railML® Use Case Definition
Network Statement

Abbreviation	NEST
Implementation	railML® 3.1 (release: 19.02.2019)
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Author	Christian Rahmig

Revision History

Version	Date	Description	Author
0.1	27.06.2015	Initial Version	Christian Rahmig
0.2	13.03.2018	Updating element specification	Christian Rahmig
0.3	03.04.2018	Updating schema implementation	Christian Rahmig
0.4	14.11.2018	updating according railML 3.1 release candidate schema	Christian Rahmig
0.5	05.12.2018	revision after schema refactoring	Christian Rahmig
0.6	08.02.2019	updating according railML 3.1 RC2 schema	Christian Rahmig
1.0	19.02.2019	First release of use case NEST	Christian Rahmig

1 Informal Use Case Description

The Network Statement covers the requirements for access and use of the rail network (route network) of the infrastructure manager. It provides all the technical and operational information that is necessary for entities entitled to access the network and use track capacity to carry out their rail traffic services and operate their rollingstock on the rail network.

1.1 Data Flows and Interfaces

The infrastructure managers are responsible for exporting all the required data.

1.2 Data Characterization

This section serves to specify the required data regarding certain aspects.

How often do the data change (update)?

- Static (not changing)
- Yearly

How big are the data fragments to be exchanged (complexity)?

- big (station/yard)
- huge (region)
- whole data set (network)

Which views are represented by the data (focus)?

- Geometry
- Construction
- Railway Operation

Which specific data do you expect to receive/send (elements)?

- Infrastructure:
    - Topology: Lines + operational points
    - Geometry: curve radius, slope, superelevation
    - Signalling: train radio, communication system
    - Electrification: voltage, frequency, contact line type
    - Rails: track gauge, clearance gauge, switches, crossings
    - Operational Points: name, type, service facilities

2 Schema Implementation

2.1 Sub-schema References

The implementation of the NEST use case is based on elements of the following railML® sub-schemas:

- Common
- Infrastructure

2.2 Element Classification

This section serves to list all the railML® elements that are required for the implementation of the NEST use case. For all the related sub-schemas the listing is done using tables in the following structure:

{Topic}		
{mandatory element/@attribute}	**m**	{Description}
{optional element/@attribute}	**o**	{Description}

Mandatory elements have to be provided by an export interface and have to be understood by an import interface. Optional elements are recommended for export and import interfaces.

2.2.1 Common

The following tables contain the railML® common elements required for the NEST use case:

Common		
electrificationSystems	**m**	The electrification system infrastructure shall be described by its basic electrification parameters.
organizationalUnits	**m**	At least all involved infrastructure managers owning parts of the described railway network shall be listed.
speedProfiles	**o**	If the speeds modelled along the tracks of the described railway network are not the same for all the various train types and other circumstances, these different circumstances need to be provided in form of different speed profiles.
positioning	**m**	The element <positioning> includes all positioning systems that are used by element coordinates.

2.2.1.1 Electrification Systems

electrificationSystems		
electrificationSystem	**m**	At least one <electrificationSystem> has to be provided.

electrificationSystem		
@id	**m**	The ID must be unique in the whole railML file.
@voltage	**m**	The voltage shall be given in Volts.

@frequency	m	The frequency shall be given in Hertz.

2.2.1.2 Organizational Units

organizationalUnits		
infrastructureManager	m	The infrastructure manager who owns at least some part of the described railway network shall be named by their infrastructure manager code (reference to codelist InfrastructureManagers.xml.

infrastructureManager		
@id	m	The ID must be unique in the whole railML file.
@code	m	Insert the infrastructure manager code as listed in the codelist *InfrastructureManagers.xml*.

