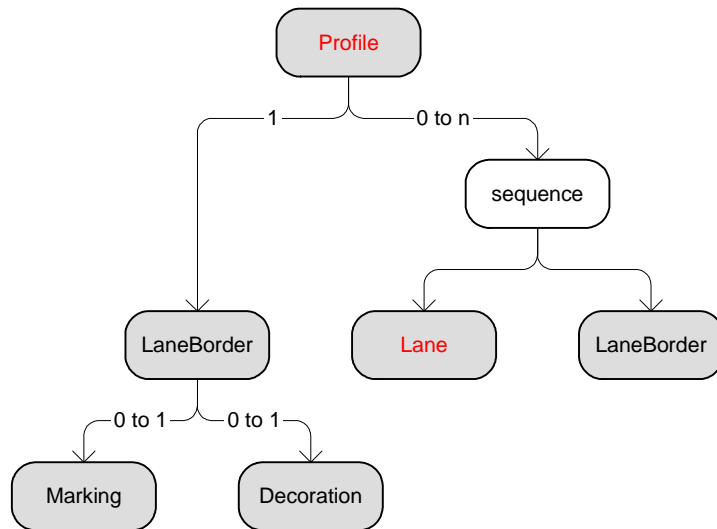
#### 2.2.1 ROADXML GRAPH

Below, this is a simplified graph representation of the RoadXML file format (.rnd extension). The Profile, XYCurve, and TrackClippedData elements are described in specific graph.

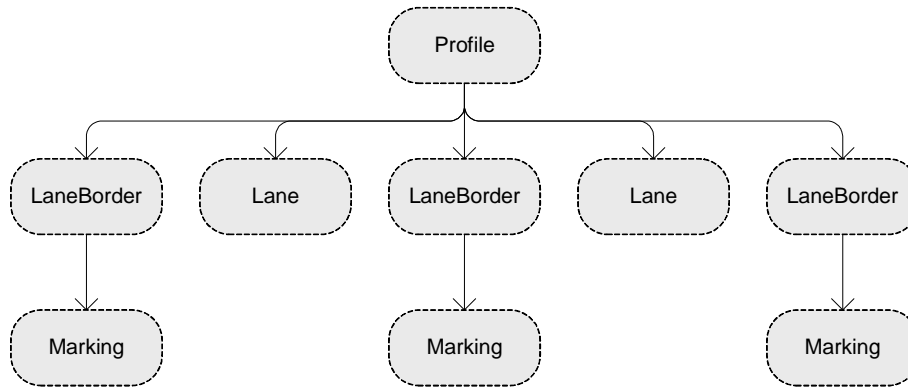


#### 2.2.2 PROFILE GRAPH

The Profile represents a cross section of the road.



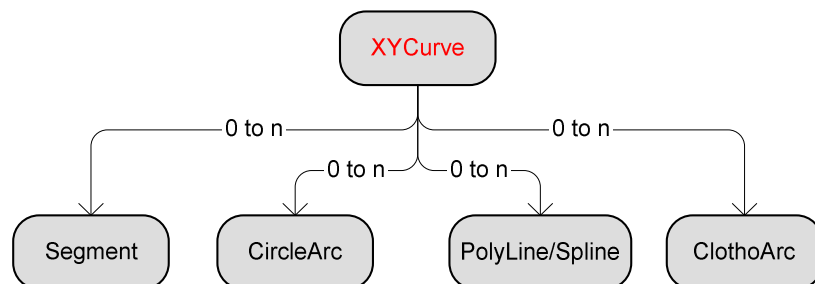
The profile is composed of LaneBorders and Lanes. For example, to describe a simple profile with two lanes with markings border, the graph will be:



### 2.2.3 CURVE GRAPH

The XYCurve and SZCurve elements have the same description. A curve is a combination of these elements:

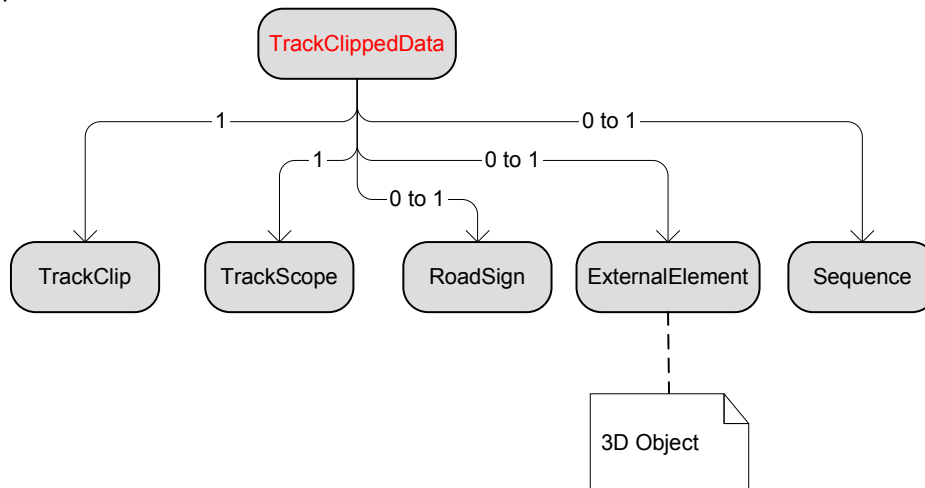
- Segment
- Circle Arc
- PolyLine (the type attribute set the 3D representation of the PolyLine : sequence of segments or spline interpolation)
- Clotho Arc (Clothoid)



### 2.2.4 TRACKCLIPPEDDATA GRAPH

The TrackClippedData element is an element attached to the track and contains different components to represent different object on the road:

- Track Clip (to define the position of the object on the track)
- Track Scope
- Road Sign
- External Element (Reference to a 3D Object)
- Sequence



## 2.3 UNITS

The units are in the I.S system:

- distance in meters
- angle in radians
- time in seconds
- speed in m/s



### 3 DETAILED DESCRIPTION

This chapter describes all the XML elements of the RoadXML file in alphabetical order.

#### 3.1 ANIMATIONS

##### 3.1.1 CONCEPTS

The <Animations> element declares an array of <TrafficLightAnimation>

##### 3.1.2 RELATED ELEMENTS

<b>Parent elements</b>	<TrafficLightGroup>
<b>Child elements</b>	<TrafficLightAnimation>
<b>Other</b>	

#### 3.2 AMBIENT

##### 3.2.1 CONCEPTS

The <Ambient> element defines the ambient aspect of the Material.

##### 3.2.2 RELATED ELEMENTS

<b>Parent elements</b>	<Material>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

##### 3.2.3 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Color>	The color of the ambient component of the material.	Black color	1

##### 3.2.4 EXAMPLE

```
<Material shininess="0">
  <Diffuse>
    ...
  </Diffuse>
  <Ambient>
    <Color alpha="1" blue="0.2" green="0.2" red="0.2"/>
  </Ambient>
  <Specular>
    ...
  </Specular>
  <Emissive>
    ...
  </Emissive>
```

</Material>

### 3.3 BANNEDLINKS

#### 3.3.1 CONCEPTS

The <BannedLinks> element contains an array of LanePair.

#### 3.3.2 RELATED ELEMENTS

<b>Parent elements</b>	<Intersection>
<b>Child elements</b>	<LanePair>
<b>Other</b>	

### 3.4 BANKINGCURVE

#### 3.4.1 CONCEPTS

The <BankingCurve> element contains the road longitudinal banking curve. A positive banking implied a rotation of the road surface around the Track axis toward the left, a negative value toward the right.

See 3.31 Polynomial function for description.

#### 3.4.2 RELATED ELEMENTS

<b>Parent elements</b>	<Track>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<BankingCurve>

#### 3.4.3 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Polynomial>	Curve piece describes as a 3 <sup>rd</sup> degree polynom.	NA ( <i>not applicable</i> )	1 or more

#### 3.4.4 EXAMPLE

```
<BankingCurve>
  <Polynomial>
    <begin direction="0" x="0" y="5" />
    <end direction="0" x="226.142" y="20" />
  </Polynomial>
</BankingCurve>
```

## 3.5 CIRCLEARC

### 3.5.1 CONCEPTS

The <CircleArc> element describes a circle arc. A circle arc is defined by a radius and a length.

### 3.5.2 ATTRIBUTES

Name	Type	Description
length	double	The length of the circle arc
curvature	double	The curvature (1/radius) of the circle arc

### 3.5.3 RELATED ELEMENTS

<b>Parent elements</b>	<XYCurve>
<b>Child elements</b>	None
<b>Other</b>	

### 3.5.4 EXAMPLE

```
<XYCurve direction="-0.563742" x="-1826.12" y="601.344">
  <Segment .../>
  <ClothoArc .../>
  <CircleArc curvature="-0.0172478" length="25"/>
  <ClothoArc .../>
  <CircleArc curvature="0.00213655" length="121.61"/>
  <ClothoArc .../>
  <Segment .../>
</XYCurve>
```

## 3.6 CLOTHOARC

### 3.6.1 CONCEPTS

The <ClothoArc> element declares parameters to describe a clothoid. A clothoid is a curve whose curvature changes linearly with its curve length. Clothoids are also commonly referred to as Euler spirals or Cornu spirals.

### 3.6.2 ATTRIBUTES

Name	Type	Description
startCurvature	double	The starting curvature (1/radius)
endCurvature	double	The ending curvature (1/radius)
length	double	Length of the clothoid.

