

**TAF/TAP-TSI Objects Identifiers**

**Framework for Usage of Operational Train  
Number (OTN) with Objects Identifiers**

Version 0.3 of 16/06/2021

## History of document versions

Version	Date	Author	Reason for change / comment
0.1	2015-03-06	Seid Maglajlic	Creation (1 <sup>st</sup> draft)
0.2	2015-06-24	Seid Maglajlic	Review results integrated
0.3	2021-06-16	Christian Weber	Integration of Train Combined Model

## Content

1. About this document .....	3
2. Introduction .....	3
3. IM-Triggered: PathDetailsMessage in Path Alteration procedure: Notify about change of the OTN (IM -> RU) .....	7
4. IM-Triggered: ObjectInfoMessage: Send information about the OTN to the partners.....	11
5. Conclusion .....	14

## 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:

<p><b>Precondition</b> – the precondition that has to be fulfilled in order to process the particular OTN</p> <p><b>Trigger</b> – the situation or circumstances which drove the company to the decision to exchange the information about OTN</p> <p><b>Business process</b> – we refer here to the Business Scenarios and described in the Telematics Sector Handbook. <b>The readers are required to be familiar with Sector Handbook before examining this document.</b></p> <p>This document is amended according to the Train Combined Model.</p>
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

The Train Combined Model and the related Objects Identifiers are described in the Telematics RU/IM Sector Handbook section 8.

In the continuation of the concept of WG10, the OTN is introduced as the ATTRIBUTE of the Path object and OWNED by IM.

The principle of the OTN is to be stable for the entire journey (cf. UIC leaflets 419-1&2 for numbering of international trains). Nevertheless 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 Reference 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.

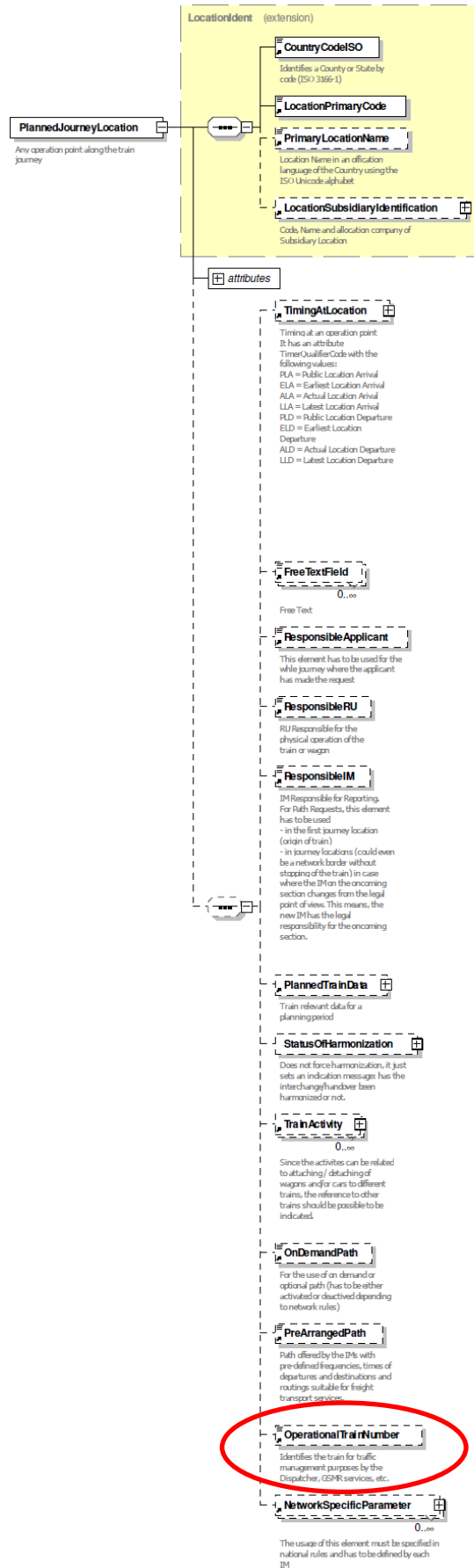


Fig. 1 OTN as a child element of PlannedJourneyLocation

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 today's identification to the new TrainID-based identification). PlannedJourneyLocation is used in the TrainInformation and PathInformation elements.