2.2.1.3 Speed Profiles

speedProfiles		
speedProfile	m	At least one <speedProfile> has to be provided.

speedProfile		
tilting	o	If the speed profile depends on the train's ability of tilting, this child element has to be defined.
load	o	If the speed profile depends on the train's load capabilities, this child element has to be defined.
braking	o	If the speed profile depends on the train's braking configuration, this child element has to be defined.
trainType	o	If the speed profile depends on the train type, this child element has to be defined.
@id	m	The ID must be unique in the whole railML file.
@influence	m	Specify whether the speed profile is an increasing or decreasing one.

trainType		
@type	m	Specify the train type: freight or passenger
@etcsTrainCategoryNumber	m	Specify the train category according to ETCS definition

2.2.1.4 Positioning

positioning		
geometricPositioningSystems	m	There shall be at least one <geometricPositioningSystem> for defining the WGS84 coordinates of the operational points.
linearPositioningSystems	m	There shall be at least one <linearPositioningSystem> for defining the mileage or kilometers along the railway line.

geometricPositioningSystems		
geometricPositioningSystem	m	At least one <geometricPositioningSystem> has to be provided.

geometricPositioningSystem		
isValid	m	Definition of the time period when the positioning system is valid defined by dates for begin and/or end of validity
@id	m	The ID must be unique in the whole railML file.
@crsDefinition	m	The geometric positioning system shall be identified by its EPSG code to be found in this attribute.

isValid		
from	o	If the time period starts at a certain day, this day need to be defined via attribute @from.
to	o	If the time period ends at a certain day, this day need to be defined via attribute @to.

linearPositioningSystems		
linearPositioningSystem	m	At least one <linearPositioningSystem> has to be provided.

linearPositioningSystem		
name	o	It is recommended to provide a human readable name for the linear positioning system in a relevant language and eventually with additional descriptions.
isValid	m	Definition of the time period when the positioning system is valid defined by dates for begin and/or end of validity
anchor	m	All mileage changes and other mileage anomalies shall be modelled using <anchor> elements.
@id	m	The ID must be unique in the whole railML file.
@units	m	Mileage shall be given in meters.
@startMeasure, @endMeasure	m	Mileage shall be given in meters with one digit after the comma.

isValid		
from	o	If the time period starts at a certain day, this day need to be defined via attribute @from.
to	o	If the time period ends at a certain day, this day need to be defined via attribute @to.

anchor		
@id	m	The ID must be unique in the whole railML file.
@measure	m	This is the actual (incoming) mileage value of the mileage change given in meters.
@measureToNext	m	The distance from this mileage change until the next <anchor> point or until the end of the <netElement>.

2.2.2 Infrastructure

The following tables contain the railML® infrastructure elements required for the NEST use case:

infrastructure		
topology	m	The topology of the described railway network has to be given.
geometry	m	The geometry of the described railway network has to be given in terms of horizontal curves and gradient curves.
functionalInfrastructure	m	The functional infrastructure includes all elements that form the operational railway infrastructure network.
infrastructureStates	o	It is recommended to provide the state of the infrastructure in order to specify the time span when the described functional infrastructure is available.

2.2.2.1 Topology

topology		
netElements	m	<netElement> objects have to be given at least for mesoscopic (line section) and macroscopic (line) level.
netRelations	m	<netRelation> objects habe to be defined for connecting the mesoscopic level <netElement> objects.
networks	m	The <network> shall contain at least two child elements <level> for describing the mesoscopic and macroscopic railway network on line section level and line level.

netElements		
netElement	m	At least one <netElement> has to be provided.

netElement		
associatedPositioningSystem	m	The associated positioning system defines the reference positioning system, which provides a spatial dimension to the topology element
@id	m	The ID must be unique in the whole railML file.
@length	o	It is recommended that for <netElement> objects representing tracks or line sections that have a specified physical length, this length shall be provided.

associatedPositioningSystem		
intrinsicCoordinate	m	The associated positioning system contains at least one <intrinsicCoordinate> providing a reference to a specific geometric (e.g. WGS84) or linear (e.g. mileage) coordinate.
@id	m	The ID must be unique in the whole railML file.

intrinsicCoordinate

***Coordinate**	m	
@id	m	The ID must be unique in the whole railML file.
@intrinsicCoord	m	The value is “0” for non-linear <netElement> and between “0” and “1” for linear <netElement> objects.