### 3.6.3 RELATED ELEMENTS

<b>Parent elements</b>	<XYCurve>
<b>Child elements</b>	None
<b>Other</b>	

### 3.6.4 EXAMPLE

```
<XYCurve direction="-1.17401" x="-1838.74" y="144.688">
  <CircleArc .../>
  <ClothoArc endCurvature="0.00129562" length="50" startCurvature="-
0.00285714"/>
  <CircleArc .../>
  <ClothoArc endCurvature="0" length="50" startCurvature="0.00129562"/>
  <Segment .../>
</XYCurve>
```

## 3.7 COLOR

### 3.7.1 CONCEPTS

The <Color> element declares the four components of a color : alpha, blue, green and red.

### 3.7.2 ATTRIBUTES

Name	Type	Description
alpha	double	The alpha value of the color. The value is between 0.0 and 1.0. 0.0 = transparent 1.0 = opaque
blue	double	The blue value of the color. The value is between 0.0 and 1.0.
green	double	The green value of the color. The value is between 0.0 and 1.0.
red	double	The red value of the color. The value is between 0.0 and 1.0.

### 3.7.3 RELATED ELEMENTS

<b>Parent elements</b>	<Diffuse>, <Ambient>, <Specular>, <Emissive>
<b>Child elements</b>	None
<b>Other</b>	

### 3.7.4 EXAMPLE

To describe white color, use the Color element as this example:

```
<Color alpha="1" blue="1" green="1" red="1" />
```

A grey Emissive color description is for example:

```
<Emissive>
  <Color alpha="1" blue="0.2" green="0.2" red="0.2" />
</Emissive>
```

## 3.8 CONTOURPIECE

### 3.8.1 CONCEPTS

The <ContourPiece> element describes a piece of a contour around an Intersection. The contour is described with a PolyLine relative to the Intersection's position.

### 3.8.2 ATTRIBUTES

Name	Type	Description
startAnchorTrack	string	Name of the Track at the beginning of the piece of contour
isStartAnchorOnTrackEnd	int	0: start anchor is on the beginning of the Track 1: start anchor is on the ending of the Track
isStartAnchorOnTheLeftSide	int	0: start anchor is on the right side of the Track 1: start anchor is on the left side of the Track
endAnchorTrack	string	Name of the Track at the ending of the piece of contour
isEndAnchorOnTrackEnd	int	0: end anchor is on the beginning of the Track 1: end anchor is on the ending of the Track
isEndAnchorOnTheLeftSide	int	0: end anchor is on the right side of the Track 1: end anchor is on the left side of the Track

### 3.8.3 RELATED ELEMENTS

Parent elements	<Contour>
Child elements	<PolyLine>
Other	

### 3.8.4 EXAMPLE

```
<ContourPiece endAnchorTrack="Track" isEndAnchorOnLeftSide="1"
isEndAnchorOnTrackEnd="1" isStartAnchorOnLeftSide="0"
isStartAnchorOnTrackEnd="1" startAnchorTrack="Track 2">
  <PolyLine type="spline">
    <Vectord2 x="3.23589" y="10.3312"/>
    <Vectord2 x="1.36301" y="9.82394"/>
    <Vectord2 x="-1.09515" y="9.78493"/>
    <Vectord2 x="-3.43626" y="9.78493"/>
  </PolyLine>
</ContourPiece>
```

## 3.9 CONTOURS

### 3.9.1 CONCEPTS

The <Contour> element contains an array of ContourPiece.

### 3.9.2 RELATED ELEMENTS

<b>Parent elements</b>	<Intersection>
<b>Child elements</b>	<ContourPiece>
<b>Other</b>	

## 3.10 DECORATION

### 3.10.1 CONCEPTS

The <Decoration> element declares elements to define a decoration of a LaneBorder of the road.

### 3.10.2 RELATED ELEMENTS

The <Decoration> element relates to the following elements:

<b>Parent elements</b>	<LaneBorder>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.10.3 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Material>	Material description for the decoration of the lane border	NA ( <i>not applicable</i> )	1
<UVMapping>	Way to use the decoration texture	NA ( <i>not applicable</i> )	1
<PolyLine>	Pecked line part of the curve.	NA ( <i>not applicable</i> )	0 or 1

### 3.10.4 EXAMPLE

```
<LaneBorder distance="-3.5" height="0" markingName="my marking"
markingOffset="0" />
  <Decoration>
    <Material>
      <Diffuse>
        <Color alpha="1" blue="1" green="1" red="1" />
      </Diffuse>
    </Material>
```

```
<UVMapping leftU="0" lengthV="1" rightU="1" />
<PolyLine type="spline">
  <Vectord2 x="108.688" y="0" />
  <Vectord2 x="167.232" y="51.3674" />
  <Vectord2 x="177.398" y="152.731" />
</PolyLine>
</Decoration>
</LaneBorder>
```



## 3.11 DIFFUSE

### 3.11.1 CONCEPTS

The <Diffuse> element defines the diffuse aspect of the Material.

### 3.11.2 RELATED ELEMENTS

<b>Parent elements</b>	<Material>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.11.3 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Texture>	The texture for the diffuse component of the material.	empty	1
<Color>	The color of the diffuse component of the material.	Black color	1

### 3.11.4 EXAMPLE

```
<Material shininess="0">
  <Diffuse>
    <Texture path="../../Data/Textures/DefaultTerrain.png"/>
    <Color alpha="1" blue="1" green="1" red="1"/>
  </Diffuse>
  <Ambient>
    ...
  </Ambient>
  <Specular>
    ...
  </Specular>
  <Emissive>
    ...
  </Emissive>
</Material>
```

## 3.12 EMISSIVE

### 3.12.1 CONCEPTS

The <Emissive> element defines the emissive aspect of the Material.

### 3.12.2 ATTRIBUTES

Name	Type	Description
none		

### 3.12.3 RELATED ELEMENTS

<b>Parent elements</b>	<Material>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.12.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Color>	The color of the emissive component of the material.	Black color	1

### 3.12.5 EXAMPLE

```
<Material shininess="0" >
  <Diffuse>
    ...
  </Diffuse>
  <Ambient>
    ...
  </Ambient>
  <Specular>
    ...
  </Specular>
  <Emissive>
    <Color alpha="1" blue="0" green="0" red="0" />
  </Emissive>
</Material>
```

### 3.13 EXTERNALELEMENT

#### 3.13.1 CONCEPTS

The <ExternalElement> element is used to find an external file.

#### 3.13.2 ATTRIBUTES

Name	Type	Description
path	string	File path to the external file

#### 3.13.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>, <MarkClippedData>
<b>Child elements</b>	none
<b>Other</b>	

#### 3.13.4 EXAMPLE

```
<SubNetwork name="...">
  <Track ...>
    <XYCurve ...>...</XYCurve>
    <SZCurve ...>...</SZCurve>
    <Portion .../>
    <TrackclippedData name="...">
      <TrackClip .../>
      <TrackScope .../>
      <ExternalElement path="C:/Data/trafficLight.ive"/>
    </TrackClippedData>
  </Track>
</SubNetwork>
```

### 3.14 EXTERNALSURFACE

#### 3.14.1 CONCEPTS

Same as <ExternalElement>, but specific to external surface file, the representation of the ground for dynamic models.

#### 3.14.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	none
<b>Other</b>	

### 3.15 EXTERNALTERRAIN

#### 3.15.1 CONCEPTS

Same as <ExternalElement>, but specific to external Terrain file, the 3D representation of the road

#### 3.15.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	none
<b>Other</b>	

### 3.16 GROUND

#### 3.16.1 CONCEPTS

The <Ground> element contains the physical properties of the ground surface.

A library of Ground elements is present in each SubNetwork.

#### 3.16.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the ground
grip	double	A value representing the grip coefficient of the surface.
granulosity	double	A value representing the roughness of the surface. Can be used for sound or vibration engines.
type	string	Describe the type of material of the ground. Default types are: <ul style="list-style-type: none"> <li>- asphalt</li> <li>- grass</li> <li>- concrete</li> <li>- cobblestone</li> </ul>

#### 3.16.3 RELATED ELEMENTS

<b>Parent elements</b>	<Grounds>
<b>Child elements</b>	NA

#### 3.16.4 EXAMPLE

```
<Ground granularity="0.5" grip="1" name="My Asphalt" type="asphalt" />
```

## 3.17 GROUNDS

### 3.17.1 CONCEPTS

The <Grounds> element contains an array of Ground.

### 3.17.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Ground>

## 3.18 INTERSECTION

### 3.18.1 CONCEPTS

The <Intersection> element declares attributes to describe an intersection between several Tracks. The attribute name is used as a unique identifier in the SubNetwork. The Intersection is a position in the (X,Y) plane and an altitude. An Intersection can connect [0-N] tracks.

