Modeling of supplementary timetables using the 'scope' attribute

Content

This article describes the mapping of so-called supplementary timetables of the German infrastructure operator DB Netz AG in railML.

Introduction

It is often necessary to define different timetables with the same train number for an operational train on different days of operation. These can also be understood as alternative time slots or "variants" of one and the same train. If these train variants have the same route and the same travel and stop times in sections, this relationship can be mapped using so-called supplementary timetables.

A supplementary timetable only describes the section of a train variant that differs from its master timetable. The overall itinerary of such a train variant is therefore usually made up of a section of the master timetable and one or more supplementary timetables.

Representation in railML

To differentiate between master and supplementary timetables in railML, the scope attribute on the <train> element is used. The following table shows the terminological relationship between DB Netz AG designations and their railML mapping:

DB Netz wording		Representation in railML
Stammfahrplan / Stammzug / master timetable		<train scope='primary' … />
Ergänzungsfahrplan / supplementary timetable	Startflügel	<train scope='secondaryStart' … />
	Zielfflügel	<train scope='secondaryEnd' … />
	Doppelfahrplan	<train scope='secondaryInner' … />

If several supplementary timetables of the same type and the same train number exist in the same period of validity, they should be distinguished using the attribute additionalTrainNumber of the <train> element.

Constraints:

- Only applicable for operational trains

- Supplementary timetables cannot exist without a matching master timetable in terms of location and time. The running days of the supplementary timetable must not exceed those of the corresponding master timetable

- For those sections of a train route where the master and the supplementary timetables are overlapping location-wise, their running days must be disjoint

Examples

Remark:
In the following examples, only temporal variations of multiple train runs on the same track are shown for simplification. However, spatial deviations (other routes / tracks) are also possible.

Typical example for train.scope=secondaryStart:
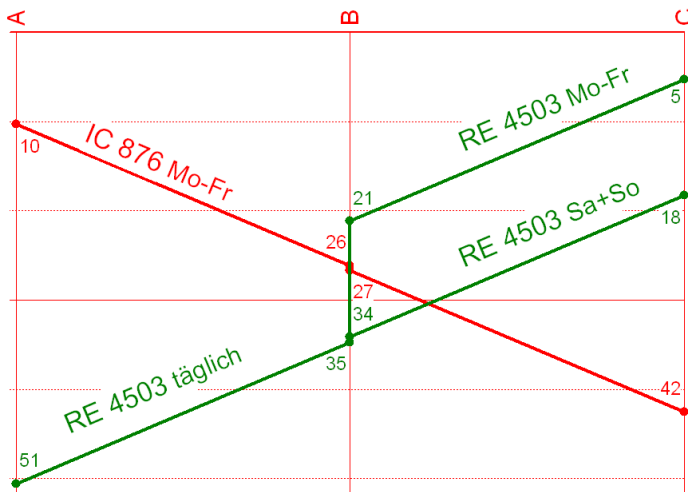
Legend:
Mo-Fr: Monday to Friday
Sa+So: Saturday and Sunday

Modelling:

```
<train id='tro_4503P' type='operational' trainNumber='4503' scope='primary'>
<train id='tro_4503S' type='operational' trainNumber='4503' scope='secondaryStart'>
```

RE 4503 **train.scope=primary**:
- operates Monday to Friday in section C-B
- operates daily in section B-A

RE 4503 **train.scope=secondaryStart**:
- operates only in section C-B and only on Saturday and Sunday

or:

RE 4503 **train.scope=primary**:
- operates Saturday and Sunday in section C-B
- operates daily in section B-A

RE 4503 **train.scope=secondaryStart**:
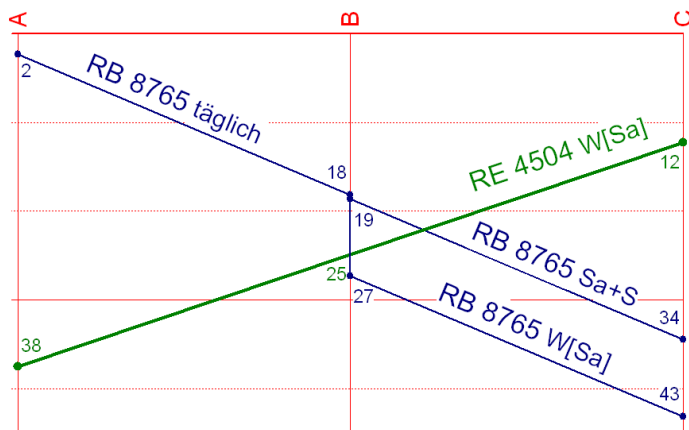- operates only in section C-B and only Monday to Friday

or:

```
<train id='tro_4503P1' type='operational' trainNumber='4503' scope='primary' additionalTrainNumber='1'>
<train id='tro_4503P2' type='operational' trainNumber='4503' scope='primary' additionalTrainNumber='2'>
```

