TAF/TAP-TSI TrainID

Framework for Usage of Operational Train Number (OTN) with New Identifiers
History of document versions

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author</th>
<th>Reason for change / comment</th>
</tr>
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1. About this document

This document contains the concise description of the framework for usage of Operational Train Number (in further text OTN) in the identifier-related messages. The basic cases that explain the usage of the OTN in the identifier-related messages are provided in the form of a table with one column and four rows:

**Precondition** – the precondition that has to be fulfilled in order to process the particular OTN

**Trigger** – the situation or circumstances which drove the company to the decision to exchange the information about OTN

**Business process** – we refer here to the Business Scenarios given in the WG 10 Handbook that are translated into the UML Model Activity Diagrams. The readers are required to be familiar with WG 10 Handbook or Sector Handbook and the corresponding UML Model before examining this document.

**Illustration**

XML content example according to the illustration. The readers are required to be familiar with the XSD when examining this document.

**Consequences:** what happens after the message is transmitted – which business processes should be considered.

2. Introduction

In order to understand the role and the usage of OTN with new identifiers of TAF/TAP TSI it is necessary to introduce the new business object model of TAF/TAP:

In the concept of WG10 the OTN was introduced as the ATTRIBUTE of the Path object and OWNED by IM.
The further analysis of WG10 indicated that the OTN can be changed from one path section to another within the one and the same Path object. For that reason the OTN can no longer be used as an identifier in RU planning systems. The TrainID will have to be used instead.

In the implementation of the new model, the OTN is placed as the child element of the element PlannedJourneyLocation.
Fig. 2 OTN as a child element of PlannedJourneyLocation
OTN in the TAF/TAP-TSI framework has the type “String” of maximal 8 characters. OTN is an optional element of the PlannedJourneyLocation. Depending on the use case and agreements between the partners within the sector, OTN can be required to be mandatory in the communication, especially in the migration phase (from todays identification to the new TrainID-based identification). PlannedJourneyLocation is used in the TrainInformation and PathInformation elements.

Why is the OTN in the TrainInformation element which actually belongs to the Train object and is owned by RU? Due to the historical reasons that the RUs may specify the “desired” OTN for the specific path sections, but the final decision is taken by the IM. Of course, since OTN is not the mandatory element, it may be omitted in TrainInformation.

The PathInformation element as the part of the Path object plays here a more important role.
Please note the cardinality of the element PlannedJourneyLocation in both PathInformation and TrainInformation elements. PlannedJourneyLocation is contained in the PathInformation at least 2-times. More precisely, there have to be at least 2 locations to define a path section. Consequently, the Path object must contain at least one PATH SECTION. Every additional PlannedJourneyLocation indicates an additional path section. As we have seen above, OTN is contained on the path section level, as the child element of the PlannedJourneyLocation. Therefore, it is possible to set different OTNs on the different path sections in the ONE AND THE SAME Path object.

If the OTN is missing in the element PlannedJourneyLocation, the OTN is by default the OTN of the previous PlannedJourneyLocation.

We may illustrate this with the example below.
Let us assume that one RU has requested a path on the infrastructure of one IM. Furthermore, IM has constructed the path upon the request.

![Network overview](image)

In the table below, the improvised identifiers (TrainID; PathRequestID and PathID) are shown, section by section.

<table>
<thead>
<tr>
<th>PLJ</th>
<th>RU</th>
<th>TR-ID</th>
<th>Date</th>
<th>Time</th>
<th>PR-ID</th>
<th>IM</th>
<th>PA-ID</th>
<th>OTN-Matrix</th>
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<tbody>
<tr>
<td>G</td>
<td>1</td>
<td>TR[(RU1)-[core-ac1]-[v00]]</td>
<td>1-5</td>
<td>15:00</td>
<td>PR[(RU1)-[core-df1]-[v00]]</td>
<td>1</td>
<td>PA[(IM1)-[core-xy1]-[v00]]</td>
<td>47512</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47512</td>
</tr>
<tr>
<td>J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47512</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31614</td>
</tr>
<tr>
<td>M1</td>
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<td></td>
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<td></td>
<td>54322</td>
</tr>
<tr>
<td>T</td>
<td>1</td>
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<td>1-5</td>
<td>18:00</td>
<td>PR[(RU1)-[core-df1]-[v00]]</td>
<td>1</td>
<td>PA[(IM1)-[core-xy1]-[v00]]</td>
<td>45046</td>
</tr>
</tbody>
</table>

The first column “PLJ” carries the name of the PlannedJourneyLocation. Identifier columns contain the improvised identifiers in the short form: ObjectType[(Company)-(CoreElement)-(Variant)]. The change of OTN from section to section is indicated in the last column “OTN-Matrix”. For example, on the section G-J, we have the OTN 47512. On the next subsequent section J-M, OTN is changed to 31614.

Additionally, we will explain two more business scenarios in the subsequent chapters.
- indication of the change of OTN from IM to RU in the Path Alteration process
- indication of the change of OTN by sending the ObjectInfoMessage to the partners.

