



railML.org

Timetable Scheme  
railML® 3.2

39th railML® Conference – April 21st 2021

# Agenda

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## railML timetable 3.2 Development

- Use Case
- Approach
- Current Modelling

# Timetable 3.2 Development – Use Case

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- ITMS use case
  - Driven mainly by requirements of Thales
  - Detailed timetable
    - Links to Mesoscopic/Microscopic infrastructure
    - Links to rolling stock
  - Planning scope
    - Yearly (full data transfer)
    - Daily (full data transfer)
    - Adhoc (partial data transfer)
  - Connections
    - For passengers and crew

## Timetable 3.2 Development – Approach

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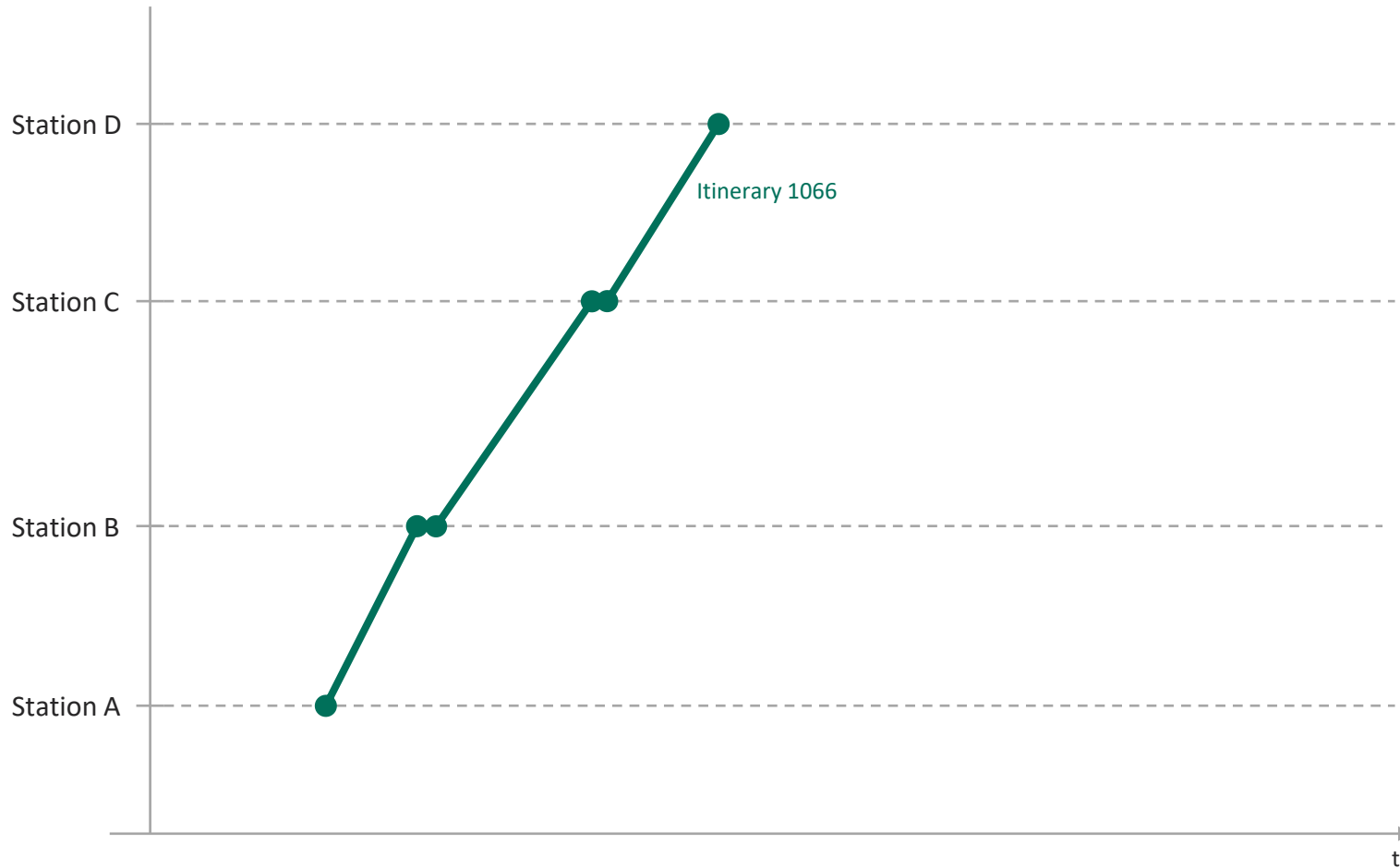
- Community driven
- Development in developer meetings
  - Due to Covid-19 virtual ones
- Transparency
  - Publishing of progress in forum
  - Discussions of modelling details in forum
  - Cloud
- Development using EA 15.2 (like IS and IL)
- Feel free to join and contribute