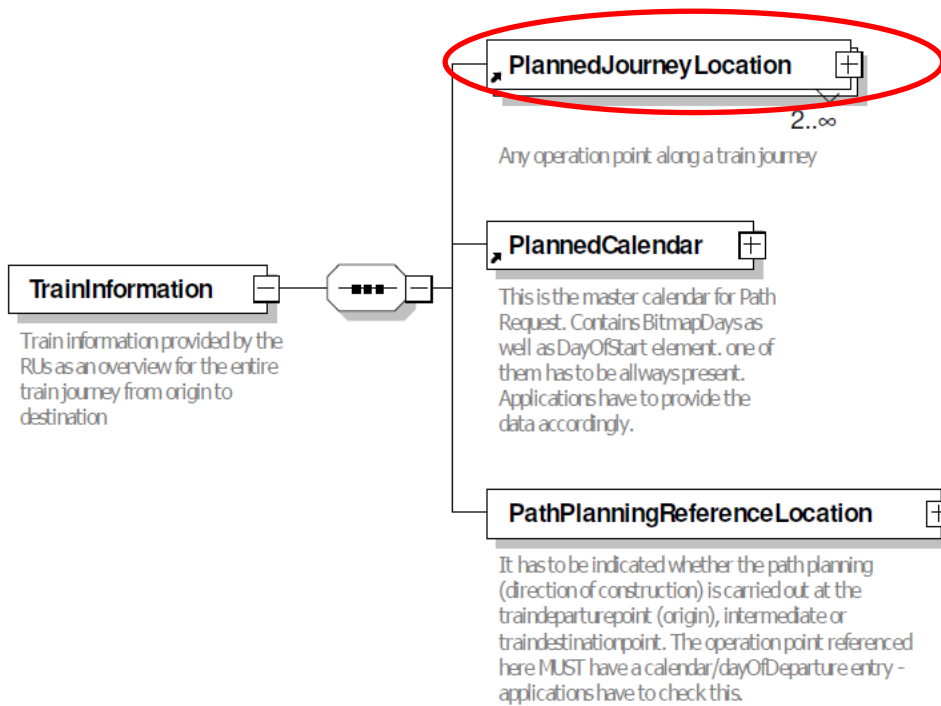


Fig. 2 - PlannedJourneyLocation in TrainInformation element

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.

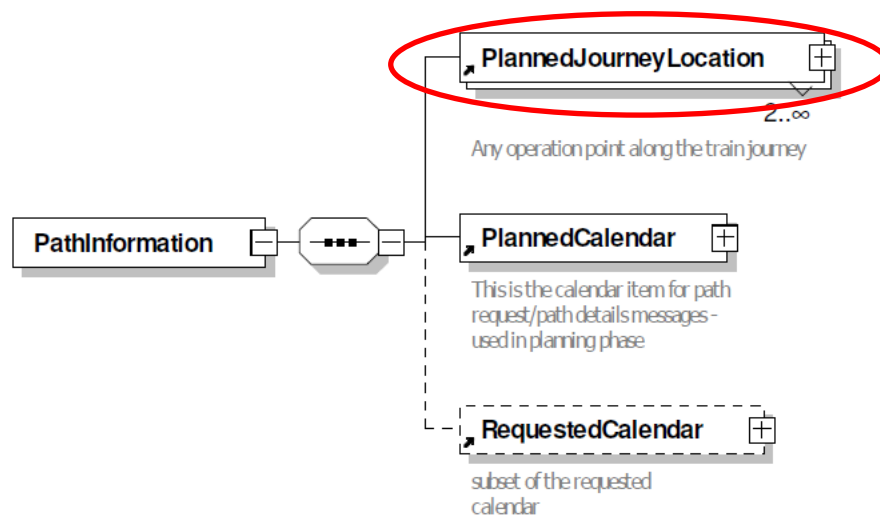


Fig. 3 PlannedJourneyLocation - ARRAY in the PathInformation element

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.

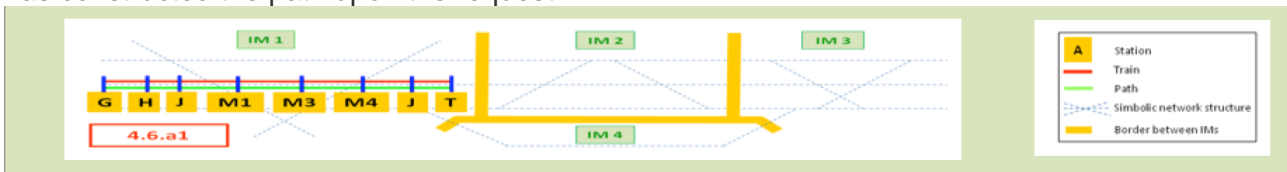


Fig. 1 Network overview

In the table below, the improvised identifiers (RouteID; PathRequestID and PathID) attached to the same Reference TRID are shown, section by section.