***Coordinate**		
@positioningSystemRef	m	reference to the geometric or linear positioning system
@measure	o	(required if linear coordinate) measure of linear mileage in meters.
@x	o	(required if geometric coordinate) value in x dimension
@y	o	(required if geometric coordinate) value in y dimension

netRelations		
netRelation	m	At least one <netRelation> has to be provided.

netRelation		
elementA	m	the reference to <netElement> at the begin of the <netRelation> has to be given
elementB	m	the reference to <netElement> at the end of the <netRelation> has to be given
@id	m	The ID must be unique in the whole railML file.
@positionOnA	m	intrinsic coordinate on <netElement> referenced by <elementA> (0 or 1) has to be given
@positionOnB	m	intrinsic coordinate on <netElement> referenced by <elementB> (0 or 1) has to be given
@navigability	m	the navigability has to be provided for each <netRelation>

elementA		
@ref	m	reference to <netElement> at the begin of the <netRelation> has to be given

elementB		
@ref	m	reference to <netElement> at the end of the <netRelation> has to be given

networks		
network	m	At least one <network> has to be provided.

network		
level	m	The <network> shall contain at least two child elements <level> for describing the mesoscopic and macroscopic railway network on line section level and line level.
@id	m	The ID must be unique in the whole railML file.

level		
networkResource	m	This repeatable child element is used to reference all the topology network resources (netElement,

		netRelation) that belong to this topology level.
@id	m	The ID must be unique in the whole railML file.
@descriptionLevel	m	There shall be at least two instances of <level>: one with @descriptionLevel=”Meso” and one with @descriptionLevel=”Macro”.

2.2.2.2 Geometry

geometry		
horizontalCurves	o	It is recommended to describe the line / line section layout by horizontal curves.
gradientCurves	m	The gradient profile of a line shall be given per direction.

horizontalCurves		
horizontalCurve	m	At least one <horizontalCurve> has to be provided.

horizontalCurve		
***Location**	m	It is recommended to locate geometry curves as linear elements within the topology network.
@id	m	The ID must be unique in the whole railML file.
@curveType	m	The type of the horizontal curve shall be defined using this attribute.
@azimuth	o	If the horizontal curve has a constant azimuth (heading), it is recommended to define the azimuth in degrees using this attribute.
@deltaAzimuth	o	If the horizontal curve has a changing azimuth (heading), it is recommended to define the changing azimuth in degrees using this attribute.
@radius	o	If the horizontal curve has a changing heading, it is recommended to define the radius of the curve in meters using this attribute.

gradientCurves		
gradientCurve	m	At least one <gradientCurve> has to be provided.

gradientCurve		
***Location**	m	It is recommended to locate geometry curves as linear elements within the topology network.
@id	m	The ID must be unique in the whole railML file.
@curveType	m	The type of the gradient curve shall be defined using this attribute.
@gradient	o	If the gradient curve has a constant gradient (slope), it is strongly recommended to define the gradient in per mille using this attribute.
@deltaGradient	o	If the gradient curve has a changing gradient (slope), it is strongly recommended to define the changing gradient in per mille using this attribute.

@radius	o	If the gradient curve has a changing gradient (slope), it is recommended to define the radius of the curve in meters using this attribute.

2.2.2.3 Functional Infrastructure

functionalInfrastructure		
borders	m	Borders between infrastructure manager responsibilities shall be modelled as well as national borders
electrifications	m	The elementary electrification parameters (and changes of them) shall be given for the complete line
levelCrossingsIS	o	It is recommended to provide elementary information about existence of level crossings along the line
lines	m	All lines and line sections that are relevant for describing the mesoscopic railway line network shall be given.
loadingGauges	m	The allowed loading gauges have to be defined for each line.
operationalPoints	m	The operational points that connect the different lines and line sections in the mesoscopic railway network have to be provided.
overCrossings	m	All over crossings that are connected with constraints on operating the modelled railway line or line section have to be mentioned with their location and constraints.
platforms	m	Platforms along the line and line sections or within the operational points have to be given with their usable length.
restrictionAreas	m	All restriction areas that are connected with constraints on operating the modelled railway line or line section have to be mentioned with their location and constraints.
serviceSections	m	Service sections have to be defined with their location and available services for all operational points along the line.
speeds	m	The speed profile of the line has to be provided for each driving direction. This includes references to the constraints for specific validity.
tracks	m	The number and usable length of all available tracks within an operational point have to be given.
trackGauges	m	The track gauge has to be defined for the whole railway line and line section network.
trainDetectionElements	o	It is recommended to define the equipment of the line or line section with train detection systems.
trainRadios	m	The train radio system has to be specified for the line and line sections w.r.t. available radio services.
underCrossings	m	All under crossings that are connected with constraints on operating the modelled railway line or line section

		have to be mentioned with their location and constraints.
weightLimits	m	All weight limits that affect railway line or line section operation have to be mentioned with their location and constraints.