## Timetable 3.2 Development – Current Modelling

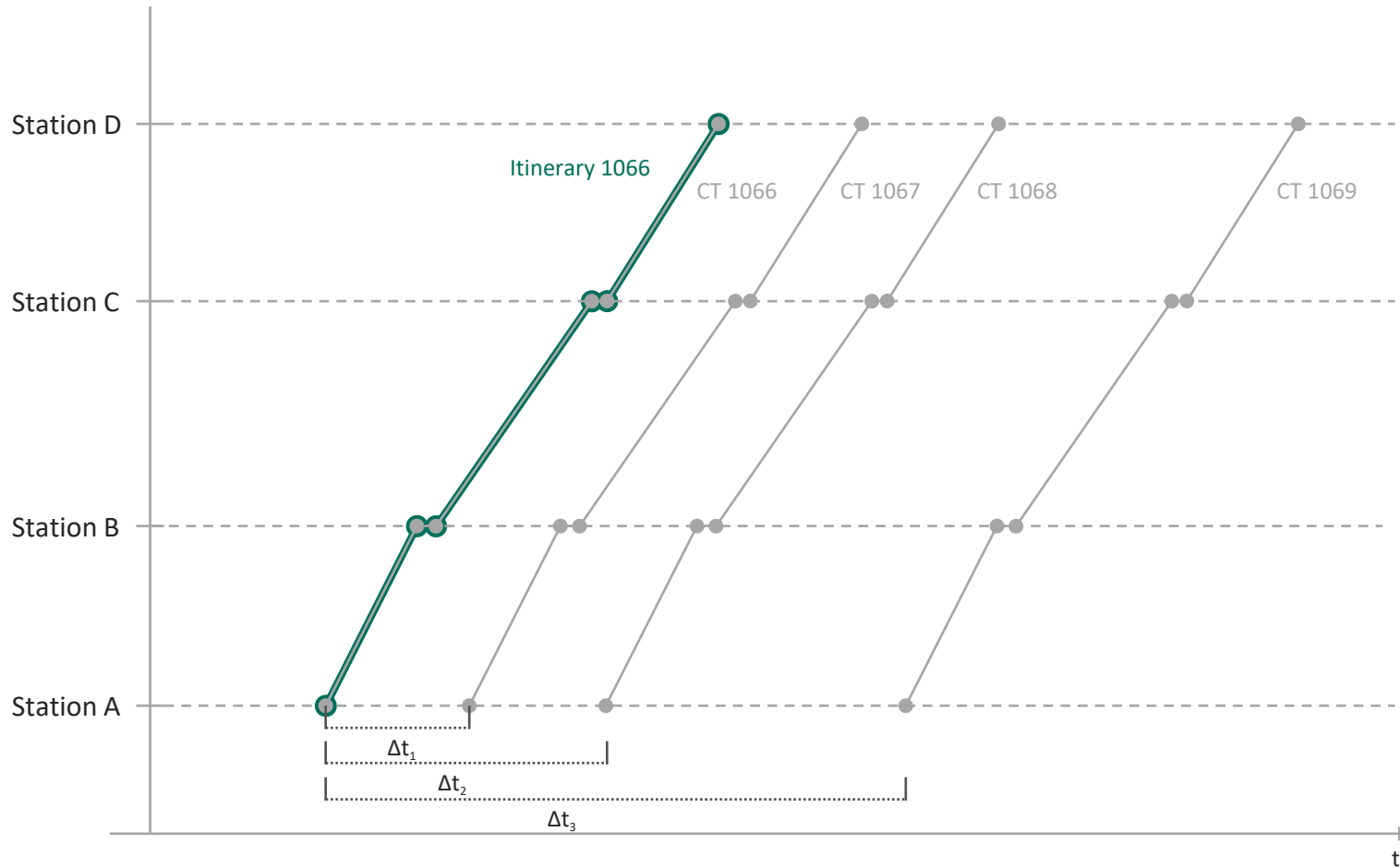
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- Modelling of commercial and operational trains published as preview in forum:  
<https://www.railml.org/forum/index.php?t=msg&th=703&start=0&>
- General approach:
  - Definition of itineraries
  - Reference of these by operational as well as commercial trains
  - Definition of mapping between operational and commercial trains
- Benefits:
  - Less redundant
  - Easy to specify regular train runs (e.g. one train every hour)