PLJ	RU	RO-ID	Date	Time	PR-ID	IM	PA-ID	OTN-Matrix
G	1	RO[(RU1)-(core-ac1)-(v00)]	1-5	15:00	PR[(RU1)-(core-df1)-(v00)]	1	PA[(IM1)-(core-xy1)-(v00)]	47512
H								47512
J								47512   31614
M								31614   56432
M1								56432   64422
M3								64422   45314
M4								45314   54322
Q								54322   45046
T	1	RO[(RU1)-(core-ac1)-(v00)]	1-5	18:00	PR[(RU1)-(core-df1)-(v00)]	1	PA[(IM1)-(core-xy1)-(v00)]	45046

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 Route, Path and PathRequest attached to the same Reference TRID. 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

**Activity:** Path Alteration.

The Path Alteration process is described in Sector Handbook chapter 12.8.5.

**Before :**

```

<PathInformation>
  <PlannedJourneyLocation JourneyLocationTypeCode="01">
    <CountryCodeISO>DE</CountryCodeISO>
    <LocationPrimaryCode>16741</LocationPrimaryCode>
    <PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALD">
        <Time>09:00:00</Time>
        <Offset>0</Offset>
      </Timing>
    </TimingAtLocation>
    <FreeTextField>note:path might be affected by works, modifications are possible
      7 hrs, 2 stops, 45 min</FreeTextField>
    <ResponsibleApplicant>2180</ResponsibleApplicant>
    <ResponsibleRU>2180</ResponsibleRU>
    <ResponsibleIM>80</ResponsibleIM>
    <PlannedTrainData>...</PlannedTrainData>
    ...
    <OperationalTrainNumber>47511</OperationalTrainNumber>
  </PlannedJourneyLocation>
  <PlannedJourneyLocation JourneyLocationTypeCode="02">
    <CountryCodeISO>DE</CountryCodeISO>
    <LocationPrimaryCode>13284</LocationPrimaryCode>
    <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALA">
        <Time>10:00:00</Time>
        <Offset>0</Offset>
      </Timing>
      <Timing TimingQualifierCode="ALD">
        <Time>10:10:00</Time>
        <Offset>0</Offset>
      </Timing>
    </TimingAtLocation>
    <FreeTextField>note:path might be affected by works, modifications are possible
      7 hrs, 2 stops, 45 min</FreeTextField>
    <ResponsibleApplicant>2180</ResponsibleApplicant>
    <ResponsibleRU>2180</ResponsibleRU>
    <ResponsibleIM>80</ResponsibleIM>
    <PlannedTrainData>

```

```

....
</PlannedTrainData>
....
<OperationalTrainNumber>47511</OperationalTrainNumber>
...
</PlannedJourneyLocation>
<PlannedJourneyLocation JourneyLocationTypeCode="03">
  <CountryCodeISO>DE</CountryCodeISO>
  <LocationPrimaryCode>16691</LocationPrimaryCode>
  <PrimaryLocationName>Mainz Gbf</PrimaryLocationName>
  <TimingAtLocation>
    <Timing TimingQualifierCode="ALA">
      <Time>12:00:00</Time>
      <Offset>0</Offset>
    </Timing>
  </TimingAtLocation>
  <FreeTextField>note:path might be affected by works, modifications are possible
    7 hrs, 2 stops, 45 min</FreeTextField>
  <ResponsibleApplicant>2180</ResponsibleApplicant>
  <ResponsibleRU>2180</ResponsibleRU>
  <ResponsibleIM>80</ResponsibleIM>
  <PlannedTrainData>
    ....
    </PlannedTrainData>
  ....
  <OperationalTrainNumber>47511</OperationalTrainNumber>
  ...
  </PlannedJourneyLocation>
  ....

