

# TTR IT Landscape

## Technical specification

(for the first step of the stepwise implementation)

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## 1. Introduction

The feedback on the feasibility check questionnaire of the “TTR IT Landscape Analysis” document showed that companies are not ready for the full TTR IT implementation. Therefore, the TTR IT Landscape will be gradually implemented, to be ready for the TT2025. In this stepwise implementation approach, only minimum requirements will be described and built into the solution, with the aspiration to the complete implementation later.

### 1.1. Purpose

The main purpose of this document is to provide a detailed technical specification needed for implementation of the TTR IT landscape.

In the document, information on the technical interfaces, messages and communication workflows will be provided. Furthermore, the overview of the needed implementation in Infrastructure Managers (IMs) and Responsible Applicants (RAs) side will be given.

This document is targeted to those people within railway companies and their suppliers, who are in charge of organising, supervising and/or carrying out the implementation of the functionalities of the TTR IT Landscape.

The intended audience of this document are:

- TTR IT core team members
- TTR IT WG members
- RNE
- FTE
- TEG (Technical expert group)
- Stakeholders (IMs, ABs and RAs)
- Existing suppliers that provide the systems mentioned in the document

### 1.2. Scope

This technical specification of the TTR IT Landscape outlines the implementation of the necessary functions for the first step of implementing TTR IT Landscape. The specification covers the national and central implementation on existing systems, as well as a definition proposal of new capacity product objects and messages based on the TAF/TAP TSI standard and possible modifications of existing objects.

This document covers the following topics:

- Definition of new TAF/TAP TSI messages and objects
- Modification of existing TAF/TAP TSI objects
- Description of the minimal required implementation together with use cases
  - Description of central implementation
  - Description of implementation with examples to be done at the national level
- Information about the basic functions that should be implemented in the second step (additional requirements)

The scope of this work includes further development on the existing systems, based on the process implementation and IT Landscape documents, taking into account feedback from the TTR Pilots.

### Example description

All the examples and use cases in the document will reference to the simple railway infrastructure example that shows a border crossing between Austria (ÖBB) and Hungary (VPE). Each side has three primary locations, including also the state or network borders. One of the IM works alone, but other sends its capacity to an RFC.

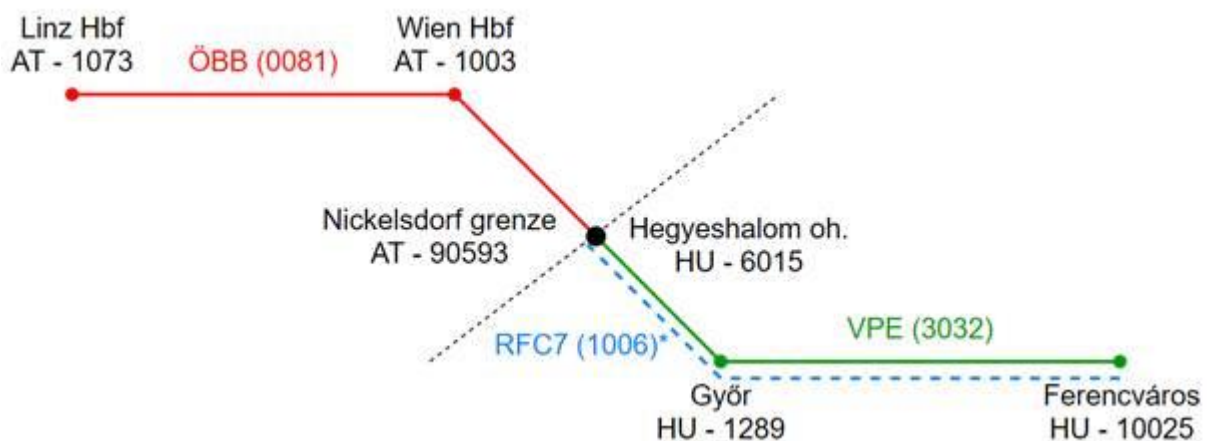


Figure 1 - Railway infrastructure that will be used in the document

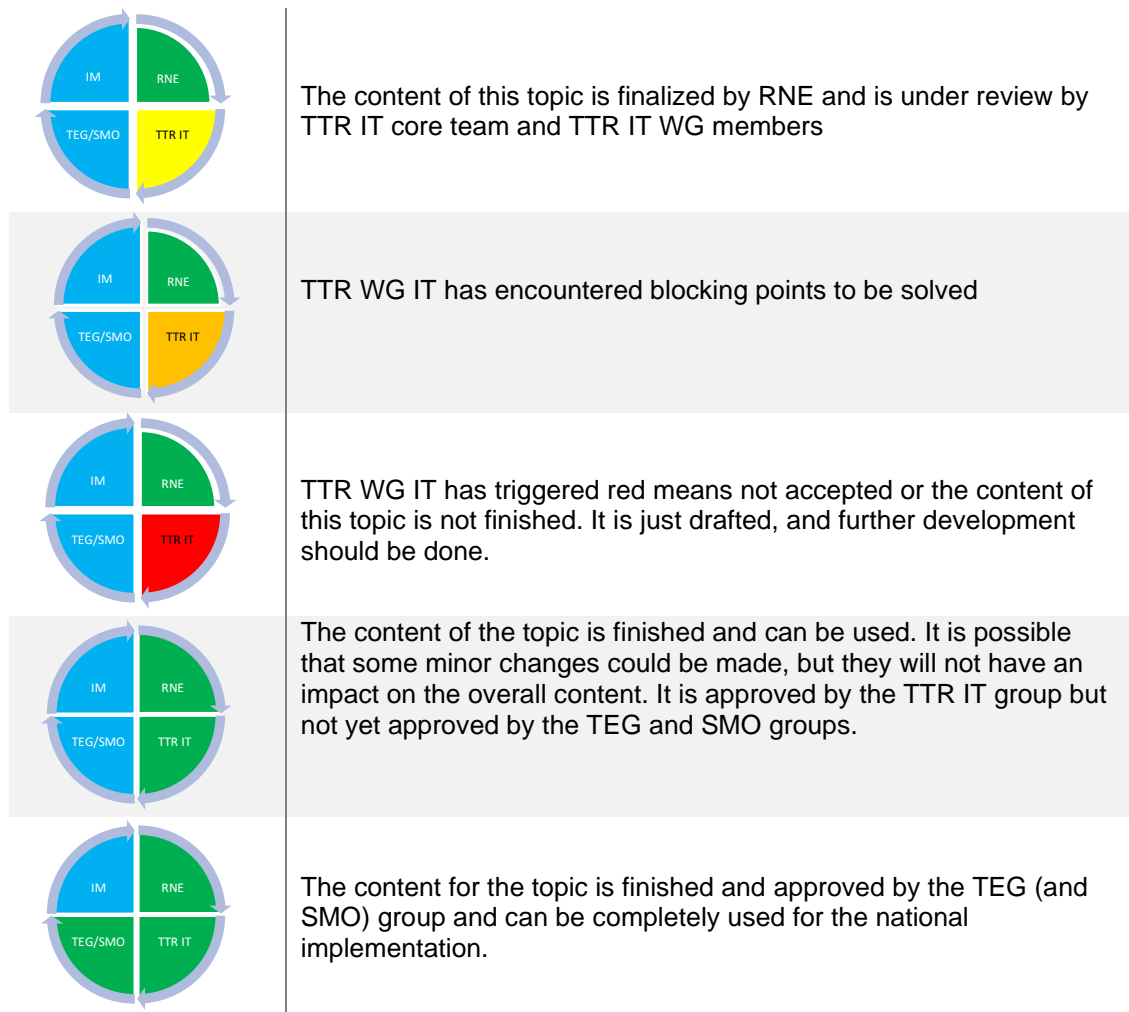
Also, as it is shown on the image, in Hungary RFC7 will be active in the capacity product publication. As in TAF TSI messages, the companies are identified with their company code, but RFC7 doesn't have one yet, we've added there a 4-digit identifier (actually, it's the corridor ID in PCS).

### The summary of completeness

To facilitate completeness checks and the possibility to use a particular topic in the national implementation plan, at the beginning of each topic a table is defined that describes the degree of completion, open issues, reasons and steps to be taken to finish the topic.

To the faster visualization of the completeness of each topic, the different colours were defined.

COLOR	DESCRIPTION
	The content of this topic is drafted by RNE



The contents marked with the green and blue colors can be considered for the national implementation of the TTR IT Landscape. These contents may be used for the preparation of the necessary updates in national systems, to be in line with the TTR IT Landscape.

The orange and especially red colors are draft proposals and not mature enough to be considered for the central neither national implementation. It is still working on these topics and, for the time being, should not be used as a final specification for the preparation of the complete changes in national systems. These contents will be updated.

### 1.3. Document conventions

Description of the most used acronyms is displayed in the table below.

Acronym	Explanation
<b>BigData</b>	RNE central database to enable the exchange of harmonized reference files between IM and RNE systems.
<b>Buffer block</b>	Capacity blocked in the capacity diagram to be used as a cushion against fluctuations in available capacity for train runs and TCRs
<b>Capacity band</b>	Time frame up to several hours that includes capacity for at least one path for rolling planning requests. Publication in the form of a number of "slots" per defined capacity band
<b>Central TTR IT Framework</b>	Represents a common environment for all the modules defined in the TTR IT Landscape. It consists of three layers: RU, IM and Common layer.

<b>CI</b>	Common Interface, a message transformation middleware, which does the transformation from legacy format of messages into common or shared metadata format (XML) and vice versa
<b>CRD</b>	Central Reference Database File, formerly known as Central Repository Domain, a common repository node in the network containing the reference files
<b>DWH</b>	Data WareHouse – a system used for reporting and data analysis. It is a central repository of integrated data from one or more disparate sources
<b>ERA</b>	European Railway Agency
<b>GeoEditor</b>	RNE webtool to visualise and manage the infrastructure data provided in the CRD database. Also, some additional data that doesn't exist in the CRD like segments, sections, layers are created and managed in the GeoEditor.
<b>JSG</b>	Joint Sector Group – a voluntary organisation supported by 9 European Associations involved in the implementation of the Technical Specification for Interoperability relating to the subsystem "Telematics Applications for Freight services" (TAF TSI of the rail system in the European Union
<b>Layer</b>	The layer is a set of sections (and section groups implicitly) that has a certain added value. One corridor can be one layer, for example.
<b>LI</b>	Local Interface, a node in the network interfacing the legacy systems (CI from a user perspective)
<b>MS</b>	Message status: Assigned by the Sender 1=creation, 2=modification, 3=deletion
<b>PCS</b>	Path Coordination System
<b>PI SG</b>	The Process Implementation Sub-group (responsible for the description and interpretation of the TTR processes)
<b>PLC</b>	Primary location code is a basic topology unit. Location is uniquely defined within the BigData system.
<b>POC</b>	Proof of Concept - is a realization of a certain method or idea in order to demonstrate its feasibility or demonstration that some concept or theory has practical potential
<b>Pre-planned paths</b>	This is a path that an IM has planned at the beginning of the capacity process based on the cap. partitioning as well as its expectations regarding market needs, requirements contained in Framework Agreements, and capacity needs announcements made by applicants. TCRs according to the RNE guideline "TCR" have to be taken into account as much as possible.
<b>RA</b>	Responsible Applicants
<b>RINF</b>	Register of Infrastructure of European Union Agency for Railways (ERA)
<b>Rolling Planning Slot</b>	"Capacity usage possibility" within a capacity band that will be converted into a path year after year
<b>Section</b>	The section is an ordered set of segments. Each section connects two not necessary neighbouring points where there exists only one possible path from one section's edge point to another one.
<b>Segment</b>	The segment represents the link connecting two neighbouring primary locations
<b>SMO</b>	Sector Management Office – responsible for Change Management in TAF/TAP TSI schema
<b>Subsidiary location</b>	Subsidiary location is hierarchically child of the primary location. One subsidiary location can have only one parent primary location.
<b>TAF/TAP TSI</b>	Technical Specification for Interoperability (TSI) relating to Telematics Application for Freight (TAF) and Passenger (TAP)
<b>TOI</b>	Type of Information: Enumeration, indicating to which process step or process type in the planning the message belongs
<b>TOR</b>	Type of Request: Enumeration for 3 different basic types of the processes in the planning: Study (1), Request (2), Modification (3)
<b>TTR</b>	Timetable Redesign (Project title)
<b>TTR IT Landscape</b>	The TTR IT Landscape describes the functionalities and modules of the future IT landscape. It is a result of the digitalisation of the processes.

<b>Unplanned capacity</b>	Capacity on a line that is still available after pre-planned capacity for ATT and RP traffic as well as TCRs (incl. maintenance) have been assigned
<b>X-n</b>	A deadline referring to the day of the timetable change (X) and the number of months (n) in advance of this deadline.

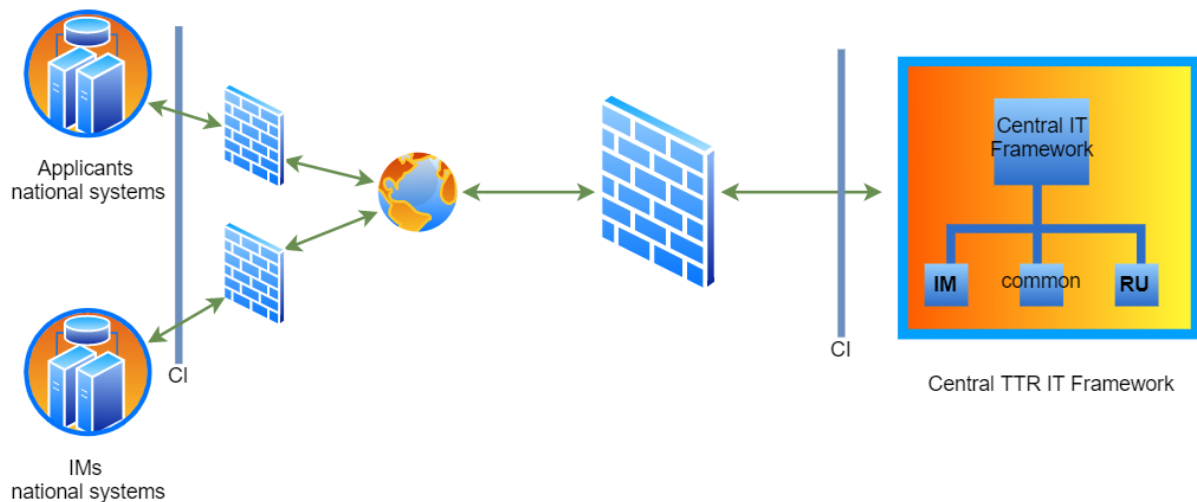
## 1.4. References

The bases for the preparation of this document were the following documents:

- TTR IT Landscape Analysis – version 1.0 from 20<sup>th</sup> November 2018
- Redesign of International Timetabling Process (TTR) – version 0.19-1 from 4<sup>th</sup> October 2018
- Common Components System LI Release 2.0 User Manual – version 2.0.1 from 18<sup>th</sup> October 2018
- BigData GeoEditor user manual

## 2. System architecture

In general, the architecture of the Central TTR IT framework, from the stakeholder's point of view, is quite simple. IMs and RAs national systems will communicate using the Common interface (CI) with the Central TTR IT Framework.