### 3.18.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the intersection
x	double	The x position of the intersection
y	double	The y position of the intersection
z	double	The z position of the intersection
uVOffsetX	double	Planar projection on the Intersection: offset the U value
uVOffsetY	double	Planar projection on the Intersection: offset the V value
uVHeading	double	Planar projection on the Intersection: rotate the UV (intersection position is the center of rotation)
uVScaleX	double	Planar projection on the Intersection: scale the U value
uVScaleY	double	Planar projection on the Intersection: scale the V value
groundName	string	Name of the Ground to use on this intersection

### 3.18.3 RELATED ELEMENTS

<b>Parent elements</b>	<Intersections>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<Track>

### 3.18.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<BannedLinks>	List of the forbidden connections between 2 lanes. For the vehicles coming from the first lane, it means that they can't go out of the Intersection using the second Lane.	none	0 to n
<Material>	Optional material for the intersection.	none	0 or 1
<ContourPiece>	Describe the shape of the contour between 2 Tracks on the Intersection		

### 3.18.5 EXAMPLE

```

<SubNetwork name="Sub Network 1">
  <Intersections>
    <Intersection name="Intersection" uVOffsetX="0" uVOffsetY="0"
uVScaleX="0" uVScaleY="0" uVheading="0" x="-2.5" y="8.1" z="0">
      <Material>
        <Diffuse>
          <Texture path="textures/marking.png"/>
          <Color alpha="1" blue="1" green="1" red="1"/>
        </Diffuse>
        <Ambient>
          <Color alpha="1" blue="1" green="1" red="1"/>
        </Ambient>
        <Specular>
          <Color alpha="1" blue="0" green="0" red="0"/>
        </Specular>
        <Emissive>
          <Color alpha="1" blue="0" green="0" red="0"/>
        </Emissive>
      </Material>
    </Intersection>
    <Intersection name="Intersection 2" x="-143.125" y="110" z="0"/>
  </Intersections>
  <Tracks>
    ...
  </Tracks>
</SubNetwork>

```

## 3.19 INTERSECTION

### 3.19.1 CONCEPTS

The <Intersection> element contains an array of <Intersection>.

### 3.19.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Intersection>
<b>Other</b>	

## 3.20 LANE

### 3.20.1 CONCEPTS

The <Lane> element declares attributes and elements to describe a part of a cross profile section of the road.

A Lane is a child element of a Profile and contains data for the traffic, geometric description, material and road surface.

### 3.20.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the lane
circulationWay	string	The name of the circulation way. Values: none direct inverse both
speedLimit	double	Speed limit in m/s.
type	string	The type of the lane. This type determine if a Vehicle is allowed to use the lane or not, and how it should use it. See the following subsection.
ground	string	Name of the Ground used by this Lane

### 3.20.3 RELATED ELEMENTS

<b>Parent elements</b>	<Profile>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<LanePair>

### 3.20.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<VehicleType>	Types of vehicle allowed on this lane	NA ( <i>not applicable</i> )	1
<Material>	Material description for the lane	NA ( <i>not applicable</i> )	1
<UVMapping>	Way to use the lane texture	NA ( <i>not applicable</i> )	1



### 3.20.5 DETAILS

Possible values for “type” attribute:

Value	Comment
paved	The part of the road where vehicle can drive
paved roundabout	Paved lane specific to roundabout
paved entry	Paved lane specific to entry lanes (highway entry)
paved exit	Paved lane specific to exit lanes (highway exit)
paved express	Paved lane specific to expressways (highway, freeway)
sidewalk	Path for the pedestrians
emergency	Part of the road reserved for the emergency vehicles
parking	Part of the road for vehicle parking
zebra	Part of the road where no vehicle is allowed to drive
median	Separation between 2 roadways
shoulder	edge of the road
embankment	a man-made ridge of earth or stone that carries the road
ditch	A channel dug in the earth used to drain water
barrier	No Vehicle can go through
land	Area away from the road

### 3.20.6 EXAMPLE

```
<Profile ...>
  <LaneBorder .../>
  <Lane circulationWay="both" name="Lane 1" speedLimit="2.31481"
type="sidewalk" ground="my ground material">
    <VehicleType categories="pedestrian,bicycle"/>
    <Material>
      <Diffuse>
        <Texture path="..\textures\sidewalk.png"/>
        <Color alpha="1" blue="1" green="1" red="1"/>
      </Diffuse>
    </Material>
    <UVMapping leftU="0" lengthV="1" rightU="1"/>
  </Lane>
</LaneBorder .../>
...
</Profile>
```

## 3.21 LANE BORDER

### 3.21.1 CONCEPTS

The <LaneBorder> element is a child element of a Profile, it declares attributes and elements to describe the geometric description and decoration of the border of the road surface.

### 3.21.2 ATTRIBUTES

Name	Type	Description
distance	double	Distance from the axe of the road
height	double	Elevation from the axe of the road
markingName	string	Name of the marking to use
markingOffset	double	Horizontal offset of the marking relatively to the LaneBorder

### 3.21.3 RELATED ELEMENTS

Parent elements	<Profile>
Child elements	See the following subsection
Other	

### 3.21.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Decoration>	Description of a decoration along the lane border.	NA ( <i>not applicable</i> )	0 or 1

### 3.21.5 EXAMPLE

```
<Profile name="Default Fr">
  <LaneBorder distance="-5.8" height="0.2" />
  <Lane ...>
    ...
  </Lane>
  <LaneBorder .../>
  <Lane ...>
    ...
  </Lane>
  <LaneBorder distance="-3.5" height="0" markingName="my marking"
markingOffset="0" />
  <Decoration>
    ...
  </Decoration>
</LaneBorder>
</Profile>
```

## 3.22 LANEPAIR

### 3.22.1 CONCEPTS

The <LanePair> element declares attributes describe a link between 2 lanes around an Intersection. The entry of the link is identified by a lane name identifier, a track name identifier and the track bound information: start track or end track.

### 3.22.2 ATTRIBUTES

Name	Type	Description
fromTrack	string	The name identifier of the track
fromTrackBoundInfo	string	The bound information. Values : <ul style="list-style-type: none"> <li>• start</li> <li>• end</li> </ul>
fromLane	string	The name identifier of the lane
toTrack	string	The name identifier of the track
toTrackBoundInfo	string	The bound information. Values : <ul style="list-style-type: none"> <li>• start</li> <li>• end</li> </ul>
toLane	string	The name identifier of the lane

### 3.22.3 RELATED ELEMENTS

<b>Parent elements</b>	< BannedLinks >
<b>Child elements</b>	None
<b>Other</b>	<Track>, <Lane>

### 3.22.4 EXAMPLE

```
<BannedLinks>
  <LanePair fromTrack="Track 2" fromTrackBoundInfo="end" fromLane="Lane
1" toTrack="Track" toTrackBoundInfo="start" toLane="Lane 1" />
  <LanePair fromTrack="Track 3" fromTrackBoundInfo="end" fromLane="Lane
2" toTrack="Track 1" toTrackBoundInfo="start" toLane="Lane" />
  ...
</BannedLinks>
```

## 3.23 LIGHT

### 3.23.1 CONCEPTS

The <Light> element declares attributes to define a single light of a traffic light.

### 3.23.2 ATTRIBUTES

Name	Type	Description
name	string	Name of the light. Can be use to find the corresponding item in a 3D model.
VehicleType	string	Describe the vehicles targeted by the light. See Details paragraph to view different values of VehicleType attribute.
color	string	Color of the light. It is not the actual color of the light but the signification of the color. Values : <ul style="list-style-type: none"> <li>• nocolor</li> <li>• red: cannot pass</li> <li>• orange: shouldn't pass</li> <li>• green: can pass</li> </ul>
direction	string	Direction targeted of the light Values : <ul style="list-style-type: none"> <li>• none</li> <li>• straight</li> <li>• left</li> <li>• right</li> <li>• a combination of the preceding values separated by a comma</li> </ul>
illumination	string	Illumination of the light Values : <ul style="list-style-type: none"> <li>• off</li> <li>• on</li> <li>• blinking</li> </ul>

### 3.23.3 RELATED ELEMENTS

Parent elements	<RoadSign>
Child elements	none
Other	

### 3.23.4 DETAILS

The value of VehicleType attribute may be a combination of the following values separated by a comma.

Value	Comment
pedestrian	
bicycle	
moped	
motorcycle	
car	
trail	
caravan	
bus	
agricultural vehicle	
goods transport	
polluting transport	
dangerous transport	
nailed tires	
truck	
tramway	
train	

### 3.23.5 EXAMPLE

```
<RoadSign direction="none" message="" signType="traffic light"
temporary="0" value="0">
  <VehicleType categories="..." height="-1" length="-1" traileWeight="-1"
weight="-1" weightPerAxle="-1" width="-1"/>
  <Light
VehicleType="pedestrian,bicycle,moped,motorcycle,car,trail,caravan,bus,agri
cultural vehicle,goods transport,poluting transport,dangerous
transport,nailed tires,truck,tramway,train" color="orange" direction="all"
illumination="off"/>
  <Light .../>
  ...
  <Light .../>
</RoadSign>
```

## 3.24 MARKCLIPPEDDATA

### 3.24.1 CONCEPTS

The <MarkClippedData> element declares attribute and element to describe data attached to a Cartesian element of the network. Currently they are attached to the Intersection.

A MarkClippedData contains different kind of data:

- Its data, one or several of :
  - o Road sign
  - o Obstacle
  - o Surface modification
  - o User data
- Its position relative to its parent (x, y, z, heading, pitch, roll)

### 3.24.2 ATTRIBUTES

Name	Type	Description
name	string	Name of the clipped data. This name is unique in a Sub-Network
mass	double	Mass of the object to use in physics engines. -1 for static objects.
sequenceOrientation	double	Heading of the child sequences. Rotation center is the TrackClip position.
x	double	x offset relative to the parent object
y	double	y offset relative to the parent object
z	double	z offset relative to the parent object
heading	double	Rotation around the Z axis
pitch	double	Rotation around the Y axis
roll	double	Rotation around the X axis

### 3.24.3 RELATED ELEMENTS

<b>Parent elements</b>	<ClippedDatas>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<TrackClippedData>

### 3.24.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<RoadSign>	Describe a road sign	NA ( <i>not applicable</i> )	0 or 1
<ExternalElement>	Give a path to an external 3D file	NA ( <i>not applicable</i> )	0 or 1

<Obstacle>	Describe an obstacle on the track	NA ( <i>not applicable</i> )	0 or 1
<SurfaceModifier>	Describe local deformation of the road surface (a hump or a pothole)	NA ( <i>not applicable</i> )	0 or 1

### 3.24.5 EXAMPLE

```

<ClippedDatas>
  <MarkClippedData heading="0.1" mass="-1" name="obj.ive" pitch="0"
roll="0" sequenceOrientation="0" x="-7" y="-3.5" z="0">
    <ExternalElement ..."/>
  </MarkClippedData>
  ...
  <MarkClippedData ...>
    ...
  </MarkkClippedData>
</ClippedDatas>

```

## 3.25 MARKING

### 3.25.1 CONCEPTS

The <Marking> element declares attributes and elements to describe a road marking.