2.2.2.3.1 Borders

borders		
border	m	At least one <border> has to be provided.

border		
***Location**	m	Border points have to be located by the geographic coordinates (e.g. WGS84) of their center point.
name	m	Border point names shall be provided in all languages of the connected railway network countries.
markedByInfrastructureElement	o	It is recommended to reference elements of functional infrastructure that mark the border point.
@id	m	The ID must be unique in the whole railML file.
@isOpenEnd	m	Please specify if the border point connects to “terra incognita”.
@type	m	Please specify the border type.
@externalRef	o	It is recommended to provide the external identifier that allows to reference information about the “terra incognita” behind this open end.

2.2.2.3.2 Electrifications

electrifications		
electrificationSection	m	At least one <electrificationSection> has to be provided.

electrificationSection		
***Location**	m	Electrification properties have to be defined for each line and line section.
electrificationSystemRef	m	The referenced electrification system is defined in <common> schema and provides basic electrification system information.
energyCatenary	m	With respect to catenary parameters the maximum train current shall be defined for the railway line.
energyPantograph	o	It is recommended to provide information about the pantograph properties of the electrification.
energyRollingstock	o	It is recommended to provide information about the rollingstock related electrification properties.
hasContactWire	o	It is recommended to provide information about the contact wire details.
pantographSpacing	o	It is recommended to provide information about the

		pantograph spacing properties.
phaseSeparationSection	o	It is recommended to provide information about the phase separation properties.
systemSeparationSection	o	It is recommended to provide information about the system separation properties.
@id	m	The ID must be unique in the whole railML file.
@contactLineType	m	The type of electrification contact line has to be specified.

electrificationSystemRef		
@ref	m	The referenced electrification system is defined in <common> schema and provides basic electrification system information.

energyCatenary		
maxTrainCurrent	m	The maximum current accessible in the electrification section shall be defined.
@allowsRegenerativeBreaking	o	It is recommended to indicate whether regenerative breaking is allowed in this electrification section.

maxTrainCurrent		
@maxCurrent	m	Please define the maximum allowed current in Ampere.
@trainType	o	If the maximum train current depends on the type of train, please provide this train type information.
@operationType	m	Specify whether the maximum train current is given for driving or standing trains.
@validFor	m	Specify whether the maximum train current is given for a single pantograph or the whole train.

energyPantograph		
@requiresTSIcompliance	m	Specify whether a TSI compliant pantograph head is required.

hasContactWire		
@minHeight	m	Specify the minimum height of the contact wire above top of rail.
@maxHeight	m	Specify the maximum height of the contact wire above top of rail.
@maxDisplacement	m	Specify the maximum lateral displacement of the contact wire from center of track.

2.2.2.3.3 Level Crossings

levelCrossingsIS		
levelCrossingIS	m	At least one <levelCrossingIS> has to be provided.

levelCrossingIS		
***Location**	o	The existence of level crossings along the railway line

		may be indicated by an area location.
protection	o	If level crossing elements are provided, it is recommended to indicate whether these level crossings are actively protected (have technical protection systems apart from saltire)
@id	m	The ID must be unique in the whole railML file.

protection		
@hasActiveProtection	m	Set true if the level crossing is actively protected (has technical protection systems apart from saltire).