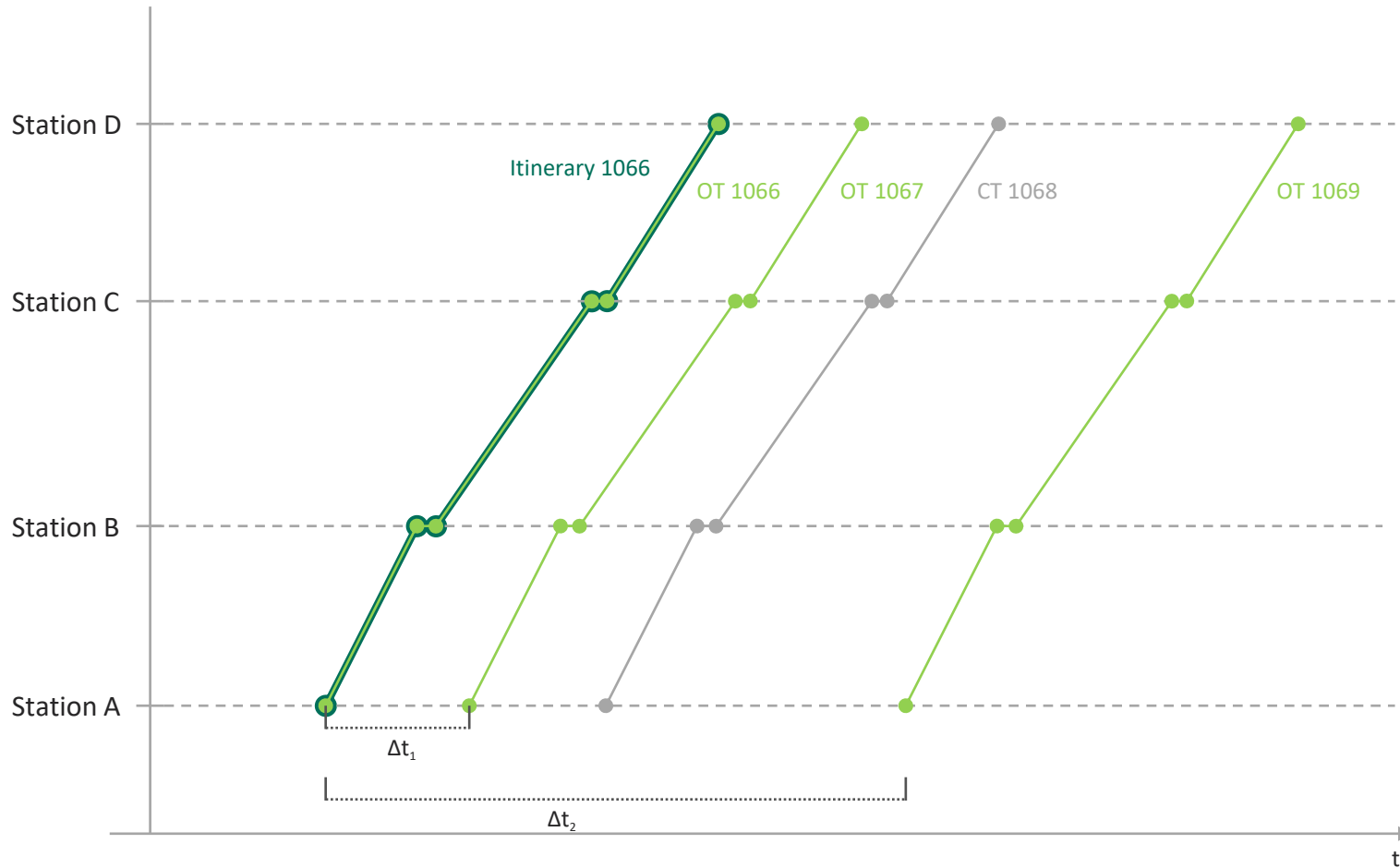
# Timetable 3.2 Development – Current Modelling