```

**After (Path alteration process has started, PathDetailsMessage sent with the following content):**

```

<PathDetailsMessage>
...
<Identifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>RO</ObjectType>
    <Company>2180</Company>
    <Core>*****132477</Core>
    <Variant>01</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>TR</ObjectType>
    <Company>2180</Company>
    <Core>*****43215</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <PlannedTransportIdentifiers>
    <ObjectType>PA</ObjectType>
    <Company>0080</Company>
    <Core>54652-313650</Core>
    <Variant>01</Variant>
    <TimetableYear>2016</TimetableYear>
  </PlannedTransportIdentifiers>
  <RelatedPlannedTransportIdentifiers>
    <ObjectType>PA</ObjectType>
    <Company>0080</Company>
    <Core>*****313309</Core>

```



```

    <Variant>01</Variant>
    <TimetableYear>2016</TimetableYear>
  </RelatedPlannedTransportIdentifiers>
</Identifiers>
  <MessageStatus>1</MessageStatus>
  <TypeOfIMHarmonization>Full</TypeOfIMHarmonization>
  <CoordinatingIM>80</CoordinatingIM>
  <LeadRU>2180</LeadRU>
  <TypeOfRequest>3</TypeOfRequest>
  <TypeOfInformation>10</TypeOfInformation>
  <PathInformation>
    <PlannedJourneyLocation JourneyLocationTypeCode="01">
      <CountryCodeISO>DE</CountryCodeISO>
      <LocationPrimaryCode>16741</LocationPrimaryCode>
      <PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
      <TimingAtLocation>
        <Timing TimingQualifierCode="ALD">
          <Time>09:00:00</Time>
          <Offset>0</Offset>
        </Timing>
      </TimingAtLocation>
      <FreeTextField>note:path might be affected by works, modifications are possible
        7 hrs, 2 stops, 45 min</FreeTextField>
      <ResponsibleApplicant>2180</ResponsibleApplicant>
      <ResponsibleRU>2180</ResponsibleRU>
      <ResponsibleIM>80</ResponsibleIM>
      <PlannedTrainData>...</PlannedTrainData>
      <OperationalTrainNumber>47511</OperationalTrainNumber>
    ...
  </PlannedJourneyLocation>
  <PlannedJourneyLocation JourneyLocationTypeCode="02">
    <CountryCodeISO>DE</CountryCodeISO>
    <LocationPrimaryCode>13284</LocationPrimaryCode>
    <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALA">
        <Time>10:00:00</Time>
        <Offset>0</Offset>
      </Timing>
      <Timing TimingQualifierCode="ALD">
        <Time>12:20:00</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>...</PlannedTrainData>
    ...
    <OperationalTrainNumber>49531</OperationalTrainNumber>
  ...
  </PlannedJourneyLocation>
  <PlannedJourneyLocation JourneyLocationTypeCode="03">
    <CountryCodeISO>DE</CountryCodeISO>
    <LocationPrimaryCode>16691</LocationPrimaryCode>
    <PrimaryLocationName>Mainz Gbf</PrimaryLocationName>
    <TimingAtLocation>
      <Timing TimingQualifierCode="ALA">
        <Time>14:00:00</Time>
        <Offset>0</Offset>
      </Timing>
    </TimingAtLocation>
  </PlannedJourneyLocation>