**General pre-condition:**
Both RU and IM have the separated records for objects Train, Path and PathRequest. The status of these objects in both RU and IM systems is up-to-date. The systems of the partners have the possibility to store OTN for each path section.

**General rule:**
The partners agree about the usage of OTN. The consequences of the change of OTN have to be agreed between the partners prior to the message exchange.
3. **IM-Triggered: PathDetailsMessage in Path Alteration procedure: Notify about change of the OTN (IM -> RU)**

**Precondition:**
Path is already booked by the RU. General pre-conditions apply.

**Trigger:**
IM alters a Path – changes the timing at the two locations on the path section and provides the new OTN, mandatory, if required by domestic rules or bilateral agreement.

**Business process:**
See the activity diagram (business scenario 4.10 from WG10 handbook given in UML)

**Activity:** Path Alteration.
Before:

```
<PathInformation>
  <PlannedJourneyLocation JourneyLocationTypeCode="08">
    <LocationPrimaryCode>16741</LocationPrimaryCode>
    <PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALD">
        <Time>09:00:00</Time>
        <Offset>0</Offset>
      </Timing>
      <FreeTextField note:path might be affected by works, modifications are possible
                    7 hrs, 2 stops, 45 min>
        <ResponsibleApplicant>2180</ResponsibleApplicant>
        <ResponsibleRU>2180</ResponsibleRU>
        <ResponsibleIM>80</ResponsibleIM>
        <PlannedTrainData>...</PlannedTrainData>
      </FreeTextField>
      <OperationalTrainNumber>47511</OperationalTrainNumber>
    </TimingAtLocation>
  </PlannedJourneyLocation>
  <PlannedJourneyLocation JourneyLocationTypeCode="08">
    <LocationPrimaryCode>13284</LocationPrimaryCode>
    <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALA">
        <Time>10:00:00</Time>
        <Offset>0</Offset>
      </Timing>
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        <Time>10:10:00</Time>
        <Offset>0</Offset>
      </Timing>
      <FreeTextField note:path might be affected by works, modifications are possible
                    7 hrs, 2 stops, 45 min>
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        <ResponsibleRU>2180</ResponsibleRU>
        <ResponsibleIM>80</ResponsibleIM>
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      </FreeTextField>
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    </TimingAtLocation>
  </PlannedJourneyLocation>
  <PlannedJourneyLocation JourneyLocationTypeCode="08">
    <LocationPrimaryCode>16691</LocationPrimaryCode>
    <PrimaryLocationName>Mainz Gbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALA">
        <Time>12:00:00</Time>
        <Offset>0</Offset>
      </Timing>
      <FreeTextField note:path might be affected by works, modifications are possible
                    7 hrs, 2 stops, 45 min>
        <ResponsibleApplicant>2180</ResponsibleApplicant>
        <ResponsibleRU>2180</ResponsibleRU>
        <ResponsibleIM>80</ResponsibleIM>
        <PlannedTrainData>...</PlannedTrainData>
      </FreeTextField>
      <OperationalTrainNumber>47511</OperationalTrainNumber>
    </TimingAtLocation>
  </PlannedJourneyLocation>
</PathInformation>
```
After (Path alteration process has started, PathDetailsMessage sent with the following content):

```
<Identifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>CR</ObjectType>
    <Company>3178</Company>
    <Core>******132477</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>TR</ObjectType>
    <Company>80</Company>
    <Core>******43215</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>PR</ObjectType>
    <Company>80</Company>
    <Core>54652-313650</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>PA</ObjectType>
    <Company>80</Company>
    <Core>54652-313650</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <RelatedPlannedTransportIdentifiers>
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    <Company>80</Company>
    <Core>******313309</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </RelatedPlannedTransportIdentifiers>
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    <CoordinatingIM>80</CoordinatingIM>
    <LeadRU>2180</LeadRU>
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    <OfTypeOfInformation>10</OfTypeOfInformation>
    <PathInformation>
      <PlannedJourneyLocation JourneyLocationTypeCode="08"/>
    </PathInformation>
  </Identifiers>
</Identifiers>
```
<LocationPrimaryCode>16741</LocationPrimaryCode>
<PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
<Timing>
  <TimingQualifierCode>ALD</TimingQualifierCode>
  <Time>09:00:00</Time>
  <Offset>0</Offset>
</Timing>
</TimingAtLocation>

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<ResponsibleApplicant>2180</ResponsibleApplicant>
<ResponsibleRU>2180</ResponsibleRU>
<ResponsibleIM>80</ResponsibleIM>
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</OperationalTrainNumber>47511</OperationalTrainNumber>

</PlannedJourneyLocation>
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  <LocationPrimaryCode>13284</LocationPrimaryCode>
  <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
  <Timing>
    <TimingQualifierCode>ALA</TimingQualifierCode>
    <Time>10:00:00</Time>
    <Offset>0</Offset>
  </Timing>
</TimingAtLocation>

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<ResponsibleRU>2180</ResponsibleRU>
<ResponsibleIM>80</ResponsibleIM>
<PlannedTrainData>...</PlannedTrainData>
</OperationalTrainNumber>49531</OperationalTrainNumber>