2.2.2.3.4 Lines

lines		
line	m	At least one <line> has to be provided.

line		
***Location**	m	The railway line shall be located in the topology network and further shall be connected with the traditional railway line coordinate system (mileage)
name	m	The name of the railway line has to be provided.
designator	m	The line can be specified by a designator or line code that is known in some external register.
beginsInOP	o	It is recommended to explicitly reference the operational point where the line section begins.
endsInOP	o	It is recommended to explicitly reference the operational point where the line section ends.
length	o	It is recommended to provide the (physical) length of the railway line or line section.
lineTrafficCode	m	Please specify the railway line by its traffic code as defined in TSI INF section 4.2.1. There should be one code for each type of traffic (passenger, freight) allowed on that line
lineCombinedTransportCode	m	Please specify the railway line by its combined transport code as defined in UIC Code 596-6.
lineLayout	m	The line layout shall be specified for the whole line in terms of number of tracks.
linePerformance	m	The line performance defines basic rules and constraints for the railway operation on that line.
@id	m	The ID must be unique in the whole railML file.
@infrastructureManagerRef	m	The infrastructure manager that is responsible for the operation on that line has to be referenced.
@lineCategory	m	The category of the line according to the EU regulation EN 15528 (A, B1, B2, C2, ..., E5; other national values are also possible) has to be given
@lineType	m	Please specify whether the line is a main line or a branching line.
@belongsToParent	o	If the line is only a line segment and belongs to a

		(parent) line, it is recommended to reference this parent line

lineLayout		
@maxGradient	o	It is recommended to provide a maximum value for the gradient occurring on that line.
@numberOfTracks	m	Please specify the number of tracks that belong to this line: most common values are “double” and “single”.
@minRadius	o	It is recommended to provide a value for the minimum radius of curves occurring on that line.

linePerformance		
allowedLoadingGauge	m	Please specify the loading gauges that are allowed on the railway line. Reference to the loading gauge element.
allowedWeight	m	Please specify the maximum axle load or meterload that is allowed on the railway line. Reference to the weight limit element.
@maxSpeed	o	It is recommended to define the maximum allowed speed on the railway line in km/h.
@maxTrainLength	m	Please specify the maximum length of trains (in meters) that can operate on the railway line.
@usablePlatformLength	o	It is recommended to define the minimum platform length that can be expected at each equipped operational point of the railway line.

lineCombinedTransportCode		
@wagonCompatibilityCode	m	Specify the type of combined transport train: P or C
@profileNumber	m	Specify the standard combined transport profile number (2 or 3 digits)

lineTrafficCode		
@maxGradient	o	It is recommended to provide a maximum value for the gradient occurring on that line.
@numberOfTracks	m	Please specify the number of tracks that belong to this line: most common values are “double” and “single”.
@minRadius	o	It is recommended to provide a value for the minimum radius of curves occurring on that line.

2.2.2.3.5 Loading Gauges

loadingGauges		
loadingGauge	m	At least one <loadingGauge> has to be provided.

loadingGauge		
***Location**	o	If the loading gauge is not referenced by the line or line section, it is recommended to locate the loading gauge element on the railway topology network.

@id	m	The ID must be unique in the whole railML file.
@code	m	The loading gauge has to be provided for the railway line (see codelist TrainClearanceGauges.xml).

2.2.2.3.6 Operational Points

operationalPoints		
operationalPoint	m	At least one <operationalPoint> has to be provided.

operationalPoint		
name	m	Each operational point shall be specified by an (operational or traffic) name.
***Location**	m	Each operational point shall be located by the geographic coordinates of its center point. Additionally, operational points have to be located in the topology network, where they are connected with the line and line section elements.
designator	m	Each operational point shall be specified by at least one designator that represents a common abbreviation or identification code of the operational point in an external register.
infrastructureManagerRef	m	The infrastructure manager that operates the operational point has to be referenced.
connectedToLine	m	The lines that have this operational point as end point or as station point in between, have to be referenced by the operational point.
limitedByBorder	o	It is recommended to reference the borders of the operational point.
opEquipment	m	At minimum, the number of available station tracks has to be provided for each operational point.
opOperations	m	The type of operation and type of traffic have to be defined for each operational point.
@id	m	The ID must be unique in the whole railML file.
@timezone	o	It is recommended to provide the timezone that is relevant for the railway operation in this operational point.
@belongsToParent	o	If the operational point is a part of another (parent) operational point, it is recommended to reference this parent OP here.

opEquipment		
ownsPlatform	o	It is recommended to reference the platforms and platform edges (if defined) from the operational point.
ownsTrack	o	It is recommended to reference the tracks (if defined) from the operational point.
ownsServiceSection	o	It is recommended to reference the service sections (if defined) from the operational point.
@numberOfStationTracks	m	Please specify the number of station tracks that are available in the operational point.

opOperations		
opOperation	**m**	At least one <opOperation> has to be provided.

opOperation		
@operationalType	**m**	Please specify the operational point by the type of operations taking place.
@trafficType	**m**	Please specify the operational point by the type of traffic that occurs there.