**Figure 2 - Simplified IT architecture**

IMs and RAs have to setup CI on their national levels. Information on the setup the CI can be found in the Messaging module under national implementation description and in the Annex 5 of this document.

It will be considered to extend the functionality of the CI to exchange json files among the stakeholders, to be prepared to support the data exchange among various type of systems (including mobile devices).

The Central TTR IT framework is divided into three layers that contain relevant modules. These three layers are: IM layer, RA layer and Common layer.



The modules that will be used by IMs, inside the IM layer, are the following:

- TCR module (TCR)
- Path Management module (PM)
- Capacity Hub (CH)
- Capacity Broker (CB)

The modules that will be used by RAs are the following:

- Path Request Management module (PRM)

Capacity Needs Announcements (CNA) module will not be developed, but instead this module the structured Excel file to announce the capacity needs from RAs will be used. According to that, an import functionality in the Capacity Hub will be developed to import CNA data from the Excel files.

The modules that will be used by both (IMs and RAs) are following:

- Messaging module (Common interface shall be used)
- BigData module

IMs should implement the CI on their side to establish the communication with the central system.

In the central TTR IT Framework, there are more tools (applications) that are connected and that have their functionalities, but from the IMs and RAs perspective, it should work as a one system with the one point of connection.

The detailed diagram of the architecture of the Central TTR IT Framework and data flow, for the first implementation step, is presented in the **Annex 3** of this document.

## 3. Advanced planning (X-60 to X-11)

Advanced planning means that capacity needs to be planned and partitioned before the request phase begins. Advanced planning takes into account market needs and available capacity, but also the temporary capacity restrictions.

### 3.1. Capacity publication - introduction

When it comes to capacity, we mean positive and negative capacity.

The **positive capacity** concerns all free usable capacities in a network not already booked or allocated respectively blocked and locked by TCR and other manners.

The **negative capacity** is used to indicate the TCRs and another capacity that cannot be requested like already allocated paths (booked or offered).

A key factor to ensure the stability of international timetabling is the availability of capacity and every IM has to build a clear picture of the available infrastructure on its network. The recommendation is that IMs publish all types of capacities (national and international) dedicated to annual planning, rolling planning, temporary capacity restrictions and maintenance windows (a subgroup of TCRs that are planned frequently). This capacity information will be visualized in the capacity supply in the Capacity Hub/Broker module. The more data is fed into the system, the better answers will be provided from the Central TTR IT Framework.

### 3.2. Capacity Process Phases

The overview on the entire TTR Process is provided in the long version of the redesigned TT process, version 2.0 from 7<sup>th</sup> April 2021 (the [link to the TTR Process description](#)).

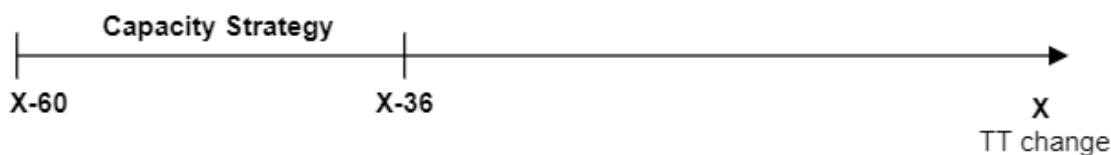
The description of each process step is not part of this chapter for the reason that the text listed in the TTR Process document is not duplicated. This chapter covers the required IT implementation following the description of the TTR process.

The components described in this chapter constitute the central building blocks of the process.

#### 3.2.1. Capacity Strategy

A capacity strategy represents an international harmonization of events with a major impact on capacity availability (such as prolonged track closure, intended increase of commuter services or newly opened lines, etc.). It is a precondition for the development of a capacity model for a line, a part of the network or the entire network. For cross-border lines, the capacity strategy, including TCRs, needs to be shared with the neighbouring IM(s).

The capacity strategy describes the main principles to be used in the planning of elements in the capacity model and they are summarised in the text document.



The capacity strategy creation starts 60 months before the timetable change (X-60) and ending 36 months before the TT change, leading to the capacity model. Items influencing the strategy should be communicated in the level of detail needed for a basic plan.

### **Data to be delivered**

Information that IMs have to provide are the following:

- Annual capacity analyses on the capacity usage and evaluation of the of potential additional requirements,
- Information on how the capacity investments are scheduled for their infrastructure, including major TCRs, to ensure efficiency in timing and availability of (alternative) capacity,
- Check the possible increase/decrease of traffic for the timetable period.

### **Tools (modules) to be used**

In the first release of the Capacity Strategy, for the TT2025, no IT is required. The strategies will be prepared in text form and exchange among the IMs.

In the later TT periods (after TT2026) when IMs become more experienced in the creation of the capacity strategies and capacity models, the capacity strategy version could be prepared in the system. The following TTR IT modules could be used:

- TCR module – to provide available information about the expected major impact TCRs in the capacity strategy,

For the later years (after 2025), the creation will start with the review of the previous year's capacity strategy (with included known information on major TCRs). The first version of the possible cap. Strategy shall be exchange with neighbouring IMs and then with other stakeholders. It should be updated according to the received feedbacks and at X-36, the final version will be used for publication in NS for the related timetable and it will be the basis for starting elaboration of the capacity model.

### **3.2.2. Capacity Model / Capacity partitioning (Advance planning)**

The capacity model, in the sense of the TTR process, represents a single entity of consolidation of all known capacity elements like available capacity, expected traffic volume, TCRs and so on. This model is a reference diagram with additional features in which all data regarding a specific timetable period will be incorporated. The findings from the capacity strategy will be included as well as applicants' capacity need announcements.

The capacity model sets the volumes of the transport per each market segment and the share of TCRs on a specific line specified per direction. Finetuned detailed train paths are not supposed to be part of the capacity model. It consists of two part – TCR share overview and 24h overview of traffic volumes reflecting market needs.

For the TT2025, it will be manually added to the capacity Hub (ECMT) and TCR (TCR Tool) modules. These modules are described in the chapters 4.6. and 4.7. of this document.

For the TT2026 and further, the assumption is that the creation of the capacity model will start by copying the previous year capacity model and then update the capacity model with necessary data by uploaded them into the capacity Hub and TCR modules via TSI based messages (chapter 3.2. and 3.3. of this document). Of course, IMs have also a freedom to create Capacity Model by sending data from their national systems yearly, not using the copy function at all.



The creation of the capacity model starts 36 months before timetable change (X-36) under the leads of IMs and last until 18 months prior the timetable change. The capacity model is defined for each international line individually and serves as the baseline for all capacity requests.

### Data to be delivered

As the source of data to be added to the capacity model came from the following sources:

- Capacity model from the preceding timetable year (if exist)
- Capacity strategy for the referenced timetable year (a text document, revised and updated yearly)
- Planned TCRs with the major and high impact for the referenced timetable year
- Capacity needs announcements from the Applicants with a new market inputs
- Own hypothesis about market growth

The objects that capacity model contains:

- o Line – part of the network of one IM or part connecting the networks of two IMs. The lines are defined in the RNE BigData and will be synchronized with the Capacity Hub. All the necessary line updates (including the updates of other infrastructure data like PLCs, Companies, etc.) will be made in the CRD.
- o Market segment - expected traffic type on a given line. This information will be provided directly in the Capacity Hub manually or by importing using messages defined in the chapter 3.2. of this document, or via pre-defined Excel file (like capacity needs announcements data which structure is provided in the Annex 8.
- o TCRs – update information on known TCRs with major/high impact and new market inputs
- o Expected traffic volume – represents the volume of paths that are expected by the IM which will be needed for ATT requests.
- o Expected volume of Rolling Planning (RP) requests – represents the number of paths that IMs expect that will be needed for Rolling Planning requests. The already allocated multi-annual capacity in the rolling planning requests of previous TT periods, must be included in the capacity model.
- o Expected volume of Ad-hoc requests – it should be defined especially on networks with an increased volume of ad-hoc traffic (e.g. capacity requirements that cannot be planned in advance, capacity can also be partitioned for this kind of traffic).
- o Unplanned capacity - Only known capacity demands shall be pre-planned in advance and leftover capacity (empty space) might represent unplanned capacity

The capacity model/partitioning of a line should occasionally be updated until X-18, based on the inputs related to TCRs, capacity need announcements from Applicants and

IMs' own hypothesis regarding the traffic growth and experience gained from market developments.

### **Tools (modules) to be used**

For the capacity model valid only for the TT2025 (the first mandatory year to publish), necessary data shall be created either manually in the ECMT or imported via Excel file structure developed for the ECMT import/export.

In the case that the interface and messages explained in the chapter 3.2. are available and implemented by IMs (after TT2025), the IMs can deliver data using the messages as well.

The capacity model creation could start by carry forward (copy) the capacity model of the previous year (in the Capacity Hub (ECMT) by using the "Copy 20xx capacity model" function) or provide data from national system on a yearly basis.

After this the model data should be updated considering the information from the capacity strategy for the considered reference timetable. Besides that, information on known TCRs with major/high impact and a new market needs delivered by Applicants should be added. The IM own hypothesis on market growth should be included as well.

The capacity models with the updated information should be exchanged among neighbours, especially a development on cross-border lines.

The following TTR IT modules shall be used:

- Capacity Hub module (ECMT) – will be used for the creation of the capacity model. The infrastructure data should be synchronized with the BigData database, what is the prerequisite for capacity model creation. The following functionalities are considered:
  - Create/update capacity model manually or by Excel data import for the TT 2025, and data exchange by using capacity messages (chapter 3.2.) for the later timetable years,
  - Make a copy of the previous capacity as a basis state for a new capacity model,
  - Supports all necessary capacity elements and allows coordination via commenting functions and tracks,
  - Supports publication of capacity models and possibility to display models for different levels of granularity,
  - Import of capacity needs announcements (CNA) data by Applicants via the Excel file structure, defined by the FTE IT WG. The CNA Excel file will be imported directly to the Capacity Hub, without additional interface (only standardized Excel template).
- TCR (TCR Tool) – used as the source for the major and high impact TCRs
  - For a new major/high impact TCRs created in the TCR module
  - Updates of already existing TCRs in the capacity model with major and high impact
  - The preliminary data exchange with neighbouring IMs and TCR coordination
- BigData (CRD, GeoEditor, RNE BigData)– Used as a central database for all infrastructure data needed for TTR IT Landscape modules.
  - All data must be updated from the CRD database before starting with the capacity model creation,
  - Additional specific information related to the BigData should be checked and updated if necessary (like border points, segments, sections, etc.)

- Capacity Needs Announcements (Excel file) – used as a first information on Applicants needs
  - Data shall be delivered by CNA Excel file (see Annex 8)
- Messaging module (CI) – has to be implemented and should serve for data exchange between national and central systems. The messages that should be concerned are the capacity and TCR messages.

For better visualisation of the capacity model data, data shall be presented on the corresponding lines. Only the volume (amount) of the transport per each market segment and per certain timeframe should be shown, including a basic operational information like train category, maximum weight and length, speed, dangerous goods and extraordinary consignments.

The implementation of the capacity model and its visualisation could be provided as presented on the image below:

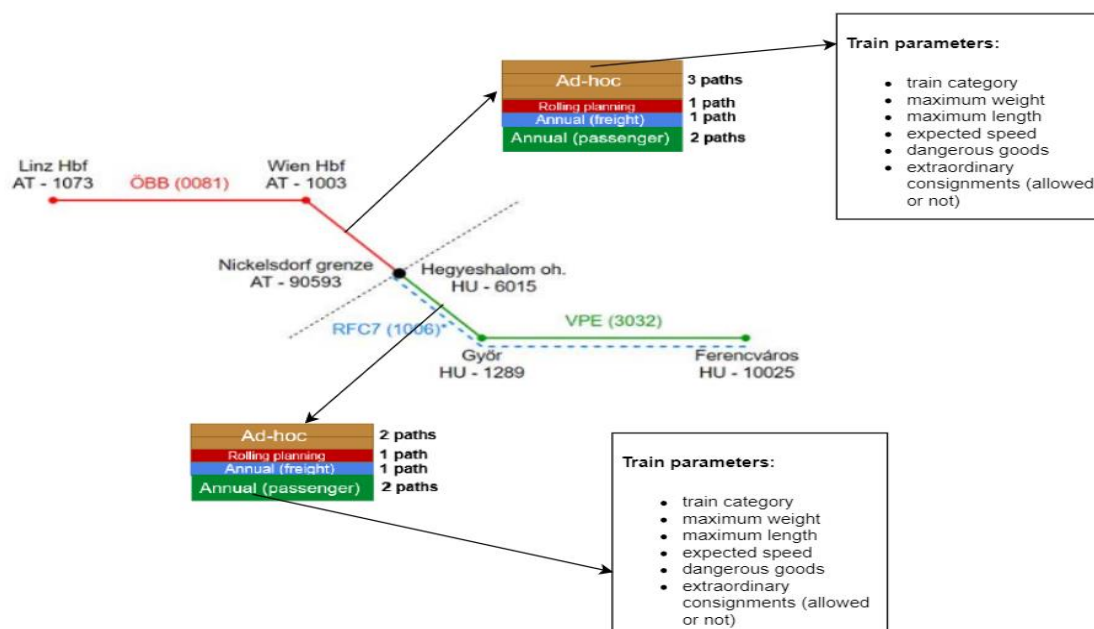


Figure 3 - Possible presentation of the Capacity Model for the part of line

It is necessary to understand the difference between the capacity analysis and capacity model.

The capacity analysis is the method or simulation of calculation of various capacities, to be used for checking different scenarios of capacity utilisation. Various tools can be used by IMs and stakeholders. It is a “tool” for the capacity model preparation.

The Capacity Model present the draft and/or final output, showing how the capacity should be used by each market segment and for TCR purposes.