```



#### 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

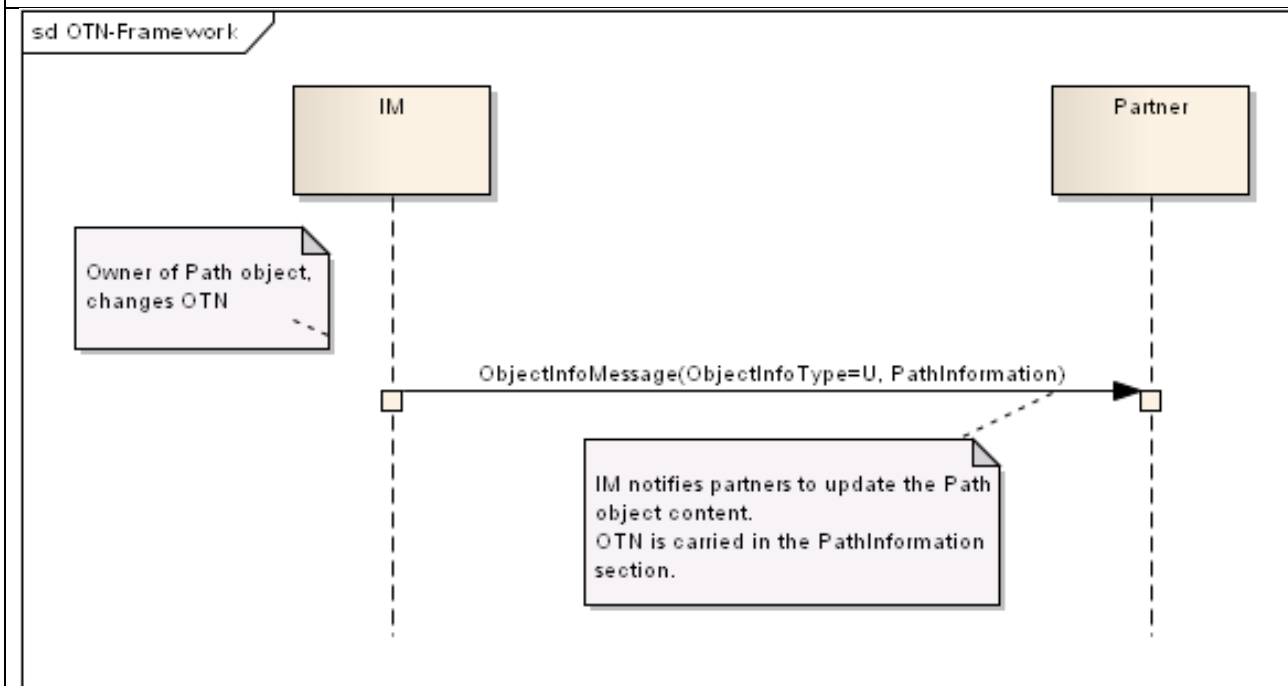
**Trigger:**

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



```

<ObjectInfoMessage>
  ...
  <Identifier>
    <ObjectType>PA</ObjectType>
    <Company>80</Company>
    <Core>54652-313650</Core>
    <Variant>01</Variant>
    <TimetableYear>2016</TimetableYear>
  </Identifier>
  <ReferenceTRID>
    <ObjectType>TR</ObjectType>
    <Company>80</Company>
    <Core>*****43215</Core>
    <Variant>00</Variant>
    <TimetableYear>2016</TimetableYear>
  </ReferenceTRID>
  <ObjectInfoType Code="U"/>
  <PathInformationExtended>
    <PlannedTransportIdentifiers>
      <ObjectType>PA</ObjectType>
      <Company>0080</Company>
      <Core>54652-313650</Core>
      <Variant>01</Variant>
      <TimetableYear>2016</TimetableYear>
    </PlannedTransportIdentifiers>
    <PathInformation>
      <PlannedJourneyLocation JourneyLocationTypeCode="01">
        <CountryCodeISO>DE</CountryCodeISO>
        <LocationPrimaryCode>16741</LocationPrimaryCode>
        <PrimaryLocationName>Mannheim Hbf</PrimaryLocationName>
        <TimingAtLocation>
          <Timing TimingQualifierCode="ALD">
            <Time>09:00:00</Time>
            <Offset>0</Offset>
          </Timing>
        </TimingAtLocation>
        <FreeTextField>note:path might be affected by works, modifications are possible
          7 hrs, 2 stops, 45 min</FreeTextField>
        <ResponsibleApplicant>2180</ResponsibleApplicant>
        <ResponsibleRU>2180</ResponsibleRU>
        <ResponsibleIM>80</ResponsibleIM>
        <PlannedTrainData>...</PlannedTrainData>
      </PlannedJourneyLocation>
      <PlannedJourneyLocation JourneyLocationTypeCode="02">
        <CountryCodeISO>DE</CountryCodeISO>
        <LocationPrimaryCode>13284</LocationPrimaryCode>
        <PrimaryLocationName>Frankfurt (Main) Ost Gbf</PrimaryLocationName>
        <TimingAtLocation>
          <Timing TimingQualifierCode="ALA">
            <Time>10:00:00</Time>
            <Offset>0</Offset>
          </Timing>
          <Timing TimingQualifierCode="ALD">
            <Time>12:20:00</Time>
            <Offset>0</Offset>
          </Timing>
        </TimingAtLocation>
      </PlannedJourneyLocation>
    </PathInformation>
  </PathInformationExtended>
  ...
  <OperationalTrainNumber>47511</OperationalTrainNumber>
  ...

```



## 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.