2.2.2.3.7 Over Crossings

overCrossings		
overCrossing	**m**	At least one <overCrossing> has to be provided.

overCrossing		
***Location**	**m**	The existence of over crossings along the railway line may be indicated by an area location.
allowedLoadingGauge	**m**	Please provide the reference to the loading gauge elements that define allowed loading gauges w.r.t. this over crossing.
length	**o**	If over crossings are defined on element basis, it is recommended to provide also their (physical) length in meters.
@id	**m**	The ID must be unique in the whole railML file.
@verbalConstraint	**o**	In case of existing further constraints on the operation w.r.t. this over crossing, these constraints can be verbally formulated here.

2.2.2.3.8 Platforms

platforms		
platform	**m**	At least one <platform> has to be provided.

platform		
***Location**	**m**	Platform edges shall be located in the operational points. Thus, they should have at least a spot location on the relevant meso or macro NetElement.
name	**m**	Platforms and platform edges shall be identified by their operational names.
ownsPlatformEdge	**o**	If platform edges are provided, it is recommended to specify their linking with the platform element that they belong to.
length	**o**	If platform edges are provided, it is recommended to define also their (physical or usable) length(s).
@id	**m**	The ID must be unique in the whole railML file.
@height	**o**	If platform edges are provided, it is recommended to

		define also their height in meters.

2.2.2.3.9 Restriction Areas

restrictionAreas		
restrictionArea	**m**	At least one <restrictionArea> has to be provided.

restrictionArea		
***Location**	**m**	For areas defining certain restrictions on operation on the railway line, their (linear or area) position in the line and line section railway network shall be given.
@id	**m**	The ID must be unique in the whole railML file.
@type	**m**	The type of operational restriction that applies in that area has to be defined.

2.2.2.3.10 Service Sections

serviceSections		
serviceSection	**m**	At least one <serviceSection> has to be provided.

serviceSection		
***Location**	**m**	Service sections shall have a location in the operational point where they belong to. Thus, they should have at least a spot location referencing the relevant NetElement.
@id	**m**	The ID must be unique in the whole railML file.
@{service}	**o**	It is recommended to specify the specific services that are available in the service section by setting the related Boolean attribute to TRUE.

2.2.2.3.11 Speeds

speeds		
speedSection	**m**	At least one <speedSection> has to be provided.

speedSection		
***Location**	**m**	Speed sections defining areas with a maximum allowed speed shall be located at least on line and line section level (linear location). If the speed depends on the driving direction, the speed sections have to be defined for each driving direction.
validForSpeedProfile	**m**	The speed section has to be referenced with at least one speed profile that defines a set of train or route specific parameters, e.g. train category.
@id	**m**	The ID must be unique in the whole railML file.
@maxSpeed	**m**	For every speed section the allowed maximum speed

		has to be provided in km/h.

2.2.2.3.12 Tracks

tracks		
track	**m**	At least one <track> has to be provided.

track		
name	**m**	The track shall be identified by its operational or traffic name.
***Location**	**o**	Station tracks shall be referenced with the operational point where they belong to. This can be either done by referencing the tracks from the operational point via <opEquipment> or by locating the track element with a spot location on the relevant meso or macro NetElement.
trackBegin	**o**	If needed, a specific infrastructure element (switch, buffer stop, etc.) representing the begin of the track, can be provided.
trackEnd	**o**	If needed, a specific infrastructure element (switch, buffer stop, etc.) representing the end of the track, can be provided.
length	**m**	The usable length of the station tracks have to be provided for each driving direction.
@id	**m**	The ID must be unique in the whole railML file.
@type	**m**	The type of the track has to be given to distinguish between main, secondary, connecting and siding tracks.
@infrastructureManagerRef	**o**	The infrastructure manager that operates the track has to be provided. If the track belongs to an operational point for which the same operating infrastructure manager has already been defined, the information should not be given again.
@mainDirection	**o**	It is recommended to define the main direction of operation on the track.