Basic requirements for a published capacity model:

1. The models are published at least for the lines with the international relevance.

2. The capacity partitioning shall be done at least for a timetable year and published per train-path-line section and direction.
3. the publication shall be done via the Capacity Hub (ECMT), unless the IM already has an existing tool for Capacity Models, in that case, it can be done also via national tool and the interface has to be developed as soon as possible.
4. The TCRs implies to major and high impact TCRs (as published at X-24), estimated of capacity and approximate placement of medium TCRs, minor TCRs, maintenance windows.
5. The Annual timetable (ATT) requirements shall be presented separately for the passenger and freight paths. The expected number of slots for passenger regional and long-distance trains, and freight trains on a standard weekday shall be provided.
6. Expected number of slots for rolling planning (RP) on a standard weekday shall be provided.
7. Expected number of slots for ad-hoc on a standard weekday shall be provided.
8. The expected number of slots (bands) should be added to the model to ensure the stability of the model. It should be provided not only separately for a train path line section, but also for the real origins to destinations.

To support all the necessary tasks to create the capacity model, it is not necessary to have national tool for creation of the capacity model. All tasks can be made in the ECMT, which will be the capacity model tool.

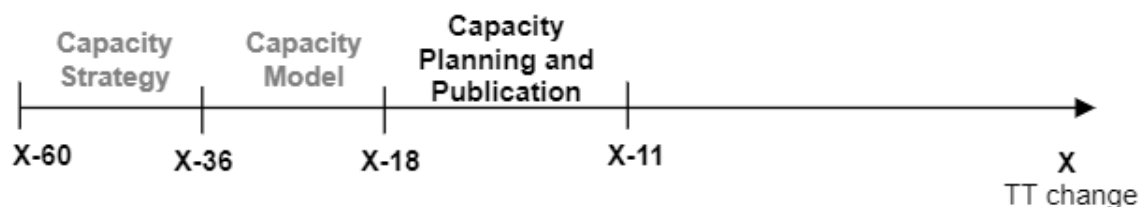
### 3.2.3. Capacity Planning and Publication product portfolio (Capacity Supply)

Before the capacity planning starts, the Applicants will be consulted on various issues like intended capacity offer, Network Statement (NS), TCRs.

The first step in the capacity planning, based on capacity analysis made in earlier stage, is the consultation of TCRs with stakeholders.

The second step is the finalisation of the capacity needs announcements and network statement consultation with presentation of changes in comparison with the previous version Applicants are invited to give feedback.

The third step is related to the feasibility study and finally, publication of the capacity products itself.



The capacity planning starts 18 months before timetable change (X-18), after the capacity partitioning (commercially available part of the capacity model), as a final step of the capacity model creation. The capacity planning and publication process phase finishes 11 months before the TT change with the publication of the capacity products (Capacity Supply) which can be requested by Applicants.

#### Data to be delivered

Information that IMs have to provide are the following:

- Publication of all known TCRs according to the RNE TCR Guidelines
- Possible design of the capacity products (e.g. catalogue paths, capacity bands with slots) for use in the annual requests
- Capacity for ad-hoc requests can be made available – potentially as paths or slots
- Capacity bands with slots for rolling planning capacity

### Tools (modules) to be used

The following TTR IT modules may be used:

- TCR (TCR Tool) – used for the following functionalities:
  - TCR Coordination on defined TCR types between the involved IMs
  - Consultation on TCRs among the IMs and Applicants
  - Publication of TCRs
  - Exchange TCR data with the ECMT in sense of all capacity visualisation
- Capacity Hub (ECMT) – used for planning, visualisation and publication of the capacity products (Capacity Supply role)
  - Import updates of the CNA data
  - Exchange data with the TCR Tool regarding the TCRs and provide information on affected paths on the TCR Tool requests (information needed to easier IMs the TCR coordination in the TCR Tool)
- Path Request Management (PCS) –
  - Feasibility study – request a path for a study of how train can realistically run, that helps in creating path requests for tailor made paths to have a preview on the paths.
- Path Management module (PCS) -
  - Feasibility study – study the path with Applicants, to reduce the effort in the path elaboration with a realistic path offer.
- Capacity Needs Announcements (Excel) –used for the finalisation of the capacity needs.

The ECMT (Capacity Supply) was developed to support TTR Pilots and its functionalities will be further updated to support all the TTR Process requirements.

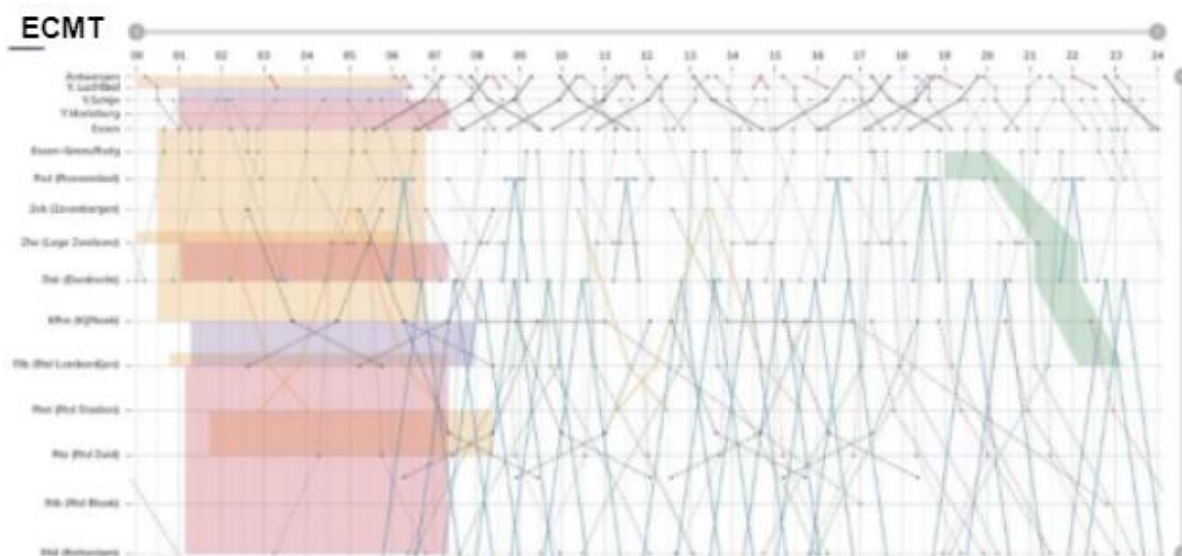


Figure 4 - European Capacity Model Tool

Basic requirements for a published Capacity Supply (applicable for TT2025):



1. Time-diagram with the 365-days overview of the capacity supply published per train-path-line section and direction with a zoom in/out possibility to a line and corridor.
2. Complete network should be considered.
3. The TCRs with the Major, High and Medium impact considered (as published at X-12) including the maintenance windows.
4. For the ATT, any capacity product can be used (pre-planned paths, bandwidths, empty space for tailor-made requests). The cross-border capacity shall be harmonised.
5. Pre-planned paths and/or bandwidths (with number of slots) for RP should be safeguarded. The cross-border shall be harmonised.
6. Pre-planned paths and/or bandwidths (with number of slots) for ad-hoc/short-term should be safeguarded. Empty space can be used for ad hoc requests, but in case the capacity is also safeguarded, this information should be part of the publication.

### 3.3. Capacity product messages

In the existing TAF/TAP TSI schema, the messages to manage capacity products do not exist. Therefore, new messages should be defined, and a proposal of the capacity messages structure is provided in this section.

The messages will be tested in the TTR IT Pilot, approved by TTR IT WG and then sent to the Technical Expert Group (TEG), and Sector Management Office (SMO) for their final feedback. After that messages could be incorporated into the Joint Sector schema or TAF/TAP TSI schema.

The capacity model is a description of a 24-h overview reflecting market needs and TCRs with major/high impact. The aim of a capacity model is a definition of the demand forecast, divided into an approximate share for commercial needs and TCRs (advanced planning).

As it was described in the chapter 3.1.2., the focus of the capacity model is on the volumes of the transport per each market segment and shares for TCRs and not on the real timings, real paths, etc.

The next step, after the capacity model is finalised (at X-18), is the capacity planning and publication and for this step a more detailed information is needed. From the capacity model, IMs need to transform expectations about future demand into capacity products that can be planned, safeguarded, and offered to customers. All the elements that can be requested by Applicants, have to be shown in a capacity diagram with detailed information. The capacity diagram is created in Capacity Supply and shows all paths, pre-constructed paths, bandwidths, empty space for tailor-made requests, and defined TCRs including the maintenance windows. Every change that impacts capacity on lines and in stations/nodes should be taken into account.

To be able to share and publish information about the capacities and their update it is necessary to establish the system-to-system data exchange by using the capacity product messages.

Since the capacity messages do not exist in the existing TAF/TAP TSI schema, it is needed to define new messages for sharing information about the available capacities between the systems (national and central).

This section covers the positive capacity messages while the messages related to the negative capacity were explained in the TCRs topic (see *chapter 3.3.*). A complete message schema can be found in **Annex 1** of this document.

To manage the capacity products, new objects, elements and messages are proposed. In addition, the existing document of the TAF/TAP TSI schema should be updated.

The new objects that should be defined in the “ObjectType” element are as follows:

- Capacity band (BA)
- Pre-arranged path (PP)
- Catalogue path (CP)
- TCR (TC)

The list of proposed **new messages** that will be created and implemented in the TAF/TAP TSI schema, together with their description, are defined below:

## Summary

<p><b>Completeness:</b></p> <ul style="list-style-type: none"> <li>- The draft version of the Capacity Product messages was defined and it was checked by the TTR IT core team and TTR IT WG.</li> <li>- The messages will be used in the TTR IT Pilot to test the prepared test cases and improve the concept (if needed)</li> </ul>		
<p><b>Open issues:</b></p> <ul style="list-style-type: none"> <li>- Requesting capacity via TAF/TAP TSI is under analysis</li> <li>- Requesting multi-annual products from RA</li> <li>- Multi-annual RP use cases are missing</li> </ul>	<p><b>Reasons:</b></p> <ul style="list-style-type: none"> <li>- The capacity process should be defined in more details by the Process Implementation group, specially process related to the multi-annual RP (including all use cases) and process related to the ad-hoc requests</li> </ul>	
<p><b>Plan to make this topic green:</b></p> <ul style="list-style-type: none"> <li>- Define the use cases for the detailed processes defined by the PI SG</li> <li>- Definition of how the RAs will request multi-annual products</li> <li>- Check proposals within the TTR IT core team meeting</li> <li>- Define additional elements (objects) if necessary</li> </ul>		
<p><b>Dependency:</b></p> <ul style="list-style-type: none"> <li>- Feedback from the sub-group TTR process (RP use cases, feedback on prepared diagrams) (regarding the project, modules, other activities)</li> </ul>		
<p><b>Timeline:</b></p> <ul style="list-style-type: none"> <li>- The final draft specification of the Capacity messages should be ready until end of <b>June 2020</b></li> </ul>		
<p><b>Implementation deadlines:</b></p> <ul style="list-style-type: none"> <li>- <u>TTR central:</u> June 2022 (X-30 The IT Landscape for the advanced planning published)</li> <li>- <u>National implementation:</u> June 2022 (X-30 The national tools released and start to communicate with the central TTR IT framework to exchange data about the capacity)</li> </ul>		

### 3.3.1. Capacity Product Details Message

This message shall be used by IM/AB and RFC for the publication of information on available capacity bands on the networks for which they are responsible. The same message will be used, in the case of multi-annual aspect, for sending a capacity offer to Applicant and it will be used by the IM to the RA confirming details of the capacity in response to an RA request. A different TOI (Type of information) code will be sent with the message, depends on which purpose message is used. The TOI codes are explained in the text below.

```
<xs:element name="CapacityProductDetailsMessage">
  <xs:complexType>
```

```

<xs:sequence>
  <xs:element ref="MessageHeader"/>
  <xs:element ref="AdministrativeContactInformation"/>
  <xs:element ref="Identifiers" minOccurs="0"/>
  <xs:element name="MessageStatus"/>
  <xs:element ref="TypeOfRUHarmonization" minOccurs="0"/>
  <xs:element ref="TypeOfIMHarmonization" minOccurs="0"/>
  <xs:element ref="CoordinatingIM" minOccurs="0"/>
  <xs:element ref="LeadRU" minOccurs="0"/>
  <xs:element ref="TypeOfRequest"/>
  <xs:element ref="AffectedIMs" minOccurs="0"/>
  <xs:element ref="InvolvedICEs" minOccurs="0"/>
  <xs:element ref="TypeOfInformation"/>
  <xs:element ref="BandInformation"/>
  <xs:element ref="PathInformation" minOccurs="0"/>
  <xs:element ref="FreeTextField" minOccurs="0"
maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>

```

**Figure 5 – Capacity Product Details message structure**

The structure of the CapacityProductDetailsMessage is similar to PathDetailsMessage but with less information. There is no NetworkSpecificParameter element and a new BandInformation element is added to store the information of the bands.

The MessageHeader and AdministrativeContactInformation are standard elements as in any other message.

The “Identifiers” element is a mandatory element that distinguishes between objects: train, path, case reference, path request, capacity bands, pre-arranged paths, catalogue paths and multi-annual business identifier, and identifies a railway company (Infrastructure manager) that creates.

An additional optional identifier “**PlannedMultiAnnualTransportIdentifiers**” was added to the identifier’s element. It is used only in the case of the multi-annual capacity requests, for the unique identification of the objects through all timetable periods related to the same demand.

```

<xs:element name="PlannedMultiAnnualTransportIdentifiers"
type="CompositIdentifierPlannedMultiAnnualTypeType"/>

```

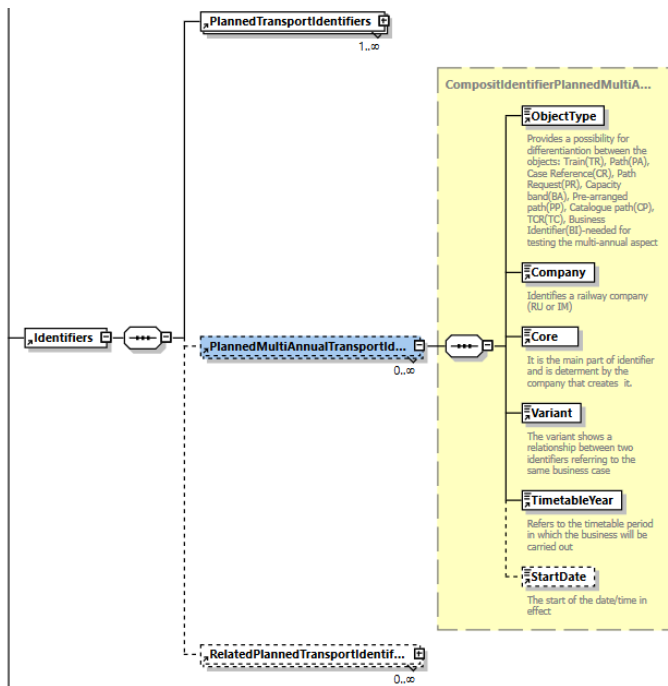


Figure 6 - Planned multi-annual transport identifier

The “PlannedMultiAnnualTransportIdentifiers” is type of “**CompositIdentifierPlannedMultiAnnualTypeType**” that contains the following elements:

- “ObjectType”, that is used for the differentiation between different objects like Train, Path, Case Reference, Path Request, Capacity product, Pre-arranged path, Catalogue path and Multi-annual business identifier.
- “Company”, that is used to identify the railway company (RU or IM)
- “Core”, which is the main part of the identifier and is determined by the company that creates it.
- “Variant”, presents a relationship between two identifiers refereeing to the same business case
- “TimetableYear”, refers to the timetable period in which the business will be carried out
- “StartDate”, an optional element of the start of the date/time in effect

The “MessageStatus” element is assigned by sender and has three statuses: creation (1), modification (2) and deletion (3).