</PlannedJourneyLocation>
<PlannedJourneyLocation JourneyLocationTypeCode="08">
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  <PrimaryLocationName>Mainz Gbf</PrimaryLocationName>
  <Timing>
    <TimingQualifierCode>ALA</TimingQualifierCode>
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    <Offset>0</Offset>
  </Timing>
</TimingAtLocation>

<FreeTextField>path affected by works, modification of 2 hours and OTN</FreeTextField>
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<ResponsibleRU>2180</ResponsibleRU>
<ResponsibleIM>80</ResponsibleIM>
<PlannedTrainData>...</PlannedTrainData>
</OperationalTrainNumber>49531</OperationalTrainNumber>

</PlannedJourneyLocation>

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<ValidityPeriod>
  <StartDate>2015-12-13T00:00:00</StartDate>
  <EndDate>2016-12-10T00:00:00</EndDate>
</ValidityPeriod>
</PlannedCalendar>
</PathInformation>

<FreeTextField>[New Path Alteration Type: Modification of train number, Modification of path number.]</FreeTextField>
<FreeTextField>Path Alteration process initiated because of:
  1. Modification of timing</FreeTextField>
</PathDetailsMessage>

Consequences:
  1) General rules apply
The state diagram of Path object can be used for additional explanation on “what happens with the initial Path object” (check the UML model of new identifiers or zoom in the document regarding readability of the image below).
4. IM-Triggered: ObjectInfoMessage: Send information about the OTN to the partners

**Precondition:**
Agreement between the partner-IMs (e.g. neighbouring IMs) about the exchange of information on OTN. The partners have to agree about the notification on:
- change of OTN on any path section
- change of OTN only on the handover / border sections

**Trigger:**
IM wants to inform the partner-IMs about the change of OTN.

**Business process:**
See the sequence diagram.

**Activity:** Information about the attribute of the object

---

```
Owner of Path object, changes OTN

ObjectInfoMessage(ObjectInfoType=U, PathInformation)

IM notifies partners to update the Path object content.
OTN is carried in the PathInformation section.
```

---
<ObjectInfoMessage>
   ...<Identifier>
      <ObjectType>PA</ObjectType>
      <Company>80</Company>
      <Core>54652-313650</Core>
      <Variant>00</Variant>
      <TimetableYear>2016</TimetableYear>
   </Identifier>
   <ObjectInfoType Code="U"/></ObjectInfoMessage>

<PathInformation>
   <PlannedJourneyLocation JourneyLocationTypeCode="08">
      <LocationPrimaryCode>16741</LocationPrimaryCode>
      <PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
      <TimingAtLocation>
         <Timing TimingQualifierCode="ALD">
            <Time>09:00:00</Time>
            <Offset>0</Offset>
         </Timing>
         <FreeTextField>note:path might be affected by works, modifications are possible</FreeTextField>
         <ResponsibleApplicant>2180</ResponsibleApplicant>
         <ResponsibleRU>2180</ResponsibleRU>
         <ResponsibleIM>80</ResponsibleIM>
      </TimingAtLocation>
   </PlannedJourneyLocation>
   <PlannedJourneyLocation JourneyLocationTypeCode="08">
      <LocationPrimaryCode>13284</LocationPrimaryCode>
      <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
      <TimingAtLocation>
         <Timing TimingQualifierCode="ALA">
            <Time>10:00:00</Time>
            <Offset>0</Offset>
         </Timing>
      </TimingAtLocation>
      <FreeTextField>path affected by works, modifications on time and OTN made</FreeTextField>
      <ResponsibleApplicant>2180</ResponsibleApplicant>
      <ResponsibleRU>2180</ResponsibleRU>
      <ResponsibleIM>80</ResponsibleIM>
      <PlannedTrainData>...<OperationalTrainNumber>47511</OperationalTrainNumber>
      ...<Timing TimingQualifierCode="ALD">
         <Time>12:20:00</Time>
         <Offset>0</Offset>
      </Timing>
      <FreeTextField>path affected by works, modifications on time and OTN made</FreeTextField>
      <ResponsibleApplicant>2180</ResponsibleApplicant>
      <ResponsibleRU>2180</ResponsibleRU>
      <ResponsibleIM>80</ResponsibleIM>
      <PlannedTrainData>...<OperationalTrainNumber>49531</OperationalTrainNumber>
      ...<Timing TimingQualifierCode="ALA">
         <Time>14:00:00</Time>
         <Offset>0</Offset>
      </Timing>
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   <PlannedJourneyLocation JourneyLocationTypeCode="08">
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      <PrimaryLocationName>Mainz Gbf</PrimaryLocationName>
      <TimingAtLocation>
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            <Time>14:00:00</Time>
            <Offset>0</Offset>
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      </Timing>
      ...<FreeTextField>path affected by works, modifications on time and OTN made</FreeTextField>
      ...</PlannedJourneyLocation>
</PathInformation>
Consequences:
1) General rules apply

5. Conclusion

The cases provided in this document serve as the example for further development of applications that exchange the information on OTN. The further combinations of different operations in the message are possible, and depend on the particular situations and agreements between the partners.