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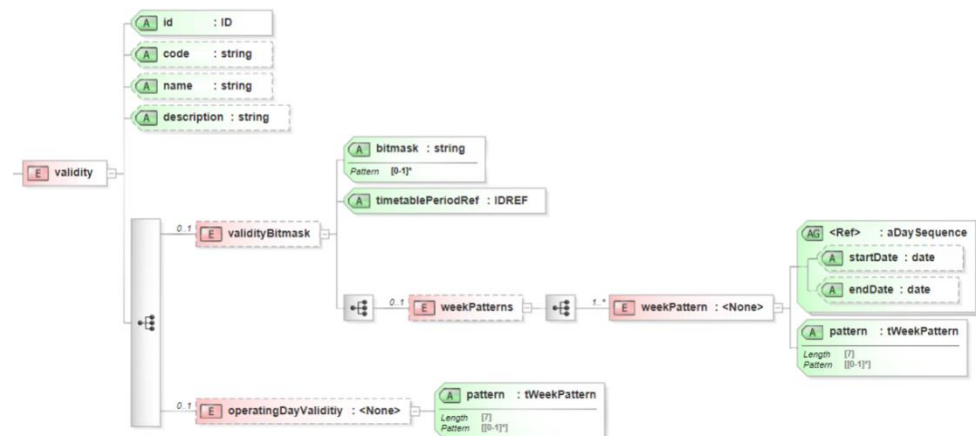
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# Timetable 3.2 Development – Current Modelling

- Validities

- Currently 2 ways of describing validities
- Bitmask-based similar to railML 2.x
  - Along with additional optional week patterns for generating descriptive texts
  - Reduced to the necessities of the Use Case
  - Reduced to simplify usage and understanding
- Week-Pattern-based
  - For early planning stages
  - Abstract weeks
- Extendable in later versions to support other use cases



# Timetable 3.2 Development – Current Modelling

- Connections
  - Clearer semantics of roles in connection
  - Modelling of multiple connection modes
  - Separation in commercial and operational connections

```
<operationalConnections>
  <operationalConnection>
    <!-- 4 Teile machen den Anschluss aus: Wann?, Wer mit wem? und was? -> validity, feeder, connector, modes -->
    <validity ref="val01"/>
    <feeder>
      <operationalTrainRef ref="ot01" itineraryPoint="bi01_p02"/>
    </feeder>
    <connector maxWaitingTime="PT5M">
      <operationalTrainRef ref="ot11" itineraryPoint="bi11_p02"/>
    </connector>
    <modes>
      <mode mode="crewTransfer"/>
      <mode mode="passengerTransfer"/>
    </modes>
  </operationalConnection>
</operationalConnections>
<commercialConnections>
  <commercialConnection>
    <validity ref="val02"/>
    <feeder>
      <commercialTrainRef ref="ct01" itineraryPoint="bi01_p02"/>
    </feeder>
    <connector maxWaitingTime="PT2M">
      <commercialTrainRef ref="ct11" itineraryPoint="bi11_p02"/>
    </connector>
    <modes>
      <mode mode="passengerTransfer"/>
    </modes>
  </commercialConnection>
</commercialConnections>
```