RE 4503 1st main run **(train.scope=primary)** operates Monday-Friday in section C-B-A
RE 4503 2nd main run **(train.scope=primary)** operates Saturday and Sunday in section C-B-A
- both main runs overlap in section B-A

Typical example for `train.scope=secondaryEnd:`

Legend:
W[Sa]: Workdays, except Saturdays
Sa+S: Saturday and public holidays

Modelling:

```
<train id='tro_8765P' type='operational' trainNumber='8765' scope='primary'>
<train id='tro_8765E' type='operational' trainNumber='8765' scope='secondaryEnd'>
```

RB 8765 **train.scope=primary**:
- Operates daily in section A-B
- Operates Saturday and on public holidays in section B-C

RB 8765 **train.scope=secondaryEnd**:
- Operates only in section B-C and on workdays except Saturday

or:

RB 8765 **train.scope=primary**:
- Operates daily in section A-B
- Operates in section B-C on workdays except Saturday

RB 8765 **train.scope=secondaryEnd**:
- Operates in section B-C only and only on Saturday and on public holidays
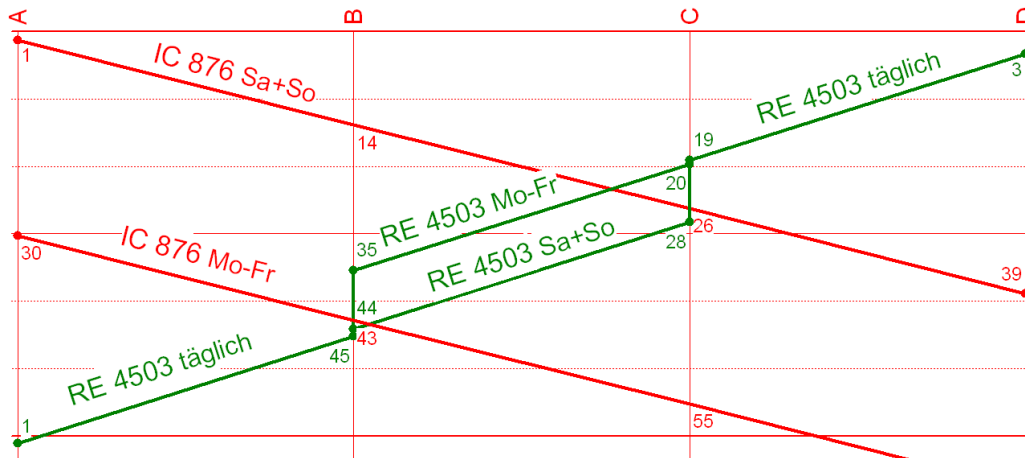
or:

```
<train id='tro_8765P1' type='operational' trainNumber='8765' scope='primary' additionalTrainNumber='1'>
<train id='tro_8765P2' type='operational' trainNumber='8765' scope='primary' additionalTrainNumber='2'>
```

RB 8765 1st main run (**train.scope=primary)** operates on workdays except Saturday in section A-B-C

RB 8765 2nd main run (**train.scope=primary)** operates Saturday and on public holidays in section A-B-C
- both main runs overlap in section A-B

Typical example for `train.scope=secondaryInner:`

Legend:
Mo-Fr: Monday to Friday
Sa+So: Saturday and Sunday

Modelling:

```
<train id='tro_4503P' type='operational' trainNumber='4503' scope='primary'>
<train id='tro_4503I' type='operational' trainNumber='4503' scope='secondaryInner'>
```

RE 4503 **`train.scope=primary`**:
  - operates daily in section D-C
  - operates Monday to Friday in section C-B
  - operates daily in section B-A

RE 4503 **`train.scope=secondaryInner`**:
  - operates only in section C-B and only on Saturday and Sunday

or:

like the above example, with main run and secondaryInner run swapped in section C-B

or:

```
<train id='tro_4503P1' type='operational' trainNumber='4503' scope='primary' additionalTrainNumber='1'>
<train id='tro_4503P2' type='operational' trainNumber='4503' scope='primary' additionalTrainNumber='2'>
```

RE 4503 1st main run (**`train.scope=primary`)** operates Monday to Friday in section D-C-B-A
RE 4503 2nd main run (**`train.scope=primary`)** operates Saturday and Sunday in section D-C-B-A
  - both main runs overlap in section D-C and B-A