The Marking is the longitudinal part of the road marking: overtaking lines, break line, etc.

### 3.25.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the marking
width	double	Width of the representation of the marking
lineLength	double	Length in meters for the marking line
totalLength	double	Length of the marking repetition
leftToRight	string	Marking Type. Values : Unknown     ( <i>unknown marking</i> ) can           ( <i>dot line</i> ) warning      ( <i>dot line ending</i> ) cannot       ( <i>continuous line</i> )
rightToLeft	string	Marking Type. Values : Unknown     ( <i>unknown marking</i> ) can           ( <i>dot line</i> ) warning      ( <i>dot line ending</i> ) cannot       ( <i>continuous line</i> )

### 3.25.3 RELATED ELEMENTS

<b>Parent elements</b>	<Markings>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.25.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Material>	Material used by the marking	NA ( <i>not applicable</i> )	1
<UVMapping>	The description of using the marking texture	NA ( <i>not applicable</i> )	1



### 3.25.5 EXAMPLE

```
<Marking leftDistance="0.05" leftToRight="can" lineLength="2" name=""
rightDistance="0.25" rightToLeft="can" side="right" totalLength="6">
  <Material>
    ...
  </Material>
  <UVMapping leftU="0" lengthV="1" rightU="1"/>
</Marking>
```

## 3.26 MARKINGS

### 3.26.1 CONCEPTS

The <Markings> element contains an array of Marking.

### 3.26.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Marking>
<b>Other</b>	

## 3.27 MATERIAL

### 3.27.1 CONCEPTS

The <Material> element declares an attribute and elements to describe a material following four aspects.

### 3.27.2 ATTRIBUTES

The <Material> element has the following attributes :

Name	Type	Description
shininess	double	The shining of the material. Values are between 0 and 128. Default value = 0 (no shining).

### 3.27.3 RELATED ELEMENTS

The <Material> element relates to the following elements :

<b>Parent elements</b>	<Lane>, <Marking>, <Decoration>, <Intersection>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.27.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Diffuse>	The diffuse aspect of the material	Black with no Texture	1
<Ambient>	The diffuse aspect of the material	Black with no Texture	1
<Specular>	The diffuse aspect of the material	Black with no Texture	1
<Emissive>	The diffuse aspect of the material	Black with no Texture	1

### 3.27.5 EXAMPLE

```
<Material shininess="0">
  <Diffuse>
    <Texture path="..\studio\data\textures\marking.png" />
    <Color alpha="1" blue="1" green="1" red="1" />
  </Diffuse>
  <Ambient>
    <Color alpha="1" blue="0.2" green="0.2" red="0.2" />
  </Ambient>
  <Specular>
    <Color alpha="1" blue="1" green="1" red="1" />
  </Specular>
  <Emissive>
    <Color alpha="1" blue="0" green="0" red="0" />
  </Emissive>
</Material>
```

## 3.28 NETWORK

### 3.28.1 CONCEPTS

The <Network> element declares an attribute to define a reference name, and elements to describe a network.

The Network is the highest level element of the RoadXML and handles the communication between the SubNetworks. It also contains some objects libraries common to all the subnetworks, and objects using information in different subnetworks (like the Roads or the Profiles).

### 3.28.2 ATTRIBUTES

The <Network> element has the following attributes:

Name	Type	Description
name	string	The name of the network
traffic	string	The type of traffic. Values : <ul style="list-style-type: none"> <li>• right-hand</li> <li>• left-hand</li> <li>• not defined</li> </ul>

### 3.28.3 RELATED ELEMENTS

The <Network> element relates to the following elements:

<b>Parent elements</b>	<RoadXML>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.28.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<SubNetworkJunctions>	A SubNetwork junction between two SubNetworks.	NA ( <i>not applicable</i> )	0 or more
<SubNetworks>	Subnetworks in the network	NA ( <i>not applicable</i> )	1 or more
<Roads>	Roads in the network	NA ( <i>not applicable</i> )	1 or more

### 3.28.5 EXAMPLE

```
<Network name="My network" traffic="left-hand">
  <SubNetworkJunctions>
```

```
    ...  
</SubNetworkJunction/>  
<SubNetworks>  
    ...  
</SubNetworks>  
<Roads>  
    ...  
</Roads>  
</Network>
```

## 3.29 OBSTACLE

### 3.29.1 CONCEPTS

The <Obstacle> element declares attribute to define an obstacle type.

An Obstacle is an element that returns collision information for a specific position or segment and gives optional information about how to turn around.

### 3.29.2 ATTRIBUTES

Name	Type	Description
dodge	string	The obstacle type. See Details paragraph to view different values of dodge attribute.

### 3.29.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>, <MarkClippedData>
<b>Child elements</b>	none
<b>Other</b>	

### 3.29.4 DETAILS

Possible values for dodge attribute :

Value	Comment
left	
right	
both sides	
cannot	
unknown	

### 3.30 POLYLINE

#### 3.30.1 CONCEPTS

The <PolyLine> element declares a list of Vectord2 points that describes a polyline in local coordinates. The first point of the Polyline is on 0,0 and is not stored in the file. The second point of the Polyline is on (x,0) with x>0.

A polyline can be used to put a decoration object on the LaneBorder.

The type attribute set the graphical representation of the PolyLine.

#### 3.30.2 ATTRIBUTES

Name	Type	Description
type	string	The type of the PolyLine. Possible values : <ul style="list-style-type: none"> <li>spline</li> <li>segment</li> </ul>
endHeading	double	Angle in rad: orientation of the tangent at the end of the polyline.

#### 3.30.3 RELATED ELEMENTS

Parent elements	<XYCurve>, <Decoration>
Child elements	See the following subsection
Other	

#### 3.30.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Vectord2>	A 2 dimension vector.	NA ( <i>not applicable</i> )	1 or more.

#### 3.30.5 EXAMPLE

```
<XYCurve direction="1.60562" x="184.076" y="102.512">
  <Segment length="9.99919" />
  <ClothoArc endCurvature="0" length="23.6003" startCurvature="0.0567661" />
  <CircleArc curvature="0.0136479" length="116.235" />
  <ClothoArc endCurvature="0" length="30.4138" startCurvature="0.0365034" />
  <PolyLine type="segment">
    <Vectord2 x="24.0416" y="0" />
    <Vectord2 x="128.693" y="33.9411" />
    <Vectord2 x="321.068" y="-601.581" />
    <Vectord2 x="309.463" y="-597.796" />
    <Vectord2 x="296.07" y="-577.832" />
    <Vectord2 x="290.829" y="-560.612" />
  </PolyLine>
  <Segment length="113.749" />
</XYCurve>
```

### 3.31 POLYNOMIAL FUNCTION

#### 3.31.1 CONCEPTS

The <Polynomial> element declares parameters of a polynomial function. It defines data for the beginning and the ending of the curve.

#### 3.31.2 RELATED ELEMENTS

The <Polynomial> element relates to the following elements :

<b>Parent elements</b>	<SZCurve>, <BankingCurve>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

#### 3.31.3 CHILD ELEMENTS

Name	Description	Default	Occurrences
<begin>	Data for the start point of the curve (direction and position)	Direction = 0	1
<end>	Data for the end point of the curve (direction and position)	Direction = 0	1

#### 3.31.4 EXAMPLE

```
<SZCurve>
  <Polynomial>
    <begin direction="0" x="0" y="0"/>
    <end direction="0" x="50" y="0"/>
  </Polynomial>
  <Polynomial>
    <begin direction="0" x="50" y="0"/>
    <end direction="0" x="100" y="0"/>
  </Polynomial>
  ...
</SZCurve>
```

## 3.32 PORTION

### 3.32.1 CONCEPTS

The <Portion> element declares attributes to describe a portion of a track.  
A Portion contains longitudinal data between 2 profiles on a track.

### 3.32.2 ATTRIBUTES

Name	Type	Description
name	string	Portion name
startProfile	string	Profile at the beginning of the portion
endProfile	string	Profile at the end of the portion
endDistance	double	Distance on the track where the portion ends. To get the start distance, check the previous portion on the track. If there's none, then it's 0

### 3.32.3 RELATED ELEMENTS

Parent elements	<Track>
Child elements	NA
Other	

### 3.32.4 EXAMPLE

```
<Track endNode="inter1" name="Main Rd" startNode="inter2">
  <XYCurve ...>
    ...
  </XYCurve>
  <SZCurve ...>
    ...
  </SZCurve>
  <Portions>
    <Portion endDistance="1" endProfile="4lanes" name="" startProfile="
4lanes"/>
    <Portion .../>
    ...
    <Portion .../>
  </Portions>
</Track>
```



### 3.33 PORTIONS

#### 3.33.1 CONCEPTS

The <Portions> element contains an array of Portion.

#### 3.33.2 RELATED ELEMENTS

<b>Parent elements</b>	<Track>
<b>Child elements</b>	<Portion>
<b>Other</b>	

### 3.34 PROFILE

#### 3.34.1 CONCEPTS

The <Profile> element describes a cross section of the road. It's made of a collection of Lanes separated by LaneBorders

The Profile's name is a unique identifier among the Profiles of a SubNetwork.