The “TypeOfRuHarmonization” and “TypeOfIMHarmonization” are optional elements that indicate the type of partner-to-partner compliance between and may be complete (Full), partial (Part) or none at all (None).

The “CoordinatingIM”, an optional element (the type of company code) represents the leading IM that coordinates the agreement process for the IMs. It is the primary point of contact for the RUs. Certain critical stages in the international timetabling process are initiated by the leading IM, such as transfer the path request to path elaboration to involved IMs in order to prepare the offer with the partner (IMs).

The “LeadRU” indicates the RU that is leading in the process.

The existing “TypeOfRequest” element, that is used in the PathDetailsMessage, should be updated with new values, so the complete list of values are as follows:

- 1 Path Study
- 2 Ad-Hoc Path Request
- 3 Path Modification/Alteration

- 4 Annual Path Request
- 5 Late Path Request
- 6 Rolling Planning Path Request
- Capacity publication

Related to the capacity publication, it is a new process and by this process a different object types are covered, like capacity band (BA), pre-arranged paths (PP) and catalogue paths (CP). These three object types are merged under the assumption that the publication process is the same for each type of object.

The “AffectedIMs” is used to provide information about the IMs that are affected by the coordination process and that should work on the harmonisation of the capacity products.

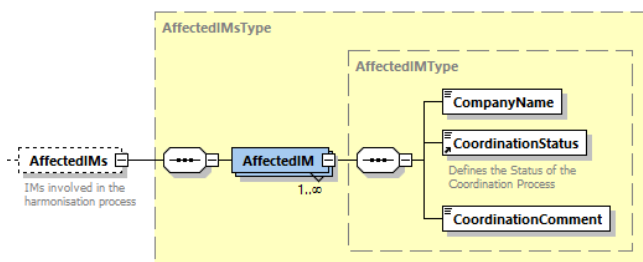


Figure 7 – Affected IMs type

The “InvolvedICEs” is used to provide information about the international coordination entities that are involved in the coordination of the capacity products.

The “TypeOfInformation” indicates the process step/type in the planning does the message belong. It is a mandatory element with the following values: path study, pre-arranged/catalogue path, (draft) offer, final offer, booked, deleted, utilisation notification, confirmation of utilisation confirmation.

### The “BandInformation” element

The “BandInformation” is a new element for storing the information of the bands and this element will be used to request a band.

```
<xs:element name="BandInformation">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="BandJourneyLocation" minOccurs="2"
maxOccurs="unbounded"/>
      <xs:element ref="PlannedCalendar"/>
      <xs:element ref="CapacityManager" minOccurs="1"/>
      <xs:element ref="CapacityTitle" minOccurs="1"/>
      <xs:element ref="TypeOfPartition" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

The “BandInformation” has a similar structure to “PathInformation”, but with some changes. The “BandInformation” structure is different from the “PathInformation” structure in terms of parameters and timetable. Band information is originating from the national system of the IM for the capacity publication. For capacity bands, it is planned to use the same composite identifier as usual, but with the object type “BA”.

The band information elements and their explanation are as follows:

- A “**BandJourneyLocation**” was created based on the “PlannedJourneyLocation” because “PlannedJourneyLocation” cannot be used as originally defined because of the additional data required to define the bandwidth (start and end time, capacity manager and so on).

```
<xs:element name="BandJourneyLocation">
  <xs:annotation>
    <xs:documentation>Operation points (with PLC) inside the capacity bands
  </xs:documentation>
</xs:annotation>
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="LocationIdent">
        <xs:sequence minOccurs="0">
          <xs:element ref="TimingAtLocation" minOccurs="0"/>
          <xs:element ref="FreeTextField" minOccurs="0" maxOccurs="unbounded"/>
            <xs:element ref="ResponsibleApplicant" minOccurs="0"/>
          <xs:element ref="ResponsibleIM"/>
          <xs:element ref="BandTechnicalData" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute ref="JourneyLocationTypeCode"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
```

The following modifications on the PlannedJourneyLocation were done:

The optional “TimingAtLocation” element is used to define the starting and ending time what is necessary to define the capacity band. The TimingQualifierCode is updated with two additional values:

- BLF – Band Location From
- BLT – Band Location To

The optional element “ResponsibleRU” is removed.

The optional element “ResponsibleIM” is updated to mandatory element.

The optional elements “PlannedTrainData”, “BandTechnicalData”, “StatusOfHarmonization”, “TrainActivity”, “OnDemandPath”, “PreArrangedPath”, “OperationalTrainNumber” and “NetworkSpecificParameter” were removed.

“**BandTechnicalData**” element, a complex type that contains the main technical characteristics of the band that was considered by the IM/AB/RFC during the construction. The following elements describe the BandTechnicalData element:

- “**TrainWeightFrame**”, the frame of parameters with an attribute ParameterQualifierCode, for the sum of all weights of wagons and traction units. With the ParameterQualifierCode, IM/AB/RFC can indicate the frame and flexibility of the value of this field. The ParameterQualifierCode has the lowest (LV) and highest (HV) values.

```
<xs:element name="TrainWeightFrame">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="TrainWeight" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

```

        <xs:element ref="ParameterQualifierCode"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

```

- “**TrainLengthFrame**”, a frame of parameters with an attribute ParameterQualifierCode, for the sum lengths of wagons and traction units. With the ParameterQualifierCode, IM/AB/RFC can indicate the frame of the flexibility of the value of this field. Applicants shall consider this frame during the request.

```

<xs:element name="TrainLengthFrame">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="TrainLength" minOccurs="0"/>
      <xs:element ref="ParameterQualifierCode"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

- “**WeightOfSetOfCarriagesFrame**”, a frame of parameters with an attribute ParameterQualifierCode, for the calculated maximum weight of all carriages without the traction.

```

<xs:element name="WeightOfSetOfCarriagesFrame">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="WeightOfSetOfCarriages" minOccurs="0"/>
      <xs:element ref="ParameterQualifierCode"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

- “**LengthOfSetOfCarriagesFrame**”, a frame of parameters with an attribute ParameterQualifierCode, for the calculated maximum length of all carriages without the traction.

```

<xs:element name="LengthOfSetOfCarriagesFrame">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="LengthOfSetOfCarriages" minOccurs="0"/>
      <xs:element ref="ParameterQualifierCode"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

- “**ReferenceLoco**” element defines the design series, mode of deployment and technical specifications associated with the traction of a train. The ReferenceLoco has a reference to the LocoTypeNumber defined by TypeCode1, TypeCode2, CountryCode and SeriesNumber values.

```

<xs:element name="ReferenceLoco">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="LocoTypeNumber"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

```

- “*PlannedSpeed*” is an optional element used by IMs to inform the RU on the speed which can be the basis for the path construction.
- “*CombinedTrafficLoadProfile*” is an optional element that does refer to combined load units that can be used for Freight Requests only.
- PlannedCalendar element is extended with two new optional elements:
  - “**NumberOfSlots**” element indicates the available slots per day inside a capacity band

```
<xs:element name="TotalNumberOfSlots" type="Numeric2-2"/>
<xs:element name="RemainingNumberOfSlots" type="Numeric2-2"/>
<xs:element name="NotReservedNumberOfSlots" type="Numeric2-2"/>
```

Considering the different process types of the capacity product publication, the published calendar of the capacity product should be introduced by these three elements. In case that the capacity reservation happens on first-come-first-served (FIFO) logic like in Ad-hoc, LPR, RP, then the elements “TotalNumberOfSlots” and “RemainingNumberOfSlots” shall be sufficient.

In the case of the NPR process type, all three elements are necessary. It is needed while more RAs can request the same capacity and then the priority rules of the Framework for Capacity Allocation (FCA) will be concerned. (*see the explanation of the calendars in the topic 3.3.3. below in this document*).

- “**AllocationStatus**” element indicates the different allocation status of a path per day

```
<xs:element name="AllocationStatus">
  <xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9A-Z]"/>
      <xs:enumeration value="Allocated"/>
      <xs:enumeration value="In study"/>
      <xs:enumeration value="Rejected"/>
      <xs:enumeration value="Allocated but might be altered"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
```

- RequestedCalendar is removed

In addition, three new elements were defined:

“**CapacityManager**” element, type of CompanyCode, shall be used for the whole journey, where it’s indicated which agency is responsible for handling and processing the capacity. The handling means to publish the capacity, return the capacity to the IM, pre-allocate/reserve the capacity to the Applicant and later allocate the capacity to the applicant.

It is an optional element and will be used in the case of PaPs, Catalogues and Capacity Bands to distinguish use cases between RFCs and IMs. This element is valid for the published capacity.

“**CapacityTitle**” element, type of string1-12, used to identify the separated capacity products such as bands, PaPs, CPs as one harmonized route. This format is based on the current PaP ID structure.



“**TypeOfPartition**” is an optional element, that defines the partition according to the TTR process description. This element is a type of “TypeOfPartition” that has three values:

- ATT – annual timetable
- Adhoc – Ad-hoc
- RP – rolling planning

### **The “PathInformation” element**

The “PathInformation” is an optional element, of the “CapacityProductDetailsMessage”, that applicants may use to request the pre-arranged path or catalogue path for the upcoming TT period, while the “BandInformation” will be used for the subsequent TT periods.

The structure of the “**PlannedJourneyLocation**” of the “PathInformation” element is slightly different from the original structure. The “PlannedJourneyLocation” element instead of the “PreArrangedPath” has a new optional “**RequestedCapacity**” element.

```
<xs:element name="RequestedCapacity" type="CompositIdentifierPlannedType"/>
```

Using this element, the applicant shall place a composite identifier of the pre-constructed product it would like to request, such a capacity band, pre-arranged path or catalogue path.

The “PlannedCalendar” element represents the calendar for path request/path details messages that are used in the planning phase. This element was extended in addition with two optional elements:

- **NumberOfSlots** – may be used by IM/AB/RFC to indicate the available number of slots per day for a capacity band
- **AllocationStatus** – may be used by IM/AB to indicate the allocation status of the pats for each day of the offer

The “RequestedCalendar” as an optional element to indicate the requested calendar, that came in the path request, was not changed.

### **Requesting capacity via TAF TSI**

The procedure to request the capacity is described in **Annex 7** of this document. The description is based on the procedure of requesting the PaPs in the PCS. The similar steps will be used for requesting other capacity products like catalogue paths (paths), bands and multi-annual paths.

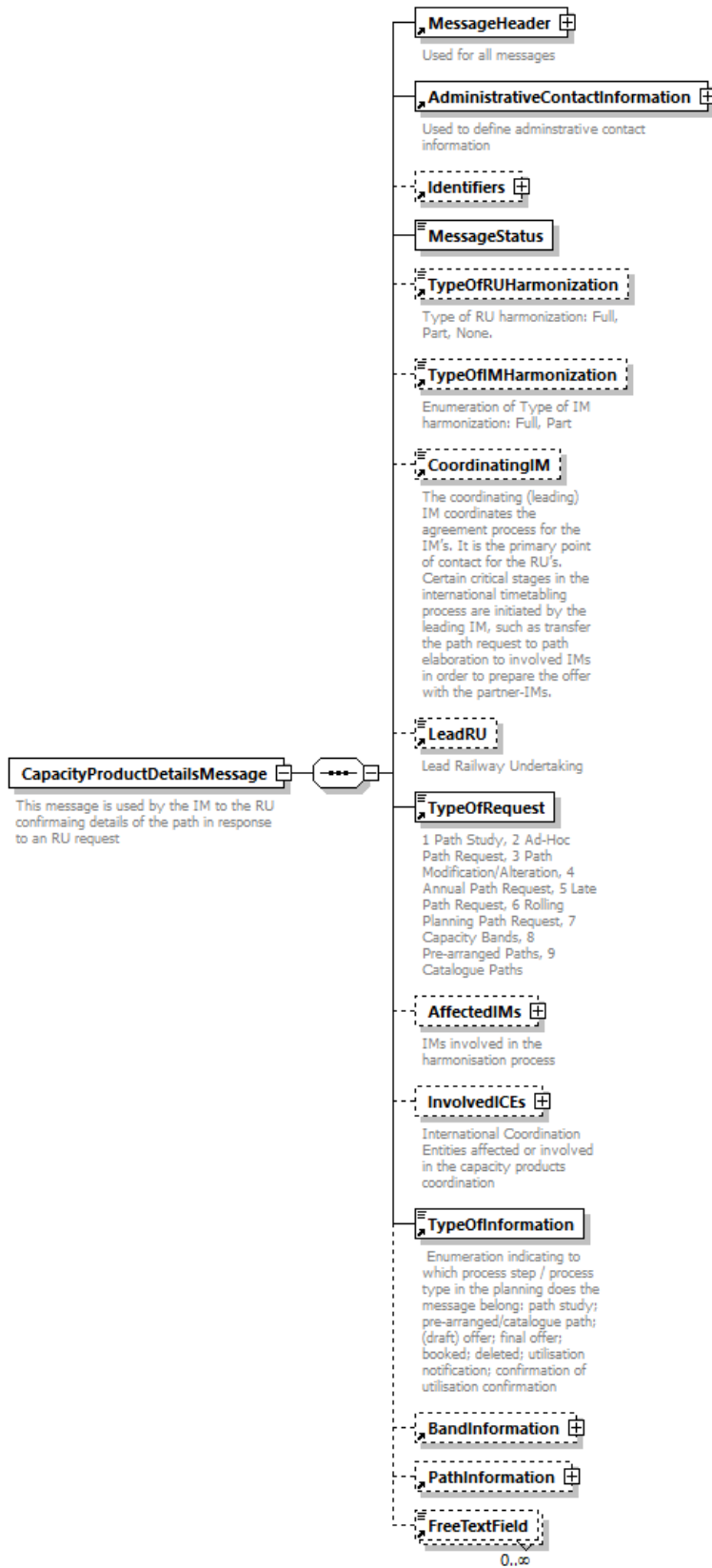


Figure 8 – Capacity Product Details message diagram

### 3.3.2. Capacity Product Coordination Message

This message shall be used for the exchange of information between IMs for coordination and data synchronization purposes on capacity bands. The IM's will decide who will assume the coordination role. In case that RFC is involved, then RFC could also be the coordinating IM.