2.2.2.3.13 Track Gauges

trackGauges		
trackGauge	**m**	At least one <trackGauge> has to be provided.

trackGauge		
***Location**	**o**	The track gauge has to be given for the whole line and line section network. If the track gauge is not referenced directly from the line element, its (linear or area) location on the relevant meso or macro topology level has to be given.
@id	**m**	The ID must be unique in the whole railML file.

@value	m	The track gauge has to be provided in meters.

2.2.2.3.14 Train Detection Elements

trainDetectionElements		
trainDetectionElement	m	At least one <trainDetectionElement> has to be provided.

TrainDetectionElement		
***Location**	m	The train detection system that is installed on the railway line, shall be located as linear or area location on meso or macro topology level.
@id	m	The ID must be unique in the whole railML file.
@type	m	The type of installed train detection system shall be given.

2.2.2.3.15 Train Radios

trainRadios		
trainRadio	m	At least one <trainRadio> has to be provided.

trainRadio		
***Location**	m	The installed train radio system shall be referenced with the meso or macro topology level NetElements forming the line and line section railway network.
@id	m	The ID must be unique in the whole railML file.
@radioSystem	m	The type of train radio system shall be given.
@supportsBroadcastCalls	o	It is recommended to specify whether the installed train radio system supports broadcast calls.
@supportsDirectMode	o	It is recommended to specify whether the installed train radio system supports direct mode.
@supportsPublicEmergency	o	It is recommended to specify whether the installed train radio system supports emergency calls via the public network.
@supportsPublicNetworkRoaming	o	It is recommended to specify whether the installed train radio system supports roaming via the public network.
@supportsTextMessageService	o	It is recommended to specify whether the installed train radio system supports text message service.
@networkSelection	o	It is recommended to specify whether the installed train radio system supports automatic network selection.

2.2.2.3.16 Under Crossings

underCrossings		
underCrossing	m	At least one <underCrossing> has to be provided.

underCrossing		
***Location**	m	The existence of under crossings along the railway line may be indicated by an area location.
allowedWeightLimit	m	Please provide the reference to the weight limit elements that define constraints on the axle load and meterload w.r.t. this under crossing.
length	o	If under crossings are defined on element basis, it is recommended to provide also their (physical) length in meters.
@id	m	The ID must be unique in the whole railML file.
@verbalConstraint	o	In case of existing further constraints on the operation w.r.t. this under crossing, these constraints can be verbally formulated here.

2.2.2.3.17 Weight Limits

weightLimits		
weightLimit	m	At least one <weightLimit> has to be provided.

weightLimit		
***Location**	m	Weight limits defining maximum axle loads and meterloads shall be located on line and line section level using linear or area locations.
@id	m	The ID must be unique in the whole railML file.
@axleLoad	m	The maximum axle load has to be given in tons.
@meterLoad	m	The maximum meterload has to be given in tons per meter.

2.2.2.4 Infrastructure States

infrastructureStates		
infrastructureState	m	At least one <infrastructureState> has to be provided.

infrastructureState		
validityTime	m	The infrastructure state has to be linked with at least one time span or time period defining its temporal validity.
elementState	o	If there are several infrastructure states defined, it is recommended to reference all functional infrastructure element (and their states) that are included in this infrastructure (state).
@id	m	The ID must be unique in the whole railML file.
@value	m	The infrastructure type of state has to be provided.

elementState		
validityTime	m	The infrastructure element state has to be linked with at least one time span or time period defining its

		temporal validity.
@id	m	The ID must be unique in the whole railML file.
@refersToElement	m	Reference to the infrastructure element for which the state is provided.
@value	m	The infrastructure element type of state has to be provided.

2.2.3 Interlocking

No elements required.

2.2.4 Timetable

No elements required.

2.2.5 Rollingstock

No elements required.

3 Additional Remarks

No entries

4 References

[1] railML.org Wiki: *Use case Network Statement*. In: https://wiki.railml.org/index.php?title=UC:IS:NetworkStatement; last access: 19.02.2019

[2] RailNetEurope: *Network Statement Common Structure*. In: http://www.rne.eu/rneinhalt/uploads/2017/05/RNE_NS_Common_Structure.pdf; last access: 19.02.2019