#### 3.34.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the profile
type	string	Describes the Profile type. See Details paragraph to view different values of type attribute.

#### 3.34.3 RELATED ELEMENTS

<b>Parent elements</b>	<Profiles>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

#### 3.34.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Lane>	Lane description	NA ( <i>not applicable</i> )	1 or more
<LaneBorder>	LaneBorder description.	NA ( <i>not applicable</i> )	1 or more

### 3.34.5 DETAILS

Possible values for type attribute:

Value	Comment
unknown	
none	
tunnel	For an underground part of the road
bridge	For the upper part of a bridge

### 3.34.6 EXAMPLE

```
<Profile name="Default Fr" type="none">
  <LaneBorder distance="-5.8" height="0.2"/>
  <Lane ...>
    ...
  </Lane>
  ...
  <LaneBorder distance="-3.5" height="0">
    ...
  </LaneBorder>
  <Lane ...>
    ...
  </Lane>
  ...
  <LaneBorder distance="5.8" height="0.2"/>
</Profile>
```

## 3.35 PROFILES

### 3.35.1 CONCEPTS

The <Profiles> element contains an array of <Profile>

The Profile's name is a unique identifier among the Profiles of a SubNetwork.

### 3.35.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Profile>
<b>Other</b>	

## 3.36 PROXYFILE

### 3.36.1 CONCEPTS

The <ProxyFile> element is used to store a SubNetwork into an external file. It's similar to the ExternalFile element.

### 3.36.1 ATTRIBUTES

Name	Type	Description
path	string	File path to the external file

### 3.36.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	none
<b>Other</b>	<ExternalFile>

## 3.37 ROADXML

### 3.37.1 CONCEPTS

The <RoadXML> element is the first element of the RoadXML file. This element declares the version of the file and network.

The RoadXML is a complete description of a road network for a driving simulator.

### 3.37.2 ATTRIBUTES

Name	Type	Description
version	String	Version of the RoadXML file.
versionRevision	String	The version of the RoadXML file and the date and revision of the SCANeR source files.

### 3.37.3 RELATED ELEMENTS

Parent elements	None
Child elements	See the following subsection
Other	

### 3.37.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Network>	The network	NA (not applicable)	1

### 3.37.5 EXAMPLE

```
<RoadXML version="1.4.10" revision="1.4.10-$Revision: 16056 $-$Date: 2009-06-23 11:22:08 +0200 (mar. 23 juin 2009) $"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Network name="">
    <Profile name="Default Fr">
      ...
    </Profile>
    <SubNetwork name="Sub Network 1">
      ...
    </SubNetwork>
  </Network>
</RoadXML>
```

## 3.38 ROAD

### 3.38.1 CONCEPTS

The <Road> element describes a road through a network.

A Road is a list of Tracks sharing a common road name. These tracks are not necessarily contiguous, and a Track can be shared between several Roads.

### 3.38.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the road
priorityLevel	int	A number that sets an indicative level of priority of the road.

### 3.38.3 RELATED ELEMENTS

<b>Parent elements</b>	<Roads>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.38.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<RoadElement>	References of the subnetwork and the track.	NA ( <i>not applicable</i> )	1 or more

### 3.38.5 EXAMPLE

```
<Road name="N5" priorityLevel="359">
  <RoadElement subNetwork="CityCenter" track="Track 24" />
  <RoadElement subNetwork="Country" track="Track 48" />
  <RoadElement subNetwork="Country" track="Track 50" />
</Road>
```

## 3.39 ROADS

### 3.39.1 CONCEPTS

The <Roads> element contains an array of <Road>.

### 3.39.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Road>
<b>Other</b>	

## 3.40 ROADELEMENT

### 3.40.1 CONCEPTS

The <RoadElement> element references a Track in a SubNetwork.

### 3.40.2 ATTRIBUTES

Name	Type	Description
subNetwork	string	Reference name of the subnetwork
track	string	Reference name of the track

### 3.40.3 RELATED ELEMENTS

<b>Parent elements</b>	<RoadPieces>
<b>Child elements</b>	none
<b>Other</b>	<SubNetwork>, <Track>, <Road>

### 3.40.4 EXAMPLE

```
<Road name="N5" priorityLevel="359">
  <RoadPieces>
    <RoadElement subNetwork="CityCenter" track="Track 24"/>
    ...
    <RoadElement subNetwork="Country" track="Track 50"/>
  </RoadPieces>
</Road>
```

## 3.41 ROADPIECES

### 3.41.1 CONCEPTS

The <RoadPieces> element declares an array of <RoadElement>.

### 3.41.2 RELATED ELEMENTS

<b>Parent elements</b>	<Road>
<b>Child elements</b>	<RoadElement>
<b>Other</b>	<SubNetwork>, <Track>

## 3.42 ROADSIGN

### 3.42.1 CONCEPTS

The <RoadSign> element declares attributes and elements to describe a road sign.

Road signs are handled by the RoadSign structure. This structure contains all the data necessary to the comprehension and the use of the sign by an application.

### 3.42.2 ATTRIBUTES

Name	Type	Description
signType	string	Type of the sign. See Details paragraph to view different values of signType attribute.
direction	string	Some signs, before an intersection, has an indication on the direction. Values : <ul style="list-style-type: none"> <li>• none</li> <li>• straight</li> <li>• left</li> <li>• right</li> <li>• a combination of the preceding values separated by a comma</li> </ul>
temporary	bool	For temporary signalization (road work signs)
message	string	Some signs contain specific messages. This message can be display on a board for the driver to see it. This message can change with time.
value	double	Store data related to the sign (speed limit in m/s, ... ) This value can change with time.
targetName	String	Optional name of another object of the Network linked to the RoadSign. This name is used for the traffic lights: it gives the name of the 3D object animated by the state machine of the traffic light.

### 3.42.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>, <MarkClippedData>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

## 3.42.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<VehicleType>	Define the authorized vehicle type.	NA ( <i>not applicable</i> )	1
<Light>	Define a light description if the road sign contain lights.		0 or more

## 3.42.5 DETAILS

Possible values for signType attribute :

Value	Comment
unknown	
Default danger sign	
danger	
danger right turn	
danger left turn	
danger speed bump	
danger right priority	next intersection: right priority
Default intersection sign	
yield	
stop	
traffic light	
Default obligation signs	
wrong way	
no left turn	
no right turn	
no U turn	
no overtaking	
speed limit	In m/s
left turn obligatory	
right turn obligator	
straight obligatory	
end speed limit	
barrier	
no parking	
Information	
message board	
parking	
dead end	



toll gate	
start highway	
end highway	
start priority road	
end priority road	
direction	
Crossing	
pedestrian crossing	
railroad crossing	
tramway crossing	

### 3.42.6 EXAMPLE

```

<RoadSign direction="none" message="" signType="traffic light"
temporary="0" value="0">
  <VehicleType
categories="pedestrian,bicycle,moped,motorcycle,car,trail,caravan,bus,agric
ultural vehicle,goods transport,poluting transport,dangerous
transport,nailed tires,truck,tramway,train" height="-1" length="-1"
trailedWeight="-1" weight="-1" weightPerAxle="-1" width="-1"/>
  <Light
VehicleType="pedestrian,bicycle,moped,motorcycle,car,trail,caravan,bus,agri
cultural vehicle,goods transport,poluting transport,dangerous
transport,nailed tires,truck,tramway,train" color="green" direction="all"
illumination="off"/>
  <Light .../>
  <Light .../>
</RoadSign>

```

## 3.43 SEGMENT

### 3.43.1 CONCEPTS

The <Segment> element declares parameters for a segment of a curve.

### 3.43.2 ATTRIBUTES

Name	Type	Description
length	double	The length of the segment

### 3.43.3 RELATED ELEMENTS

<b>Parent elements</b>	<XYCurve>
<b>Child elements</b>	None
<b>Other</b>	

### 3.43.4 EXAMPLE

```
<SZCurve direction="0" x="0" y="20">
  <Segment length="17.4926" />
  <Segment length="10.0344" />
  <Segment length="8.758" />
</SZCurve>
```

## 3.44 SEQUENCE

### 3.44.1 CONCEPTS

The <Sequence> element declares attribute to define a sequence of clipped data along an axis.

A Sequence is a repetition of n clipped element described in the TrackClippedData or MarkClippedData section.

In the case of a TrackClippedData, the sequence is made along the Track axis.

In the case of a MarkClippedData, the sequence is made along the X axis.

### 3.44.2 ATTRIBUTES

Name	Type	Description
number	int	The number of elements in the sequence.
distance	double	The abscissa distance between two elements.

### 3.44.3 RELATED ELEMENTS

Parent elements	<TrackClippedData>, <MarkClippedData>
Child elements	none
Other	<SequenceY>, <SequenceZ>

### 3.44.4 EXAMPLE

```
<Track ...>
  ...
  <TrackClippedData mass="-1" name="obj.IVE" sequenceOrientation="0">
    <Sequence distance="4" number="5"/>
    <SequenceY distance="1" number="3"/>
    <SequenceZ distance="1" number="2"/>
    <ExternalElement path="cdlp/cdlp.ive"/>
    <TrackClip abscissa="8" distance="-2" elevation="0" heading="0"
vertical="1"/>
    <TrackScope bottom="0" from="0" left="0" right="0" to="0" top="0"
way=" " />
  </TrackClippedData>
</Track>
```

## 3.45 SEQUENCEY

### 3.45.1 CONCEPTS

The <SequenceY> element declares attribute to define a sequence of clipped data along an axis perpendicular to the <Sequence> axis.