```
<xs:element name="CapacityProductCoordinationMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="AdministrativeContactInformation"/>
      <xs:element ref="Identifiers" minOccurs="0"/>
      <xs:element ref="MessageStatus"/>
      <xs:element ref="ReceivedOnTime" minOccurs="0"/>
      <xs:element ref="TypeOfIMHarmonization" minOccurs="0"/>
      <xs:element ref="LeadRU" minOccurs="0"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
      <xs:element ref="TypeOfRequest"/>
      <xs:element ref="AffectedIMs" minOccurs="0"/>
      <xs:element ref="InvolvedICEs" minOccurs="0"/>
      <xs:element ref="TypeOfInformation"/>
      <xs:element ref="BandInformation" minOccurs="0"/>
      <xs:element ref="PathInformation" minOccurs="0"/>
      <xs:element ref="FreeTextField" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Figure 9 – Capacity Product Coordination Message

The structure of this message is similar to the structure of the “PathCoordinationMessage”. The major difference is that the “CapacityProductCoordinationMessage” does not contain “TypeOfRUHarmonization”, “TrainInformation”, “NetworkSpecificParameter” neither “RevisedRequest” elements. A new “AffectedIMs”, “InvolvedICEs” and “BandInformation” elements have been added.

The explanation and the structure of the “AffectedIMs”, “InvolvedICEs” and “BandInformation” element were done in the “CapacityProductDetailsMessage” topic 3.1.1 above and will not be explained here.

To the “Identifiers” element the new “PlannedMultiAnnualIdentifiers” element was added for the unique identification of the objects through all timetable periods related to the same demand, in the case of the multi-annual request (see 3.1.1).

Using the “PathInformation” element, stakeholders are able to coordinate path information and not only bands, using the “BandInformation” element, in case that path is more suitable to the RA request. The “PlannedCalendar” element is extended with optional elements: “NumberOfSlots” and “AllocationStatus” that are explained in the topic 3.1.1 above.

### 3.3.3. Capacity Product Confirmed Message

With the “CapacityProductDetailsMessage”, IM sends its offer to the RA request and by using the “CapacityProductConfirmedMessage” RA confirms the proposed capacity offer (in case that offer is acceptable for RA).

```
<xs:element name="CapacityProductConfirmedMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="AdministrativeContactInformation"/>
      <xs:element ref="Identifiers" minOccurs="0"/>
      <xs:element ref="MessageStatus"/>
      <xs:element ref="TypeOfRequest" minOccurs="0"/>
      <xs:element ref="TypeOfInformation" minOccurs="0"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
      <xs:element ref="LeadRU" minOccurs="0"/>
      <xs:element ref="AffectedSection" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Figure 10 – Capacity Product Confirmed Message

The message structure is similar to the “PathConfirmedMessage”. The difference is related to the “Identifiers” element where in addition an optional “PlannedMultiAnnualTransportIdentifiers” element is added. This element is “CompositelntentifierPlannedMultiAnnualTypeType”, that is explained in the topic (see 3.1.1) above and will not be explained here.

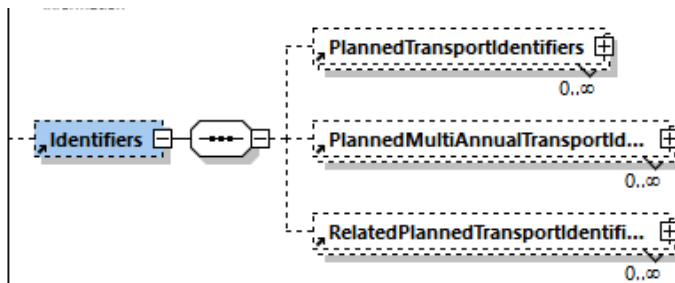


Figure 11 - Capacity Product Identifiers structure

The “PlannedCalendar” of the “AffectedSection” element is extended with additional optional elements:

- “NumberOfSlots”, that will be used by IM/AB/RFC to indicate the available number of slots per day for a capacity band of the Capacity product
- “AllocationStatus”, that will be used by IM/AB to indicate allocation status of the paths or capacity for each day of the offer

The structure of the “AffectedSection” element is presented in the image as follows:

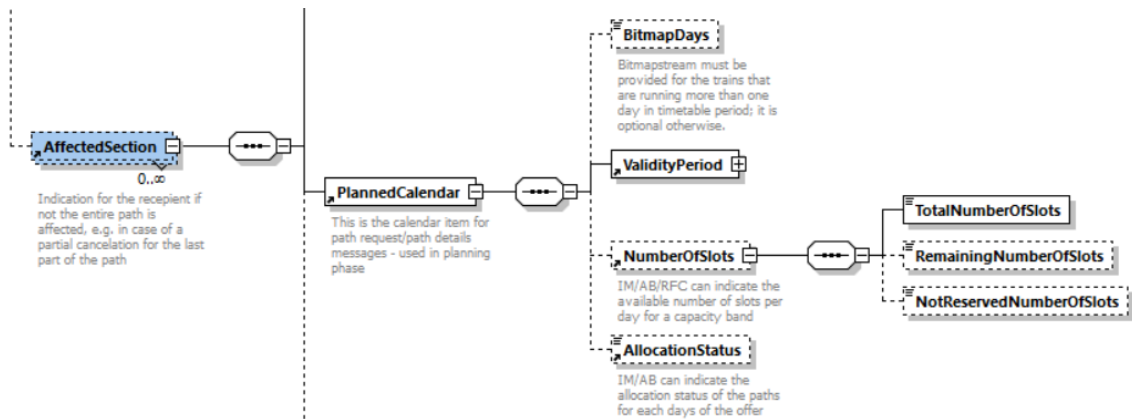


Figure 12 - Planned calendar structure of the CapacityProductConfirmed Message

### 3.3.4. Capacity Product Details Refused Message

This message is used by the RA to inform the IM that the CapacityProductDetails (with changed values to the request or to earlier booked capacity product or path) is not acceptable, what means that no contract has been made and process ends.

```
<xs:element name="CapacityProductDetailsRefusedMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="AdministrativeContactInformation"/>
      <xs:element ref="Identifiers" minOccurs="0"/>
      <xs:element ref="MessageStatus"/>
      <xs:element ref="TypeOfRequest" minOccurs="0"/>
      <xs:element ref="TypeOfInformation" minOccurs="0"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
      <xs:element ref="LeadRU" minOccurs="0"/>
      <xs:element ref="RevisedRequest" minOccurs="0"/>
      <xs:element ref="AffectedSection" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element ref="FreeTextField" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Figure 13 – Capacity Product Details Refused Message

This message is similar to the PathDetailsRefused message with the following differences:

- The difference is related to the “Identifiers” element where in addition an optional “PlannedMultiAnnualTransportIdentifiers” element is added. This element is “CompositIdentifierPlannedMultiAnnualTypeType”, that is explained in the topic (see 3.1.1) above.
- The existing “TypeOfRequest” element was extended with new values (see topic 3.1.1.)
- The “PlannedCalendar” element of the “AffectedSection” element was extended with two additional elements (see topic 3.1.1.):
  - NumberOfSlots
  - AllocationStatus

### 3.3.5. Capacity Product Not Available Message

The “CapacityProductNotAvailable” message is used to initiate alteration on capacity bands or to cancel days from a capacity offer. It can be possible to cancel the whole capacity too.

```
<xs:element name="CapacityProductNotAvailableMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="AdministrativeContactInformation"/>
      <xs:element ref="Identifiers" minOccurs="0"/>
      <xs:element ref="MessageStatus"/>
      <xs:element ref="TypeOfRequest" minOccurs="0"/>
      <xs:element ref="TypeOfInformation" minOccurs="0"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
      <xs:element ref="LeadRU" minOccurs="0"/>
      <xs:element ref="AffectedSection" maxOccurs="unbounded"/>
      <xs:element ref="InterruptionInformation"/>
      <xs:element ref="FreeTextField" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Figure 14 – Capacity Product Not Available Message

This message is similar to PathNotAvailable message with the following differences:

- The difference is related to the “Identifiers” element where in addition an optional “PlannedMultiAnnualTransportIdentifiers” element is added. This element is “CompositIdentifierPlannedMultiAnnualTypeType”, that is explained in the topic (see 3.1.1) above.
- The existing “TypeOfRequest” element was extended with new values (see topic 3.1.1.)
- The “PlannedCalendar” element of the “AffectedSection” element was extended with two additional optional elements (see topic 3.1.1.):
  - NumberOfSlots
  - AllocationStatus

### 3.4. TCR Messages

The Temporary Capacity Restrictions (TCRs) are necessary to keep the infrastructure and its equipment in good condition (maintenance) and to allow infrastructure development in accordance with market needs. TCRs refer to restrictions of the capacity of railway lines, for reasons such as infrastructure works, including associated speed restrictions, axle load, train length, traction, or structure gauge.

The TCRs represent negative capacity on the network and they are a capacity reduced factors that, if badly coordinated, decrease the stability and therefore the quality of timetables. TCRs should be known in advance (even up to 36 months) and well planned in order to provide high quality path offers. It is important to coordinate these TCRs at the international level, include Applicants in the process, and communicate unavailable capacity accordingly. Currently, the communication between the national TCR systems (IMs, RUs) and RNE central TCR tool is not possible because of the lack of the technical interface and TAF/TAP message structures for data exchange. Data should be updating more frequently (nearly to daily basis) and because of that technical interfaces for communication between central TCR tool and national TCRs systems are important.

In the existing TAF/TAP TSI schema, the messages to manage TCRs do not exist. Therefore, new messages were defined, and their structure was explained at the Sector Management Office (SMO) and Joint Sector Group (JSG) meetings. The TCR messages were approved at both meetings and shall be implemented into the TAF/TAP TSI schema.

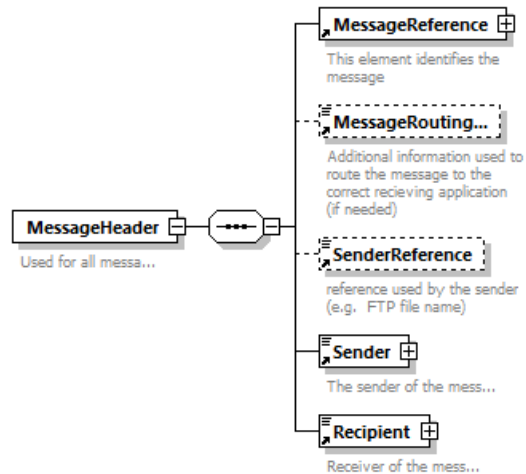
The list of proposed **TCR messages** that will be implemented in the TAF/TAP TSI schema, together with their description, are defined below:

#### Summary

<p><b>Completeness:</b></p> <ul style="list-style-type: none"> <li>- The TCR messages were approved by TTR IT groups, TEG and SMO and they are ready to be implemented in the TCR Tool and national tools</li> <li>- Some additional attributes might be added, to describe the TCR more precise and in more details</li> </ul>		
<p><b>Open issues:</b></p> <ul style="list-style-type: none"> <li>- Additional attributes (e.g. a TCR on the specific track in the PLC or segment)</li> <li>- Some extension of the temporal expansion element could be made</li> <li><del>- The proposed TCRID (Composite identifier) not fits to some IMs — 12 characters of the Core element is not long enough</del></li> </ul>	<p><b>Reasons:</b></p> <ul style="list-style-type: none"> <li>- To give more precise information on the TCR itself in case there is more than one track line (in station or line between stations)</li> <li><del>- The extension of the XSD in sense of temporal expansion needed to import maintenance windows in future</del></li> <li><del>- The TCRID is defined to follow the TAF/TAP TSI standard</del></li> </ul>	
<p><b>Plan to make this topic green:</b></p> <ul style="list-style-type: none"> <li>- Update the proposed schema with additional elements (if necessary)</li> <li>- POC of the messages inside the TTR IT Pilot</li> <li><del>- TEG and SMO approvals (for additional changes in the schema)</del></li> <li><del>- Propose a solution for those IMs for which the TCRID Core element is not long enough</del></li> </ul>		
<p><b>Dependency:</b></p> <ul style="list-style-type: none"> <li>- Feedback from the TTR IT Pilot project</li> <li>- Recommendations from the TCR pilot project group that will test a new version of the TCR Tool</li> </ul>		
<p><b>Timeline:</b></p> <ul style="list-style-type: none"> <li><del>- The final TCR message specification ready until the end of June 2020</del></li> </ul>		
<p><b>Implementation deadlines:</b></p> <ul style="list-style-type: none"> <li><del>- TCR tool: December 2020 (Tool used by members for the TCR coordination and publication)</del></li> <li>- TTR IT Landscape: June 2022 (X-30 TCR Tool completely incorporated into the IT Landscape)</li> </ul>		

### 3.4.1. TCR Message

The TCR import message shall be used by IMs to import TCRs from their national tool into the TCR tool. The same message shall be used to update already created/imported TCRs.



```
<xs:element name="TCRMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="AdministrativeContactInformation"/>
      <xs:element ref="TCRID"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
      <xs:element name="TCR" type="TCRType"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Figure 15 – TCR Import Message

The structure of this message contains following elements:

#### **MessageHeader element**

This element is a standard element that is used in all message to identify the message itself (MessageReference), to give information about the sender (Sender) and the recipient (Recipient) and to give some additional information like refence used by sender (SenderReference) and routing of the message to the correct application (MessageRoutingID).

The information that will be provided in the “MessageReference” should be one of the values below, depends on the message that is sending:

- 6500 TCRMessage**
- 6501 TCRResponseMessage**
- 6502 TCRCanceledMessage**



The message will be sent to the RNE, that means that Recipient is 3178, what is UIC of the RNE.