# Timetable 3.2 Development – Current Modelling

- Connections
  - Powerful facilities to specify external connections

```
<commercialConnections>
  <commercialConnection>
    <validity ref="[Mo-Fr]TBD"/>
    <feeder>
      <commercialTrainRef ref="ct01" itineraryPoint="bi01_p03"/>
    </feeder>
    <connector>
      <externalTrainReference>
        <!-- muss den zug identifizieren und u. U. Metadaten zu diesem publizieren, sowie Spezifika des Haltes-->
        <train>
          <tafTapTsi/>
          <!-- <trainNumber id="4711" destination="Hinter-Mden" organizationalUnitRef="SBB" any:other="..."/>-->
          <!-- <trainRef id="UUID"/>-->
        </train>
        <stop>
          <location designator="ABC" register="DS100" minTransferTime="PT10M" displayName="U-Bahn Gleis 3"/>
          <!--<locationRef id="UUID"/>-->
          <times scope="scheduled">
            <arrival day="0" time="05:05:30"/>
            <departure day="0" time="05:06:20"/>
          </times>
          <times scope="published">
            <arrival day="0" time="05:05:00"/>
            <departure day="0" time="05:06:00"/>
          </times>
        </stop>
      </externalTrainReference>
      <!--
      <lineReference line="U3"/>
      -->
    </connector>
    <modes>
      <mode mode="passengerTransfer"/>
    </modes>
  </commercialConnection>
</commercialConnections>
```

# Timetable 3.2 Development – Current Modelling


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- StopDescription / StopInfo
  - Focus on minimizing the need for semantic constraints
  - Split between pass-through and stop
  - Two-level modelling
    - Generic information (e.g. minimal dwell time, times, track information)
    - Additional optional information regarding details (e.g. shunting times for shunting operations, necessary durations for crew exchange)
  - Extendible to allow for more detailed information in future versions

# Timetable 3.2 Development – Current Modelling

- StopDescription / StopInfo
  - Focus on minimizing the need for semantic constraints

## Semantic Constraints / Semantische Beschränkungen / Contraintes semantiques

 Semantic Constraint "TT:006":

The following table summarises the semantical constraints between the attributes `<ocpTT>.ocpType`, `<stopDescription>.guaranteedPass`, `.commercial`, `.onOff`, `.stopOnRequest` and `.operationalStopOrdered`:

Nr.	<ocpTT>	<stopDescription>					Description
	ocpType	guaranteedPass	commercial	onOff	stopOnRequest	operationalStopOrdered	
1.1	pass	true	attribute not to be used	attribute not to be used	attribute not to be used	attribute not to be used	guaranteed pass
1.2		false	attribute not to be used	attribute not to be used	attribute not to be used	attribute not to be used	non-guaranteed pass
2.1	stop, begin, end	attribute not to be used	true	both	true	attribute not to be used	commercial stop on request for on and off
2.2		attribute not to be used	true	both	false	attribute not to be used	commercial stop for on and off
2.3		attribute not to be used	true	on	true	attribute not to be used	commercial stop on request for on only
2.4		attribute not to be used	true	on	false	attribute not to be used	commercial stop for on only
2.5		attribute not to be used	true	off	true	attribute not to be used	commercial stop on request for off only
2.6		attribute not to be used	true	off	false	attribute not to be used	commercial stop for off only
2.7		attribute not to be used	false		currently not supported	currently not supported	true
2.8	attribute not to be used	false		currently not supported	currently not supported	false	operational stop introduced by the IM

- Green cells are default values.
- `ocpType='begin','end'` are deprecated from railML 2.2.
- If no `<stopDescription>` is given, it is either a non-guaranteed pass (1.2) or a stop with undefined properties, depending on the attribute `ocpType`.
- The term "commercial" of the attribute in railML traditionally refers to the contractual relationship between RU and end-customer, not to the contractual relationship between IM and RU.
- The term "ordered" in the attribute `operationalStopOrdered` refers to the contractual relationship between IM and RU.