A SequenceY is a repetition of n clipped elements described in the TrackClippedData or MarkClippedData section.

In the case of a TrackClippedData, the sequence is made along the perpendicular to the Track axis.

In the case of a MarkClippedData, the sequence is made along the Y axis.

### 3.45.2 ATTRIBUTES

Name	Type	Description
number	int	The number of elements in the sequence.
distance	double	The abscissa distance between two elements.

### 3.45.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>, <MarkClippedData>
<b>Child elements</b>	none
<b>Other</b>	<Sequence>, <SequenceZ>

## 3.46 SEQUENCEZ

### 3.46.1 CONCEPTS

The <SequenceZ> element declares attribute to define a sequence of clipped data along an axis perpendicular to the <Sequence> and the <SequenceY> axis.

A SequenceZ is a repetition of n clipped elements described in the TrackClippedData or MarkClippedData section.

In the case of a TrackClippedData, the sequence is made along the elevation axis of the Track.

In the case of a MarkClippedData, the sequence is made along the Z axis.

### 3.46.2 ATTRIBUTES

Name	Type	Description
number	int	The number of elements in the sequence.
distance	double	The abscissa distance between two elements.

### 3.46.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>, <MarkClippedData>
------------------------	---------------------------------------

<b>Child elements</b>	none
<b>Other</b>	<Sequence>, <SequenceY>

### 3.47 SPECULAR

#### 3.47.1 CONCEPTS

The <Specular> element defines the specular aspect of the Material.

#### 3.47.2 ATTRIBUTES

Name	Type	Description
none		

#### 3.47.3 RELATED ELEMENTS

<b>Parent elements</b>	<Material>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

#### 3.47.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Color>	The color of the specular component of the material.	Black color	1

#### 3.47.5 EXAMPLE

```
<Material shininess="0">
  <Diffuse>
    ...
  </Diffuse>
  <Ambient>
    ...
  </Ambient>
  <Specular>
    <Color alpha="1" blue="1" green="1" red="1" />
  </Specular>
  <Emissive>
    ...
  </Emissive>
</Material>
```

## 3.48 STATE

### 3.48.1 CONCEPTS

The <State> element declares an attribute to describe the illumination of traffic lights.

### 3.48.2 ATTRIBUTES

Name	Type	Description
illumination	string	Light description for the road sign. Values : off on blinking

### 3.48.3 RELATED ELEMENTS

Parent elements	<TrafficLightState>
Child elements	none
Other	

### 3.48.4 EXAMPLE

```
<States>
  <TrafficLightState timeLength="25">
    <State illumination="off" />
    <State illumination="off" />
    <State illumination="on" />
  </TrafficLightState>
  ...
  <TrafficLightState ...>
    ...
  </TrafficLightState>
</States>
```

## 3.49 STATES

### 3.49.1 CONCEPTS

The <States> element declares an array of <TrafficLightState>.

### 3.49.2 ATTRIBUTES

Name	Type	Description
timeLength	double	Time duration of the state

### 3.49.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrafficLightAnimation>
<b>Child elements</b>	<TrafficLightState>
<b>Other</b>	

## 3.50 SUBNETWORK

### 3.50.1 CONCEPTS

The <SubNetwork> element declares elements to describe a subnetwork, and an attribute name as unique identifier in the Network.

A SubNetwork is a part of the network. It contains an array of intersections and tracks.

### 3.50.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the subnetwork
heading	double	The heading (orientation) of the subnetwork in the global network.
x	double	The x position of the subnetwork in the global network.
y	double	The y position of the subnetwork in the global network.
z	double	The z position of the subnetwork in the global network.

### 3.50.3 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetworks>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<RoadElement>

### 3.50.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Intersections>	Intersection in the subnetwork	NA ( <i>not applicable</i> )	1
<Tracks>	Track in the subnetwork	NA ( <i>not applicable</i> )	1
<Profiles>	Profiles in the network	NA ( <i>not applicable</i> )	1 or more
<Markings>	Description of horizontal markings. These marking are then referenced by the LaneBorder	NA ( <i>not applicable</i> )	0 or more
<Grounds>	Physical properties of the ground.	NA ( <i>not applicable</i> )	0 or more
<TrafficLightGroups>	Traffic light group in the subnetwork	NA ( <i>not applicable</i> )	0 or 1
<ExternalTerrain>	External file containing the 3D representation of the sub-network	NA ( <i>not applicable</i> )	0 or 1
<ExternalSurface>	External file containing the surface representation of the sub-network	NA ( <i>not applicable</i> )	0 or 1



---

### 3.50.5 EXAMPLE

```
<SubNetwork name="MySubNetwork">
  <Intersections/>
  ...
  <Intersections/>
  <Tracks>
    ...
  </Tracks>
  <TrafficLightGroups/>
  ...
  <TrafficLightGroups>
  <ExternalTerrain path="..." />
</SubNetwork>
```

## 3.51 SUBNETWORKS

---

### 3.51.1 CONCEPTS

The <SubNetworks> element contains an array of <SubNetwork>.

---

### 3.51.2 RELATED ELEMENTS

<b>Parent elements</b>	<Network>
<b>Child elements</b>	<SubNetwork>
<b>Other</b>	

## 3.52 SUBNETWOKJUNCTION

### 3.52.1 CONCEPTS

The <SubNetwokJunction> element declares an attribute name as unique identifier in the Network. The SubNetwokJunction is referenced by a start or end node from two SubNetworks's Track to connect these two SubNetworks.

A SubNetwokJunction can connect only two tracks. Connection with intersection is prohibited.

### 3.52.2 ATTRIBUTES

Name	Type	Description
name	string	The name of the intersection

### 3.52.3 RELATED ELEMENTS

<b>Parent elements</b>	<Network>
<b>Child elements</b>	None
<b>Other</b>	<Track>

### 3.52.4 EXAMPLE

```
<Network name="" traffic="not defined">
  <SubNetworkJunctions/>
  <SubNetworkJunction name="Junction Point 1"/>
</SubNetworkJunctions/>
<SubNetworks>
  <SubNetwork name="Sub Network 1" x="0" y="0" z="0">
    <Intersections/>
    <Tracks>
      <Track endNode="Intersection" name="Track" startNode="">
        ...
      </Track>
      <Track endNode="Intersection" name="Track 1" startNode="">
        ...
      </Track>
      <Track endNode="" name="Track 2" startNode="Intersection">
        ...
      </Track>
      <Track endNode="Junction Point 1" name="Track 3"
startNode="Intersection">
        ...
      </Track>
    </Tracks>
  </SubNetwork>
  <SubNetwork name="Sub Network 2" x="0" y="0" z="0">
    <Intersections/>
    <Tracks>
      <Track endNode="Intersection" name="Track" startNode="Junction Point
1">
```

```

    ...
  </Track>
  <Track endNode="Intersection" name="Track 1" startNode="">
    ...
  </Track>
  <Track endNode="" name="Track 2" startNode="Intersection">
    ...
  </Track>
  <Track endNode="Junction Point 1" name="Track 3"
startNode="Intersection">
    ...
  </Track>
</Tracks>
</SubNetwork>
</SubNetworks>
</Network>

```

### 3.53 SUBNETWOKJUNCTIONS

#### 3.53.1 CONCEPTS

The <SubNetwokJunctions> element contains an array of <SubNetwokJunction>.

#### 3.53.2 RELATED ELEMENTS

<b>Parent elements</b>	<Network>
<b>Child elements</b>	< SubNetwokJunction >
<b>Other</b>	

## 3.54 SZCURVE

### 3.54.1 CONCEPTS

The <SZCurve> element contains the road longitudinal profile curve.

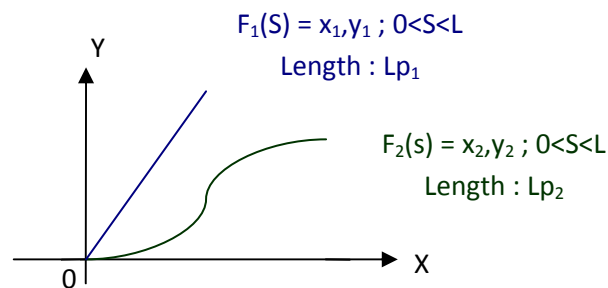
See 3.69 XYCurve and 3.22 Polynomial function for description.

### 3.54.2 DETAILS

Abscissa definition : Position along an axis is given by its abscissa S.

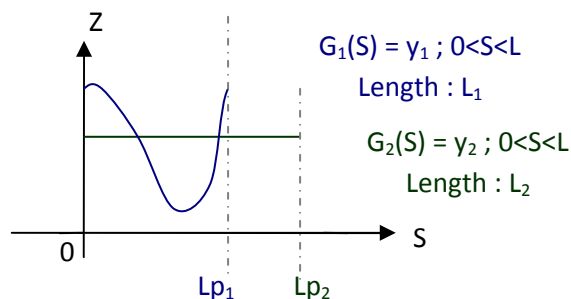
There's  $0 < S < L$ , with L the length of the axis, or  $0 < t < 1$  when the distance is normalized.

In the XY plane, a 2D curve of t is defined, with t going from 0 to 1. For each value of t the function returns a X,Y position.  $L_p$  is the length of the 2D curve in the (X,Y) plane. The length of the curve in the 3D space (X,Y,Z) is then greater or equal to  $L_p$ .



The altitude variation is then defined with a series of polynomial function of degree 3, with the following form:  $Y=f(X)$ ,  $f(X) = a*X^3 + b*X^2 + c*X + d$

In the sample here, the first axis is defined by the curve  $F_1$  in the plane (X,Y) and  $G_1$  in (S,Z) ( $G_1(S)=f(S)$ ). The length  $L_1$  of the 3D curve is greater than the length in the plane  $L_{p1}$ .