An example of the message header implementation in the XML:

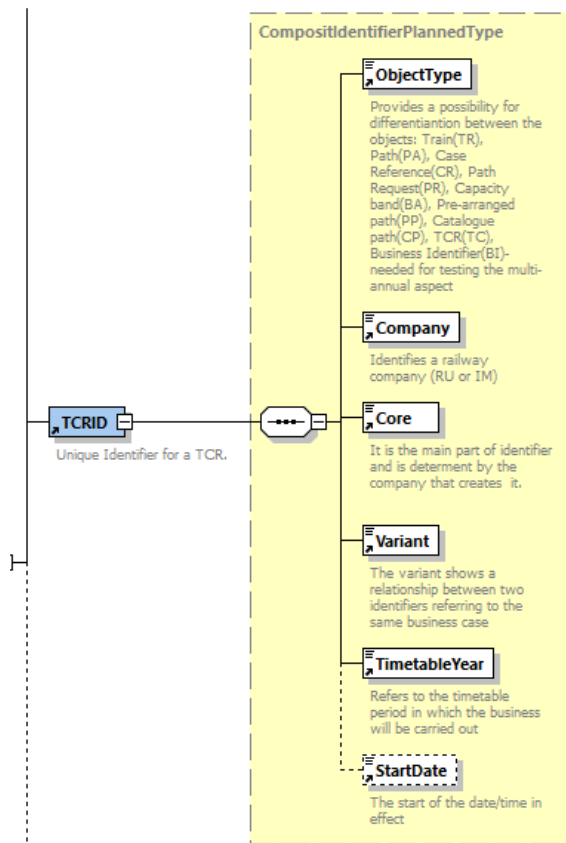
```
<Example>
  <MessageHeader>
    <MessageReference>
      <MessageType>6500</MessageType>
      <MessageTypeVersion>2.2.2</MessageTypeVersion>
      <MessageIdentifier>UUID given by Common
      Interface</MessageIdentifier>
      <MessageDateTime>2020-04-05T09:30:47Z</MessageDateTime>
    </MessageReference>
    <Sender>0080</Sender>
    <Recipient>3178</Recipient>
  </MessageHeader>
</Example>
```

### **AdministrativeContactInformation element**

The Administrative contact information element is used to give information which person inside the IM company, that was created TCR, is responsible for managing the TCR. This is a person who is TCR manager in the company or TCR manager for the specific region inside the country.

### **TCRID element**

The TCRID mandatory element is an identifier of the TCR that is being sent by message. One TCR per message will be sent. The structure type of the TCRID identifier is "CompositIdentifierPlannedType".



The “TCRID” element is the unique identifier of the TCR object and is mandatory. This element is a type of “CompositIdentifierPlannedType” with the following information:

- **ObjectType** – mandatory fixed value “TC” which defines TCR object
- **CompanyCode** – mandatory numeric value (4 digits) in range 0000 to 9999 that identifies the RU, IM or other company involved in the Rail Transport Chain
- **Core** – is the main part of the identifier and is determined by the company that creates it. It is a mandatory 12 characters alphanumeric string value.
- **Variant** – shows a relationship between two identifiers referring to the same business case. It is a mandatory 2 characters alphanumeric string value.
- **TimetableYear** – refers to the timetable period in which the business will be carried out. It is a mandatory numeric value (4 digits) in range 2012 to 2097.
- **StartDate** – it is an optional date value that represents the start of the date in effect

### Example

In the case that the DB Netz sends TCR with the ID=12345, the TCRID should look like as follows (the “StartDate” value is not included):

**TC – 0080 – 000000012345 – 00 – 2022**

An example of implementation in the XML:

```
<Example>
  <xs:TCRID>
    <xs:ObjectType>TC</xs:ObjectType>
    <xs:Company>0080</xs:Company>
    <xs:Core>000000012345</xs:Core>
    <xs:Variant>00</xs:Variant>
    <xs:TimetableYear>2020</xs:TimetableYear>
    <xs:StartDate>2019-12-08</xs:StartDate>
  </xs:TCRID>
</Example>
```

## CoordinatingIM element

This element is used to define which IM is responsible for the TCR and coordinates the process between IMs. It is important specially in the countries with more than one IM, where IMs are able to create TCRs for each other. This element is optional.

## TCR element

The TCR element is the most important element of this message. This element is of type of “**TCRType**” and it contains all the necessary information that describes the TCR object itself.

```
<xs:complexType name="TCRType">
  <xs:sequence>
    <xs:element ref="ReasonForRestriction"/>
    <xs:element name="Description" type="xs:string" minOccurs="0" />
    <xs:element ref="StartLocation" />
    <xs:element ref="EndLocation" />
    <xs:element name="Sections" type="SectionsType" minOccurs="0" />
    <xs:element ref="TCRDirection"/>
    <xs:element name="AffectedBorders" type="AffectedBordersType" minOccurs="0" />
    <xs:element name="AffectedIMs" type="AffectedIMsType" minOccurs="0" />
    <xs:element name="InvolvedICES" type="InvolvedICESType" minOccurs="0" />
    <xs:element name="TemporalExpansion" type="TemporalExpansionType" />
    <xs:element name="OperationalConsequences" type="OperationalConsequencesType"/>
    <xs:element name="ProjectID" type="xs:string" minOccurs="0"/>
    <xs:element ref="TCRStatus"/>
    <xs:element name="LastUpdated" type="xs:dateTime"/>
    <xs:element name="AutomaticProcess" type="xs:boolean" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```

The “**ReasonForRestriction**” element gives an indication about the works regarding the TCR. The following values are defined and can be used:

- 10 - Signal
- 20 - Switch
- 30 - Catenary
- 40 - Track/Rail
- 50 - Tunnel
- 60 - Bridge
- 70 - Miscellaneous
- 80 - Maintenance
- 90 - Other

```
<xs:element name="ReasonForRestriction">
  <xs:simpleType>
    <xs:restriction base="xs:token">
      <xs:enumeration value="10"/>
      <xs:enumeration value="20"/>
      <xs:enumeration value="30"/>
      <xs:enumeration value="40"/>
      <xs:enumeration value="50"/>
      <xs:enumeration value="60"/>
      <xs:enumeration value="70"/>
      <xs:enumeration value="80"/>
      <xs:enumeration value="90"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
```

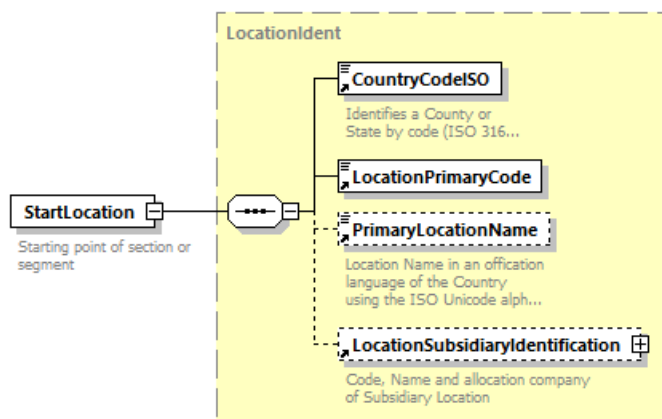
“**Description**” element is used to give a brief description of the TCR. It is optional element and can be used to make some more information related to the TCR. The type of this element is <xs:string>.

The “**StartLocation**” defines the beginning while the “**EndLocation**” defines the end location of the TCR. Both fields are mandatory and only locations associated with the country of the issuing IM are allowed. The location is described with the Country Code (CountryCodeISO) and Location Primary Code.

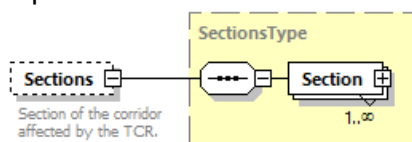
```

<Example>
<CountryCodeISO>AT</CountryCodeISO>
<LocationPrimaryCode>1003</LocationPrimaryCode>
<PrimaryLocationName>Wien Hbf</PrimaryLocationName>
</Example>

```



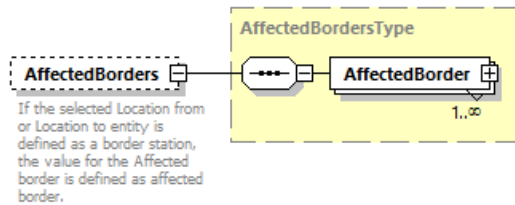
The “**Sections**” element defines the sections within where the TCR occurs. Multiple section items can be defined. This field is optional. The value must match the section which is computed from the fields “Location from” and “Location to”.



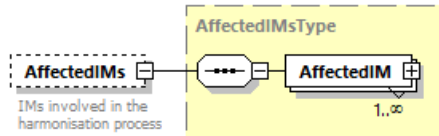
The “**TCRDirection**” field is mandatory and defines which direction of the section is affected by the TCR (bi-directional, a direction towards starting point of the location or direction towards ending point of the location). The values that can be used are the following:

- 10 – Both direction
- 20 – End to start
- 30 – Start to end

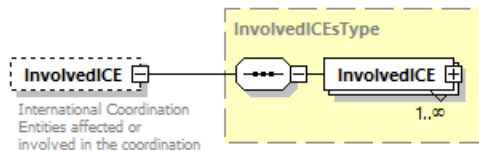
The “**AffectedBorders**” is an optional field used to define the location that is a border, in case that TCR touches or is define in this location. That means if the selected “Location from” or “Location to” entity is defined as a border station; this value should be set in the affected border field as well.



The “**AffectedIMs**” is an optional field used to involve the neighbouring IMs, that are affected by the TCR, in the harmonisation process.



The “**InvolvedICES**” is an optional field used to involve the International Coordination Entities that are affected or should be involved in the TCR coordination.



The “**TemporalExpansion**” is a mandatory field and it is used to define a date and time of the TCR, and also temporal expansion type and duration of the TCR.

When defining the “TemporalExpansion”, the attribute that defines the expansion type of the TCR should be chosen. There are two possibilities:

- **Periodical** - The characteristic of this event is described with a repeating pattern (e.g. work activities happen each Saturday and Sunday from 02:00 to 04:15). For periodical works, specific working days can be selected with checkboxes, where each checkbox represents the beginning day of each work. In the case of the given example with works on Saturday and Sunday from 02:00 to 04:15, the checkboxes Sat and Sun needs to be ticked (not Sat, Sun and Mon). A help-text (tooltip) is displayed when hovering over the label for working days and giving a brief description of the logic behind the temporal expansion of the TCR.
- **Continuous** - These events are characterized in a way that they occur non-stop during the TCR (e.g. a complete closure of a track from 01.07.2017 to 01.09.2017).

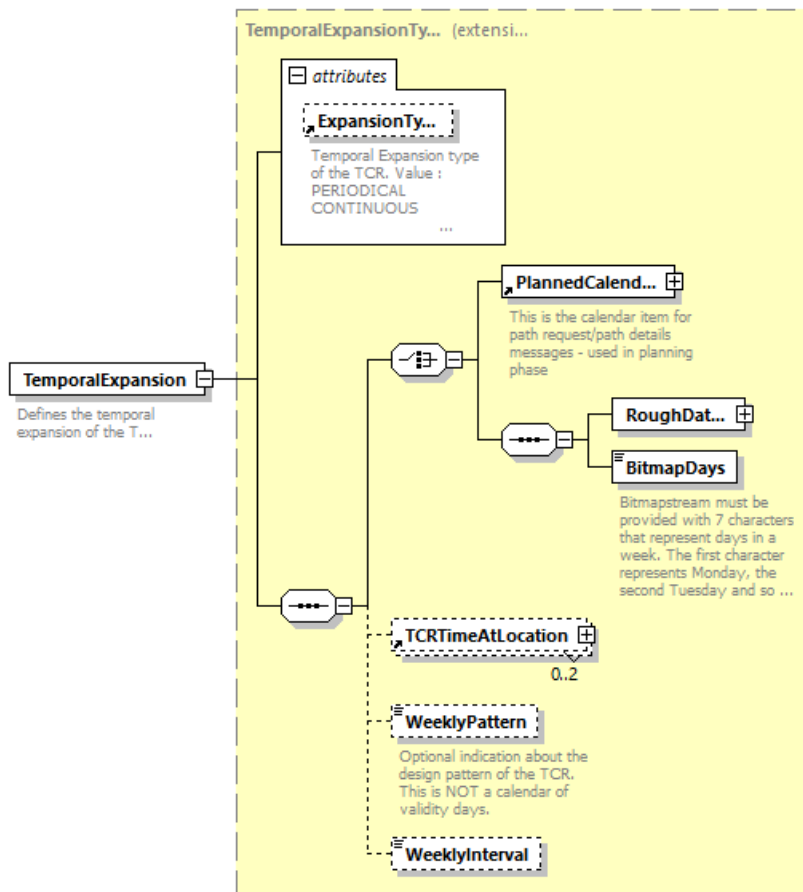
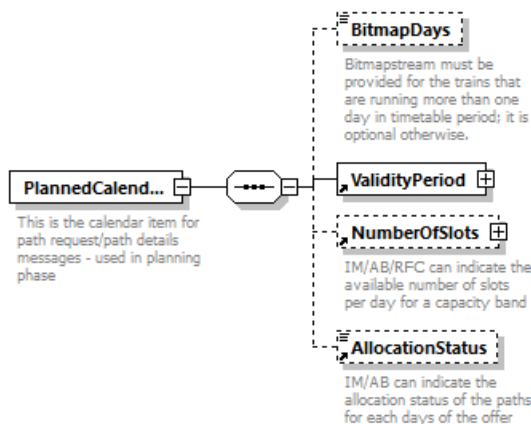


Figure 16 - Temporal expansion structure of the TCR

Depends if the exact time of the TCR is known or unknown, the “PlannedCalendar” or “RoughtDates” should be chosen.

The structure of the “PlannedCalendar” is chosen when the exact time of the TCR is known and its structure is as follows:



For the “Continuous” TCRs, the “BitmapDays” element will be used in a case of the irregularly validity days. In the case there is no irregularities, the “BitmapDays” can be avoid (not used).

For the “Periodical” TCRs it will be used to define all affected days. The weekly pattern will be defined with the “WeeklyPatern” element that represents days in a week. The first character represents Monday, the second Tuesday and so on.

That means, for the periodical TCRs that otccur every weekend from Friday to Sunday, the BitmapDays value looks as follows:

```
<BitmapDays>0000111</BitmapDays>
```

The “**ValidityPeriod**” element is mandatory and defines the start and end validity of the TCRs. With these elements the “Date/Time from” and “Date/Time to” values in the TCR Tool will be defined. The value of the element is DateTime.

Each of the temporal expansion types is defined by “StartDate” and “EndDate” and also by the “WeeklyInterval” in case of periodical and periodical continuous events.