Proposed on September 3<sup>rd</sup> 2018  
 Approved on June 20<sup>th</sup> 2019  
 FIXME: add Link to discussion!  
 Please, recognize [our guidelines on semantic constraints](#)

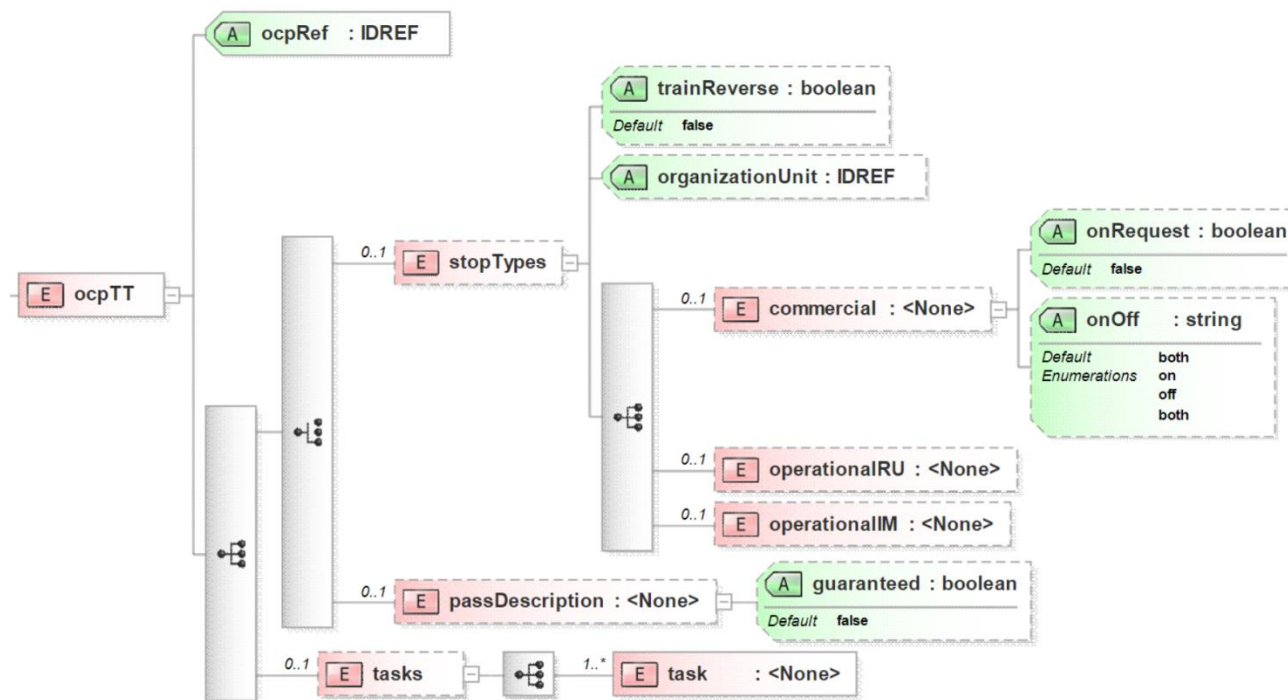
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  - Two-level modelling





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  - Two-level modelling
    - Generic information (e.g. minimal dwell time, times, track information)
    - Additional optional information regarding details (e.g. shunting times for shunting operations, necessary durations for crew exchange)
    - Dependencies between stop activities
  - Extendible to allow for more detailed information in future versions

# Timetable 3.2 Development – Current Modelling

- Train Numbers/Identification
  - Support for multiple train numbers
  - Composed of 5 parts
    - Opt. Range (From..To)
    - Type (Enumeration)
    - Opt. Issuer (Reference to organizational unit)
    - Number (String)
    - Opt. Variant (String)

```
<operationalTrain id="ot01">
  <operationalTrainVariant validity="[Mo-Fr]TBD" itineraryRef="ii01" offset="PT7H">
    <trainNumbers>
      <!-- with range here -->
      <trainNumber type="networkTrainNumber" number="12345">
        <range start="bi01_p01" end="bi01_p02"/>
      </trainNumber>
      <!-- without range (full itinerary) + issuer and variant -->
      <trainNumber type="taftaptsiTrainId" issuer:ref="DBFV" number="12345" variant="2"/>
    </trainNumbers>
    (...)
  </operationalTrainVariant>
</operationalTrain>
```



Thank you for your attention!

**railML.org**

[www.railml.org](http://www.railml.org)

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