The second curve ( $F_2, G_2$ ) shows a case where  $L_{p2} = L_2$  : in that case, the altitude is constant along the axis.

### 3.54.3 RELATED ELEMENTS

The <SZCurve> element relates to the following elements:

<b>Parent elements</b>	<Track>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<BankingCurve>

---

### 3.54.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Polynomial>	Curve piece describes as a 3 <sup>rd</sup> degree polynom.	NA ( <i>not applicable</i> )	1 or more

---

### 3.54.5 EXAMPLE

```
<SZCurve>
  <Polynomial>
    <begin direction="0" x="0" y="0" />
    <end direction="0" x="226.142" y="0" />
  </Polynomial>
</SZCurve>
```

## 3.55 TEXTURE

### 3.55.1 CONCEPTS

The <Texture> element declares the path for a texture file.

### 3.55.2 ATTRIBUTES

Name	Type	Description
path	string	The path to the texture file. It is relative to the RoadXML file.

### 3.55.3 RELATED ELEMENTS

<b>Parent elements</b>	<Diffuse>
<b>Child elements</b>	None
<b>Other</b>	

### 3.55.4 EXAMPLE

```
<Material>
  <Diffuse>
    <Texture path="../../Data/Textures/DefaultTerrain.png"/>
    <Color alpha="1" blue="1" green="1" red="1"/>
  </Diffuse>
  <Ambient>
    <Color alpha="1" blue="0.2" green="0.2" red="0.2"/>
  </Ambient>
  <Specular>
    <Color alpha="1" blue="1" green="1" red="1"/>
  </Specular>
</Material>
```

## 3.56 TIMER

### 3.56.1 CONCEPTS

The <Timer> element adds the timer functionality to one light of a traffic light..

### 3.56.2 ATTRIBUTES

Name	Type	Description
text	string	The text currently displayed in the timer. For example, it can be "05" to tell the user that the traffic light will change in 5 seconds.

### 3.56.3 RELATED ELEMENTS

Parent elements	<Light>
Child elements	None
Other	

### 3.56.4 EXAMPLE

```
<RoadSign direction="direct" message="" signType="traffic light"
temporary="0" value="0">
  <VehicleType categories="car,bus,truck" />
  <Light VehicleType="car,bus,truck" color="red"
direction="straight,left,right" illumination="off" name="LAMP03" />
  <Light VehicleType="car,bus,truck" color="orange"
direction="straight,left,right" illumination="off" name="LAMP02" />
  <Light VehicleType="car,bus,truck" color="green"
direction="straight,left,right" illumination="off" name="LAMP01" />
  <Light VehicleType="car,bus,truck" color="nocolor"
direction="straight,left,right" illumination="off" name="LAMP01" />
  <Timer>
    <Text2D message="04" />
  </Timer>
</Light>
</RoadSign>
```

## 3.57 TRACK

### 3.57.1 CONCEPTS

The <Track> element declares attributes and elements to describe a track.

The attribute name is used as a unique identifier in the SubNetwork.

A track can be connected to an intersection at its start and at its end. It contains a 3D axis description as well as a list of Portions and a list of TrackClippedData.

### 3.57.2 ATTRIBUTES

Name	Type	Description
name	string	Reference name of the track
startNode	string	Name of the starting node
endNode	string	Name of the ending node

### 3.57.3 RELATED ELEMENTS

<b>Parent elements</b>	<Tracks>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<RoadElement>, <Intersection>, <SubNetworkJunction>, <BannedLinks>

A start or end track node can have a SubNetworkJunction name or an Intersection name reference.

### 3.57.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<XYCurve>	Description of the XY coordinates	NA ( <i>not applicable</i> )	1
<SZCurve>	Description of the SZ coordinates	NA ( <i>not applicable</i> )	1
<Portions>	Details for portions of the track	NA ( <i>not applicable</i> )	1 or more
<ClippedDatas>	Details for clipped data of the track	NA ( <i>not applicable</i> )	0 or more
<BankingCurve>	Description of the road banking	NA ( <i>not applicable</i> )	1

### 3.57.5 DETAILS

The 3D Axis of a track is defined by:

- A 2D function in the (X, Y) plane: gives the position on a map.
- A 2D function in the (S, Z) space: describes the altitude.

The position along an Axis is given by its abscissa S between 0 and the length of the Track in meter.



### 3.57.5.1 FRAME: SXY, DXY, Z

Frame attached to a Track. This frame is defined by the vectors:

- Sxy : in the XY plane and tangent to the axis of the track.
- Dxy : in the XY and perpendicular to Sxy
- Z, altitude.

### 3.57.5.2 FRAME: X, Y, Z

The Frame X, Y, Z is defined by:

- X horizontal, toward the East.
- Y horizontal, toward the North.
- Z vertical, with its 0 origin at the sea level.

The origin in X, Y and Z value are local to the Sub Network.

### 3.57.6 EXAMPLE

```
<Track endNode="Node" name="Automatic branch 163" startNode="Intersection
57">
  <XYCurve ...>
    ...
  </XYCurve>
  <SZCurve ...>
    ...
  </SZCurve>
  <Portions/>
  ...
  <Portions/>
  <ClippedDatas>
    ...
  </ClippedDatas>
</Track>
```

## 3.58 TRACKS

### 3.58.1 CONCEPTS

The <Tracks> element contains an array of <Track>.

### 3.58.2 RELATED ELEMENTS

<b>Parent elements</b>	<SubNetwork>
<b>Child elements</b>	<Track>
<b>Other</b>	

## 3.59 TRACKCLIP

### 3.59.1 CONCEPTS

The <TrackClip> element declares attributes to describe a position on a track.

A TrackClip is a position along a Track (in the Abscissa, Distance, Elevation frame).

### 3.59.2 ATTRIBUTES

The <TrackClip> element has the following attributes :

Name	Type	Description
abscissa	double	Abcissa in meters
distance	double	Distance to the axis in meters
elevation	double	Elevation in meters
heading	double	Heading in rad
vertical	bool	Tells whether the object is aligned on the vertical or on the normal to the Track

### 3.59.3 RELATED ELEMENTS

The <TrackClip> element relates to the following elements :

<b>Parent elements</b>	<TrackClippedData>
<b>Child elements</b>	None
<b>Other</b>	

### 3.59.4 DETAILS

Frame attached to a Track (Abcissa, Distance, Elevation frame). This frame is defined by the vectors:

- A : tangent to the axis of the track.
- D : in the XY plane and perpendicular to S
- E: Elevation, perpendicular to S and D.

### 3.59.5 EXAMPLE

```
<TrackClippedData name="...">
  <TrackClip abscissa="813.37" distance="5" elevation="0" heading="0"
vertical="1"/>
  <TrackScope .../>
  <RoadSign ...>
    ...
  </RoadSign>
</TrackClippedData>
```

## 3.60 TRACKCLIPPEDDATA

### 3.60.1 CONCEPTS

The <TrackClippedData> element declares attribute and element to describe data attached to the track at a specific abscissa, distance and elevation to the axis.

A TrackClippedData contains different kind of data at a specific position relative to the network. A TrackClippedData is defined by:

- Its data, one or several of :
  - o Road sign
  - o Obstacle
  - o Surface modification
  - o User data
- Its position on a network's Track (a TrackClip)
- Optionally, its scope (a TrackScope)

### 3.60.2 ATTRIBUTES

Name	Type	Description
name	string	Name of the clipped data. This name is unique in a Sub-Network
mass	double	Mass of the object to use in physics engines. -1 for static objects.
sequenceOrientation	double	Heading of the child sequences. Rotation center is the TrackClip position.

### 3.60.3 RELATED ELEMENTS

<b>Parent elements</b>	<ClippedDatas>
<b>Child elements</b>	See the following subsection
<b>Other</b>	<MarkClippedData>

### 3.60.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<TrackClip>	Describe the position on a track	NA ( <i>not applicable</i> )	1
<TrackScope>	Describe a volume along the track	NA ( <i>not applicable</i> )	1
<RoadSign>	Describe a road sign	NA ( <i>not applicable</i> )	0 or 1

<ExternalElement>	Give a path to an external 3D file	NA ( <i>not applicable</i> )	0 or 1
<Obstacle>	Describe an obstacle on the track	NA ( <i>not applicable</i> )	0 or 1
<SurfaceModifier>	Describe local deformation of the road surface (a hump or a pothole)	NA ( <i>not applicable</i> )	0 or 1

### 3.60.5 EXAMPLE

```

<ClippedDatas>
  <TrackClippedData name="Stop 170">
    <TrackClip .../>
    <TrackScope .../>
    <RoadSign ...>
      ...
    </RoadSign>
    <ExternalElement path="..." />
  </TrackClippedData>
  ...
  <TrackClippedData ...>
    ...
  </TrackClippedData>
</ClippedDatas>

```

## 3.61 TRACKSCOPE

### 3.61.1 CONCEPTS

The <TrackScope> element declares attributes to describe a volume along the track.