```
<Example>
  <PlannedCalendar>
    <BitmapDays>0010100001010000101000010100001</BitmapDays>
    <ValidityPeriod>
      <StartTime>2020-10-17T09:30:47Z</StartTime>
      <EndTime>2020-11-17T09:30:47Z</EndTime>
    </ValidityPeriod>
  </PlannedCalendar>
  <WeeklyPattern>0101000</WeeklyPattern>
  <WeeklyInterval>1</WeeklyInterval>
</Example>
```

The “**NumberOfSlots**” and “**AllocationStatus**” elements are **NOT** related to the TCR Tool and these elements will not be explained here. Since the same object will be used for the capacity products, these two elements are defined to avoid multiplication of the same object.

The “**OperationalConsequences**” is a mandatory field to provide information regarding the consequences of the TCR on the operations. This includes the impact on traffic, classification of impact, traffic measures, necessary deviations and the incorporation of traffic measures in the yearly timetable. The impact on traffic triggered by TCR is:

- Reduced track availability (LT – Line track; ST – Station track)
- Dimensional restrictions: Weight, Length, Profile
- Total closure
- Speed restrictions
- No catenary
- Affected traffic volume – a volume of trains affected by TCR (in percentage)

The TCR classification is a mandatory field and classifies a TCR depends on its impact on the traffic, as presented in the table:

	<b>Consecutive days</b>	<b>Impact on traffic (estimated traffic cancelled, re-routed or replaced by other modes of transport)</b>	<b>Operator (Condition)</b>
<b>Major impact TCR</b>	More or equal 30 consecutive days	More than 50% of the estimated traffic volume on a railway line per day	>=30 days AND >=50%
<b>High impact TCR</b>	More than 7 and less than 30 consecutive days	More than 30% of the estimated traffic volume on a railway line per day	(>7 & <30) days AND (>30% & <50%)
<b>Medium impact TCR</b>	7 consecutive days or less	More than 50% of the estimated traffic volume on a railway line per day	<=7 days AND >=50%
<b>Minor impact TCR</b>	unspecified <sup>3</sup>	More than 10% of the estimated traffic volume on a railway line per day	“null” AND >10% & <50%

The traffic measures are defined by Cancellation, Re-routing, Replacement (Train/Bus) and Estimated delay values. For each of these measures the type of trains that are affected could be defined (freight, long distance, short distance, commuter). This field is optional.

The “DeviationLocations” is an optional field that defines a location within the own network, where the rail traffic shall be re-routed. The “DeviationBorders” is an optional field that defines a border where the rail traffic shall be rerouted. Also, some additional comments related to the deviation selection could be done.

The field “InYearlyTimetable” gives information on whether the TCR has been incorporated in the annual timetable or not. The field is mandatory.

The “**ProjectID**” is an optional field used by IMs to give information which their national project is related to this TCR.

The “**TCRStatus**” is an optional field used to define the status of the TCR. For the time being, the TCR status is defined automatically by the TCR tool regarding the process and cannot be set manually. Related to the simplification of the process, this field could be used to manually set the status of the TCR.

The “**LastUpdate**” is an optional field used to store information of the last TCR update.

### 3.4.2. TCRCanceledMessage

Using this message, IMs will be able to cancel the particular TCR that was sent to the TCR tool. It is important to highlight that the TCR will not be permanently deleted from the TCR tool database. The status of the TCR will be changed to “Canceled” and this TCR will not be editable anymore.

```
<xs:element name="TCRCanceledMessage">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="MessageHeader"/>
      <xs:element ref="TCRID"/>
      <xs:element name="Description" type="xs:string" minOccurs="0"/>
      <xs:element ref="TypeOfInformation" minOccurs="0"/>
      <xs:element ref="CoordinatingIM" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Only the IM who is the owner (creator / originator) of the TCR can cancel it. In a case of the cancellation, the TCR owner will send this message with the TCRID information to specify which TCR shall be cancelled.

The detailed technical specification for the implementation of the TCR messages (technical interface) on the national level can be found in the **Annex 4** of this document. Description of the Excel structure for TCR import is provided in the same annex as well.



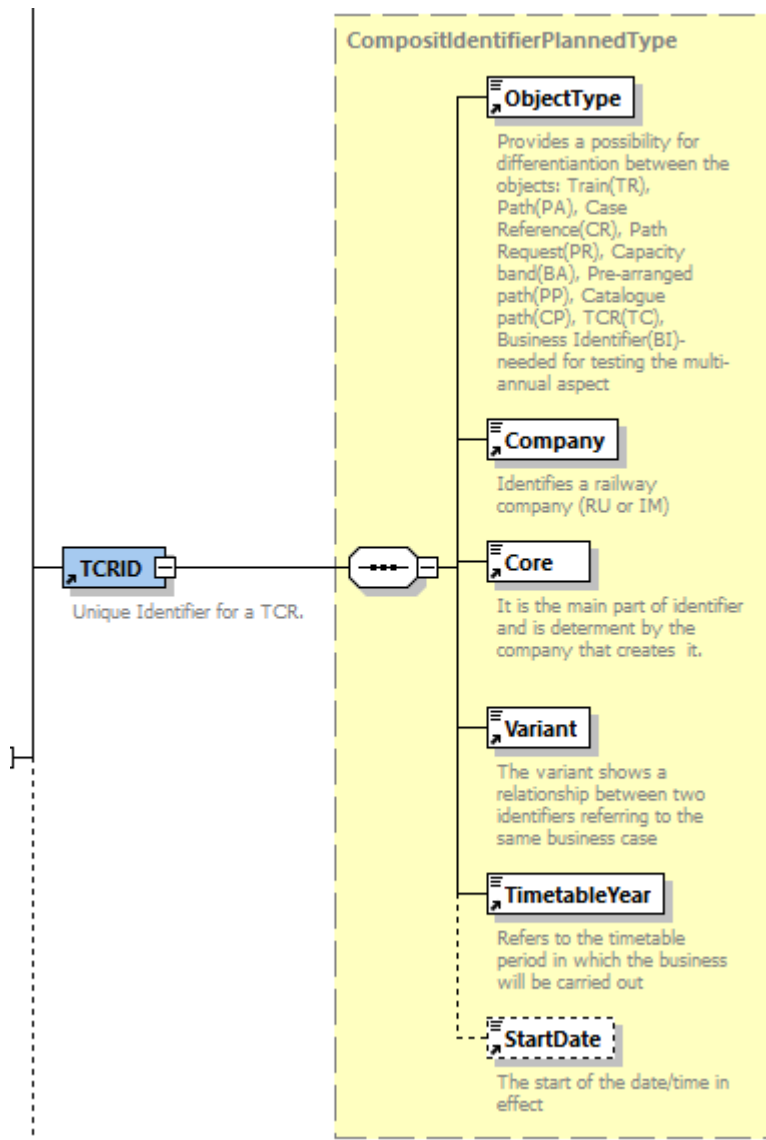


Figure 17 - TCR ID element structure

### 3.4.3. SearchCapacityProductMessage

To search for the TCRs, the “SearchCapacityProductMessage” shall be used. Using this message, it is possible to search for “negative” and “positive” capacity product. The TCRs represent the “negative” capacity product, while capacity products like capacity bands, catalogue paths and pre-arranged paths represent the “positive” capacity products.

The “SearchCriteria” contains two optional criteria elements:

- “TCRCriteria” – that is used to search for the TCRs
- “PositiveCapacityProductCriteria” – that is used to search all available products capacity bands, catalogue and pre-arranged paths that can be used (free, reserved or booked).

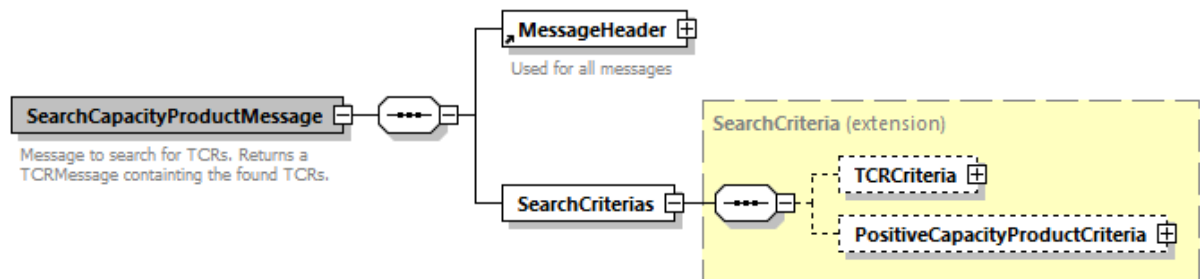


Figure 18 - Search Capacity Product Message

The TCR criterias or attributes that can be searched are as follows:

- TCRIDSearch – searches for the specific TCR ID.
- ReasonForRestrictionSearch – searches for the works regarding the TCR
- SectionsSearch – the sections that shall be searched
- TCRStatusSearch – searches for the status of the TCR. The currently defined statuses could be changed, depends on the process simplification
- DateFromSearch – the beginning date from which TCRs will be searched
- DateToSearch – the ending date to which TCRs will be searched
- ReducedTrackAvailabilitySearch – search for TCRs with reduced track availability for long or short distance trains
- DimensionRestrictionSearch – search for the TCRs with dimension restriction (weight, length, profile)
- TotalClosureSearch – search for the TCRs with total closure impact on traffic
- SpeedRestrictionSearch – search for the TCRs with speed restriction
- NoCatenarySearch – search TCRs with diesel only availability
- AffectedTrafficVolumeSearch – search TCRs that affects specific traffic volume
- TrafficMeasuresSearch – search TCRs with cancellation, re-routing, replacement and estimated delay measures
- InvolvedRFCsSearch – search TCRs by involved RFCs
- AffectedBorderSearch – search TCRs by affected borders
- AffectedIMSearch – search TCRs by affected IMs
- TCRClassificationSearch – search TCRs with a specific classification

The Positive capacity product criterias that can be searched are as follows:

- IDSearch – searches for a specific capacity product by identifier
- SectionsSearch – the sections that shall be searched
- InvolvedRFCsSearch – search capacity products by involved RFCs
- CapacityManagerSearch – search capacity products per responsible capacity manager
- AffectedBorderSearch – search capacity products by affected borders
- AffectedIMSearch – search capacity products by affected IMs
- DateFromSearch – the beginning date from which capacity products will be searched
- DateToSearch – the ending date to which capacity products will be searched
- ObjectTypeSearch – search capacity products per specific object type

### 3.4.4. CapacityProductMessage

The “CapacityProductMessage” shall be used to return the result of the Search Capacity Product Message.

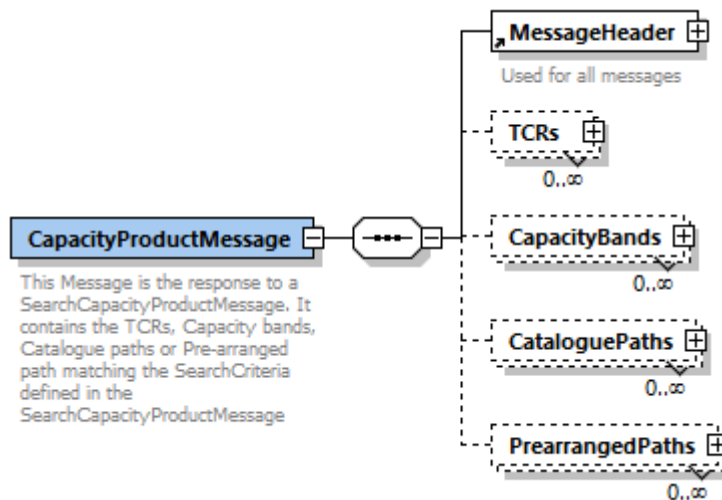


Figure 19 - Capacity product message structure

This message contains information related to the TCRs, Capacity bands, Catalogue and Pre-arranged paths. Depends on which capacity product was searched, information about the products that were implied with the search shall be returned.

## 3.5. Capacity process and capacity products

To be able to do the central and national implementation of the capacity products, it is necessary to understand the process. The aim of this part of the documentation is to show the process for the construction of the positive capacity products and describe the different use cases that shall be supported by the central and national implementation. The scope of this part of the documentation is to focus only the management (publication, modification) of the capacity product.

This topic is focusing on the detailed capacity model, where each product exists as a separated object. For a higher-level capacity model, where only the volume of traffic is exchanged among the IMs/ABs, a different approach, like sharing sheets and documents, can be applied.

The definition of how to make requests on the capacity products, including eventually multi-annual requests is not in the scope of this topic. Those can be found in the Path Request and Path Management module.

### 3.5.1. Identifiers

The usual structure of the TAF/TAP-TSI composite identifier is applied. As these objects are only planning related, the start date is not applicable.

- ObjectType: provides a possibility for differentiation among the objects, in this case: Capacity Band (BA), Pre-arranged Path (PP), Catalogue Path (CP)
- Company: identifies the company (IM/AB). Here, always the IM/AB identifier is used, even if the capacity is handled by an RFC

- Core: it is the main part of the identifier and is determined by the company that creates it
- Variant: it shows a relationship between two identifiers referring to the same business case
- TimetableYear: refers to the timetable period in which the business will be carried out

Similar to the Path Management module, if an IM/AB is not able or not willing to generate its own identifiers, the Central Tool will generate an identifier according to the structure above. For example, if VPE sends a Capacity Band to the Central Tool without an identifier, it will define an identifier like this:

```
<Example>
  BA – 3032 – *****415689 – 00 – 2022
</Example>
```

When the national identifier is generated, the Central Tool is able to store and return that in further communication.

### 3.5.2. Process

Currently, two of the RNE applications (PCS and ECMT) work with these capacity products in production, thus, their process was the baseline for the process definition.

From a high-level point of view, the process shall look like the following simple workflow. Detailed processes are in the **Annex 2**.



One process with the same process steps will be defined for all object types of positive capacity products. The information regarding their type is stored in the object type and in the type of request. It's the matter of the national implementation whether an IM/AB separates the process steps (phases) also according to the objects. For example, in PCS the phases are defined separately for CP and PP.

When we are going to the more detailed process, we must differentiate two processes that respect the same high-level aspect:

- Capacity product publication with RFC involved, as the current PP publication
- Capacity product publication without RFC, as the current CP publication

### 3.5.3. Impact of using the capacity products

As said at the beginning of the document, it's not in the scope of this part of the document to describe the request management process on the capacity. However, it's important to describe, what happens part of the capacity of the product is being used by an Applicant. Obviously, it will reduce the available capacity in the product for the other Applicants. When does that happen? It depends on the process type and from the product point of view, it's not even important.