### 3.61.2 ATTRIBUTES

Name	Type	Description
from	double	Distance in meters, relative to the origin point (the TrackClip position). See Details paragraph for description values.
to	double	Distance in meters, relative to the origin point (the TrackClip position) . See Details paragraph for description values.
left	double	Distance in meters, relative to the origin point (the TrackClip position) . See Details paragraph for description values.
right	double	Distance in meters, relative to the origin point (the TrackClip position) . See Details paragraph for description values.
bottom	double	Distance in meters, relative to the origin point (the TrackClip position) . See Details paragraph for description values.
top	double	Distance in meters, relative to the origin point (the TrackClip position) . See Details paragraph for description values.
way	string	Way description. Values: none direct inverse both

### 3.61.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrackClippedData>
<b>Child elements</b>	None
<b>Other</b>	

### 3.61.4 DETAILS

Attributes "from", "to", "left", "right", "bottom" and "top" are relative to the clipped position, the track origin and the track length.

So, to put a road sign, an obstacle or a surface modifier object at the beginning or at the end of the track, attribute value can be plus or minus infinity.

For example :

```
<TrackScope to="3.40282e+038" top="3.40282e+038" way="3" from="-3.40282e+038" left="-3.40282e+038" right="3.40282e+038" bottom="-3.40282e+038" />
```

Actually, this functionality is used only for cross walk.

---

### 3.61.5 EXAMPLE

The road sign as no scope :

```
<TrackClippedData name="...">
  <TrackClip .../>
  <TrackScope bottom="0" from="0" left="0" right="0" to="0" top="0"
way="inverse"/>
  <RoadSign ...>
    ...
  </RoadSign>
</TrackClippedData>
```

## 3.62 TRAFFICLIGHTANIMATION

### 3.62.1 CONCEPTS

The <TrafficLightAnimation> element declares an attribute and an element to describe a traffic light animation.

### 3.62.2 ATTRIBUTES

Name	Type	Description
roadSign	string	Road sign description

### 3.62.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrafficLightGroup>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.62.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<States>	Array of the TrafficLightStates description for the light animation	NA ( <i>not applicable</i> )	1 or more

### 3.62.5 EXAMPLE

```
<TrafficLightGroup name="...">
  <Animations>
    <TrafficLightAnimation roadSign="Traffic Light 02">
      <States>
        <TrafficLightState timeLength="25">
          <state illumination="off" />
          <state illumination="off" />
          <state illumination="on" />
        </TrafficLightState>
        <TrafficLightState ...>
          ...
        </TrafficLightState>
        ...
        <TrafficLightState ...>
          ...
        </TrafficLightState>
      </Animations>
    </TrafficLightAnimation>
  </States>
  ...
</TrafficLightAnimation ...>
  ...
```

```
</TrafficLightAnimation>  
</Animations>  
</TrafficLightGroup>
```



### 3.63 TRAFFICLIGHTGROUP

#### 3.63.1 CONCEPTS

The <TrafficLightGroup> element declares attribute name to identify the group and elements to specify light animation.

#### 3.63.2 ATTRIBUTES

Name	Type	Description
name	string	Name of the traffic light group

#### 3.63.3 RELATED ELEMENTS

<b>Parent elements</b>	<TrafficLightGroups>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

#### 3.63.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<TrafficLightAnimation>	Animation for the traffic light group	NA ( <i>not applicable</i> )	0 or more

#### 3.63.5 EXAMPLE

```
<TrafficLightGroups>
  <TrafficLightGroup name="Traffic Light Group 1" />
  <TrafficLightGroup name="Traffic Light Group 2" />
  ...
  <TrafficLightGroup name="4 Traffic Lights">
    <Animations>
      ...
    </Animation>
  </TrafficLightGroup>
</TrafficLightGroups>
```

### 3.64 TRAFFICLIGHTGROUPS

#### 3.64.1 CONCEPTS

The <TrafficLightGroups> element declares an array of < TrafficLightGroup>.

#### 3.64.2 ATTRIBUTES

Name	Type	Description
name	string	Name of the traffic light group

### 3.64.3 RELATED ELEMENTS

Parent elements	<SubNetwork>
Child elements	<TrafficLightGroups>
Other	

## 3.65 TRAFFICLIGHTSTATE

### 3.65.1 CONCEPTS

The <TrafficLightState> element declares an attribute and elements to describe a state for a road sign.

### 3.65.2 ATTRIBUTES

Name	Type	Description
timeLength	double	Time duration of the state

### 3.65.3 RELATED ELEMENTS

<b>Parent elements</b>	<States>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.65.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<State>	The state for the road sign.	NA ( <i>not applicable</i> )	1 or more

## 3.66 UVMAPPING

### 3.66.1 CONCEPTS

The <UVMapping> element declares attributes to use a texture on a surface.

### 3.66.2 ATTRIBUTES

Name	Type	Description
LeftU	double	The left U coordinate of the texture
lengthV	double	The length V of the texture in meters
rightU	double	The right U coordinate of the texture

### 3.66.3 RELATED ELEMENTS

<b>Parent elements</b>	<Marking>, <Lane>, <Decoration>
<b>Child elements</b>	none
<b>Other</b>	

### 3.66.4 EXAMPLE

```
<Marking ...>
  <Material ...>
    ...
  </Material>
  <UVMapping leftU="0" lengthV="10" rightU="1"/>
</Marking>

<Lane...>
  <VehicleType ...>
  <Material ...>
    ...
  </Material>

  <UVMapping leftU="1" lengthV="5" rightU="0"/>
</Lane>
```

## 3.67 VECTORD2

### 3.67.1 CONCEPTS

The <Vectord2> element declares (x, y) attributes for representation of a 2 dimension vector in double.

### 3.67.2 ATTRIBUTES

Name	Type	Description
x	Double	The x value.
y	Double	The y value.

### 3.67.3 RELATED ELEMENTS

<b>Parent elements</b>	<PolyLine>
<b>Child elements</b>	None
<b>Other</b>	

### 3.67.4 EXAMPLE

```
<XYCurve direction="1.60562" x="184.076" y="102.512">
  <PolyLine endHeading="0" type="spline">
    <Vectord2 x="24.0416" y="0" />
    ...
    <Vectord2 x="369.609" y="-572.174" />
    <Vectord2 x="361.748" y="-594.427" />
    ...
    <Vectord2 x="290.829" y="-560.612" />
  </PolyLine>
  <Segment length="21.0061" />
</XYCurve>
```

## 3.68 VEHICLETYPE

### 3.68.1 CONCEPTS

The <VehicleType> element declares attribute to define specific categories of vehicle.

### 3.68.2 ATTRIBUTES

Name	Type	Description
categories	string	Allowed vehicles. See Details paragraph to view different values of categories attribute.
height	double	Height limitation, in meter
length	double	Length limitation, in meter
weight	double	Weight limitation, in gram
trailedWeight	double	Trailed weight limitation, in gram
weightPerAxle	double	Weight per axle limitation, in gram
width	double	Width limitation, in meter

### 3.68.3 RELATED ELEMENTS

<b>Parent elements</b>	<Lane>, <RoadSign>
<b>Child elements</b>	None
<b>Other</b>	

### 3.68.4 DETAILS

The value of categories attribute may be a combination of the following values separated by a comma.

Value	Comment
pedestrian	
bicycle	
moped	
motorcycle	
car	
trail	
caravan	
bus	
agricultural vehicle	
goods transport	

polluting transport	
dangerous transport	
nailed tires	
truck	
tramway	
train	

### 3.68.5 EXAMPLE

```

<RoadSign ...>
  <VehicleType
categories="pedestrian,bicycle,moped,motorcycle,car,trail,caravan,bus,agric
ultural vehicle,goods transport,polluting transport,dangerous
transport,nailed tires,truck,tramway,train" height="3.4" length="12"
trailedWeight="-1" weight="-1" weightPerAxle="-1" width="-1"/>
  <Light .../>
  ...
  <Light .../>
</RoadSign>

```

## 3.69 XYCURVE

### 3.69.1 CONCEPTS

The <XYCurve> element declares attributes and elements to define the xy composition of the track.

### 3.69.2 ATTRIBUTES

Name	Type	Description
direction	Double	The orientation the starting point
x	Double	The x coordinate of the starting point
y	Double	The y coordinate of the starting point

### 3.69.3 RELATED ELEMENTS

<b>Parent elements</b>	<Track>
<b>Child elements</b>	See the following subsection
<b>Other</b>	

### 3.69.4 CHILD ELEMENTS

Name	Description	Default	Occurrences
<Segment>	Segment part of the curve.	NA ( <i>not applicable</i> )	0 or more
<CircleArc>	Arc of circle part of the curve.	NA ( <i>not applicable</i> )	0 or more
<ClothoArc>	Clothoid part of the curve.	NA ( <i>not applicable</i> )	0 or more
<PolyLine>	Pecked line part of the curve.	NA ( <i>not applicable</i> )	0 or more

### 3.69.5 EXAMPLE

```
<XYCurve direction="1.60562" x="184.076" y="102.512">
  <Segment length="9.99919" />
  <ClothoArc endCurvature="0" length="23.6003" startCurvature="0.0567661" />
  <CircleArc curvature="0.0136479" length="116.235" />
  <ClothoArc endCurvature="0" length="30.4138" startCurvature="0.0365034" />
  <PolyLine endHeading="0" type="segment">
    <Vectord2 x="24.0416" y="0" />
    <Vectord2 x="128.693" y="33.9411" />
    <Vectord2 x="159.265" y="29.6569" />
    <Vectord2 x="296.07" y="-577.832" />
  </PolyLine>
</XYCurve>
```



```
<Vectord2 x="290.829" y="-560.612" />
</PolyLine>
<Segment length="21.0061" />
<ClothoArc endCurvature="0.0132956" length="30.4583" startCurvature="0" />
<CircleArc curvature="0.0116691" length="85.5453" />
<ClothoArc endCurvature="-0.00114273" length="30.4628"
startCurvature="0.0116691" />
<Segment length="87.8469" />
</XYCurve>
```