### Calendar item aspects

So far, we were dealing with the published calendar of the capacity product. When it comes to using the product, we shall introduce the following calendar items:

- Remaining calendar: it means the calendar that is not yet requested
- Not reserved calendar: it means the calendar that is not yet reserved

In some process types, these two comes hand in hand, like in Ad-Hoc or Rolling Planning process types. There, the capacity reservation happens on a first-come-first-served logic. However, in the annual timetable process, there is a conflict resolution phase, where the Applicants can pick the days from the “not reserved calendar” even if someone else requested those already.

Please find here a demonstration of the different calendars.

Legend:

Published
Requested
Reserved
Not available

The situation, right after the publication:

- Published capacity: 1-7
- Remaining capacity: 1-7
- Not reserved capacity: 1-7

<b>Mo</b>		7	14	21	28
<b>Tu</b>	1	8	15	22	29
<b>We</b>	2	9	16	23	30
<b>Th</b>	3	10	17	24	31
<b>Fr</b>	4	11	18	25	
<b>Sa</b>	5	12	19	26	
<b>Su</b>	6	13	20	27	

The situation, when the request arrived in 1-4,7 and we are in the annual timetable process:

- Published capacity: 1-7
- Remaining capacity: 5-6
- Not reserved capacity: 1-7

<b>Mo</b>		7	14	21	28
<b>Tu</b>	1	8	15	22	29
<b>We</b>	2	9	16	23	30
<b>Th</b>	3	10	17	24	31
<b>Fr</b>	4	11	18	25	
<b>Sa</b>	5	12	19	26	
<b>Su</b>	6	13	20	27	

The situation, when the capacity is reserved for 1-4,7:

- Published capacity: 1-7
- Remaining capacity: 5-6
- Not reserved capacity: 5-6

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

The same applies when the capacity is requested or reserved partially from the geographical aspect. Let's have an example, where the above published capacity is available from A to D.

### A - B

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

### B - C

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

### C - D

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

However, the first request for 1-4,7 is valid only from A to C.

### A - B

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

### B - C

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

### C - D

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

Then, the Capacity Manager reserves the capacity.

### A - B

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	

### B - C

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	

### C - D

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	

Sa	5	12	19	26	
Su	6	13	20	27	

Sa	5	12	19	26	
Su	6	13	20	27	

Sa	5	12	19	26	
Su	6	13	20	27	

**Slots in Capacity Bands**

This logic is not restricted to the calendar days. The same can be applied for the slots too. Let's check a capacity band and the same publication – request – reserve triangle.

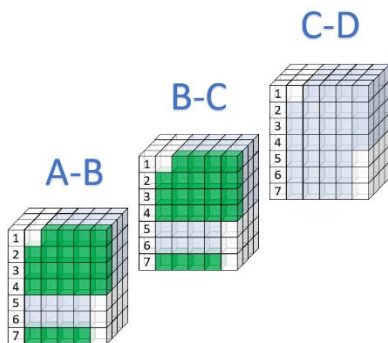
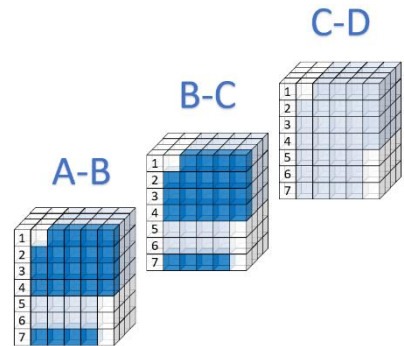
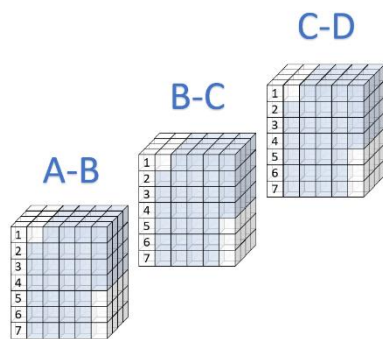
Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

Mo		7	14	21	28
Tu	1	8	15	22	29
We	2	9	16	23	30
Th	3	10	17	24	31
Fr	4	11	18	25	
Sa	5	12	19	26	
Su	6	13	20	27	

In this case, the formerly written calendar changes are valid only on the first slot of the capacity band, the rest remain untouched.

The geographical aspect is also valid.



**Returning the requested or reserved capacity**

What happens, if the Applicant changes its mind during or after the request. From the capacity product point of view, the timing is not important, but rather the impact and the way to follow that.

As you could see, the published calendar was never changed due to requests or reservation. It means, when an Applicant decides not to request the former selected capacity (withdraws, cancels, etc.), it shall be pasted back to the remaining and the not reserved capacity.

### *Calendar elements for positive capacity products in TTR IT*

The former explanation was important to understand the behaviour of the positive capacity products and the different kind of calendar aspects. **The Central Tool** will always keep **a registry of the published, remaining and not reserved capacity**. However, all of these calendars won't be presented in the schema.

When **IMs/ABs** are working on the capacity products, like in the use cases, the **published calendar** is propagated. Nationally, of course, a registry shall be kept by the IMs/ABs too for the other calendars.

Although, **Applicants** shall have the possibility to get information or even download the available capacity. If an Applicant asks for the positive capacity products, the Central Tool shall send back the objects with their **not reserved capacity calendar**.

## **3.6. Central implementation**

Since the capacity messages do not exist, it is needed to implement them into the TAF/TAP TSI schema. After acceptance of the SMO and JSG, the messages will be sent to the ERA for the final acceptance and implementation into the TAF/TAP TSI schema.

A new TAF/TAP TSI schema that will be provided by ERA, should be implemented in the central TTR IT framework.

### **3.6.1. Access Control**

The Central Tool provides access to the involved actors, but there are restrictions. Please find below the summary of this description.

#### **Elaboration**

The responsible IM, the affected IM(s) and the involved RFC(s) have always at least read-only access to the product.

The Capacity Manager (either the responsible IM or the RFC) has editing access to the product.

The affected IM has the option to set harmonization status (light) and place a comment on the product.

#### **Published**

All authenticated user has read-only access to the product.



The Capacity Manager (either the responsible IM or the RFC) has the option to withdraw, close or return capacity from the product.

As an Applicant, the read-only access doesn't mean equally requesting possibility. Even if a product is published, the request can be placed only according to the defined timeline, also matching the product's partition (for an annual timetable or rolling planning).

## **Closed**

The responsible IM, the affected IM(s) and the involved RFC(s) have read-only access to the product.

## **3.7. National implementation**

IMs/ABs on the national level have to implement the capacity product and TCR messages in their national systems to exchange capacity data with the Central TTR IT Framework using the interface.

### **3.7.1. Use case overview**

Regardless of the object types, the use cases are quite similar for each of them. That is why, below you can find a general use case for an object, but later, in the use case details, the separated explanation is provided for each object type. The same applies to the involvement of an RFC. Thus, in the use case overview, we applied only the phrase "product".

Each use case will contain the explanation of how to do a particular action, but also how the involved parties are notified by that.

The use cases will focus on the different types (message, information, request, etc.) and we consider the Path Information and Band Information elements as trivial. Only the relevant elements will be highlighted.

#### **Before publication**

1. Create a product with and without affecting a border
2. Update product as work in progress
3. Setting green light, harmonization accepted
4. Setting red light, harmonization rejected or placing a comment
5. Transfer a product
6. Publication of a product
7. Close product

#### **After publication**

8. Withdraw a product
9. Return capacity from a product
10. Modify a product (alteration)
11. Close product

The use case details contain information about the exchanged messages. The process descriptions in the **Annex 2** have them as well. Please note that the descriptions are focusing on communication with the Central Tool. However, the same message exchange can be utilized for bilateral communication among IMs/ABs only, without involving the Central Tool. In that case, only the sender/recipient information shall be adjusted accordingly.

## **Create a product with and without affecting a border**

IMs/ABs have several possibilities when they create new capacity products. Please find here the options:

- Type of the product. It can be CP, PP or BA
- The product is on an RFC line or on a non-RFC line
- The product affects another IM and requires international coordination
- The responsible IM remains the capacity manager or it transfers the capacity to an RFC

We won't describe all the possible combinations, but the document will give you the information on how you should apply the different fields for your situation.

### **Create CP on a non-RFC line without affecting neighbouring IM/AB**

ÖBB would like to create a CP from Linz Hbf to Wien Hbf. It's a national section that is not part of any RFC in this example. The IM/AB can rely on Capacity Product Coordination message to create the capacity product.

#### **Capacity Product Coordination message:**

- Message header:
  - Sender: 0081 (ÖBB)
  - Recipient: 3178 (RNE)
- TOR: 9 – Catalogue Paths
- TOI: 30 – Create Dossier
- MS: 1 – Creation
- Identifier:
  - CP – 0081 – \*\*M-AMA12345 – 00 – 2022
- Capacity Manager: 0081 (ÖBB)

As a result of this message, the Central Tool will create the new object and generate its own internal identifier. That will be part of the Case Reference ID. To notify about this action the creator IM/AB, the Central Tool sends back a Receipt Confirmation message.

#### **Receipt Confirmation message:**

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 9 – Catalogue Paths
- TOI: 30 – Create Dossier
- Identifiers:
  - CR – 3178 – \*\*\*\*\*219456 – 00 – 2022
- Capacity Manager: 0081 (ÖBB)
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: CP – 0081 – \*\*M-AMA12345 – 00 – 2022

### **Create Capacity band on an RFC line without transferring the capacity, affecting the neighbour IM/AB**

VPE would like to create a BA from Ferencváros to Győr. It's a national section, however, they would like to inform about this object the neighbouring IM. It's important that they can do

this. Similar to the TCRs and the TCR tool, each object that reaches the border, automatically affects the neighbour. However, even if an object is national, an IM/AB can start international coordination, because the object goes close enough to the border. In addition, this section lays on an RFC line. Thus, VPE shall decide whether it transfers the capacity to RFC7. In this use case, the capacity won't be transferred to RFC7. It will be only marked as an involved RFC, just like in the TCR tool.

**Capacity Product Coordination message:**

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 30 – Create Dossier
- MS: 1 – Creation
- Identifier:
  - BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation message:**

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 30 – Create Dossier
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: BA – 3032 – 2022321745\*1 – 00 – 2022

Because ÖBB was marked as affected by VPE, the Central Tool will send a notification to ÖBB. In case VPE doesn't mark ÖBB as affected IM, but the product reaches the border of VPE/ÖBB, the Central Tool will add this information automatically to the object and it will send out the notification to ÖBB.

**Capacity Product Coordination message:**

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 30 – Create Dossier
- MS: 07 – Create an offer
- Identifier:
  - BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

## **Create a Pre-arranged path on an RFC line and transferring the capacity, without affecting neighbouring IM/AB**

In this case, VPE would like to create a PP between Ferencváros and Győr, and it is handed over to RFC7 from the capacity management point of view. The procedure is rather similar to the previous one with slight changes. Now, VPE doesn't feel the need to mark ÖBB as affected IM and as it's not touching the border, not even the Central Tool would mark them.

### **Capacity Product Coordination message:**

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: 30 – Create Dossier
- MS: 1 – Creation
- Identifier:
  - PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

Before checking the confirmation from the Central Tool, what's the difference compared to the previous example?

Involved RFC is RFC7 in both cases, but with the BA VPE kept its capacity manager position and with this PP it transfers it to RFC7. This is in line with the current Pre-arranged Path process in production. With the creation of the PaPs, the IMs/ABs give the capacity to the RFCs.

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 30 – Create Dossier
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: PP – 3032 – 2022321748\*1 – 00 – 2022

There is no affected IM, meaning the Central Tool shall not send any further notification. The RFC will get information about the action, but not via TAF TSI message as they are using the Central Tool directly.

### **Particularities with RFCs**

As a section on a line can belong to more RFCs, it's possible to include more involved RFCs in an object. It works the same with the TCRs in the TCR tool. However, the capacity management shall be in the hand of one C-OSS Manager, meaning in one object only one RFC can be nominated as Capacity Manager.

## **Update product as work in progress**

In this case, the IMs/ABs are updating their timetable (Path or Band information) in the Central Tool. It will be demonstrated with two examples:

- VPE updates a BA which affects the border that triggers a notification to ÖBB
- RFC7 updates a PP that triggers a notification to VPE

If there is no RFC – IM/AB relation or affected IM, an update won't trigger a special notification to other parties.

### **IM/AB updates product with affected border**

VPE sends an update on the BA – 3032 – 2022321745\*1 – 00 – 2022. As ÖBB marked as affected IM, the Central Tool will broadcast the update information. As the object has been already created in the Central Tool and the identifier has been communicated to VPE, it shall include this identifier in the update message.

#### **Capacity Product Coordination message:**

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 01 – Harmonisation - in process
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation:**

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 01 – Harmonisation - in process
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB will receive **Capacity Product Coordination message** as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 01 – Harmonisation - in process
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)

- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### **RFC updates product**

The object is still in the Elaboration phase and it allows the RFC (as Capacity Manager) to update its content. The update itself happens on the GUI of the Central Tool, however, notification shall be sent out to the IMs/ABs.

#### **Capacity Product Coordination message:**

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: 01 – Harmonisation - in process
- MS: 1 – Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

### **Setting green light, harmonization accepted**

For products handled by RFCs, it's the RFC who sets the light (harmonisation status). The explanation is simple, the capacity is already harmonized among the IMs/ABs when the RFC gets it. However, in our case, we shall cover the process of the whole capacity harmonization. Therefore, the IMs/ABs involved in the international coordination will set their lights to green. Conclusion: always the Capacity Manager and the Affected IMs must set light.

*Notice: if the capacity has been already transferred to the RFC and the RFC sets green light, the IM/AB will get a notification via Capacity Product Coordination Message.*

To finish the harmonization process, the green light is necessary from each involved IM/AB, meaning also the affected ones.

#### **ÖBB can set green light with Capacity Product Coordination Message:**

- Message header:
  - Sender: 0081 (ÖBB)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 02 – Harmonisation - accepted
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 7 – Capacity Bands
- TOI: 02 – Harmonisation - accepted
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier:
    - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

VPE gets the notification about ÖBB's action with a **Capacity Product Coordination Message**:

- Message header:
  - Sender: 0081 (ÖBB)
  - Recipient: 3032 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 02 – Harmonisation - accepted
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### ***Setting red light, harmonization rejected or placing a comment***

The procedure is the same as the green light, with TOI: 03 – Harmonisation – rejected.

In addition, a mandatory comment shall be pasted in the free text field on the message level with the reason for rejection.

When an affected IM would like to place only comment on the product, the same procedure shall be applied with TOI: 01 – Harmonisation – in process.

### ***Transfer a product***

Transferring product or actually capacity can happen between an IM/AB and an International Coordination Entity, in our case, an RFC. It means the change of the company code in the Capacity Manager field. At the end of the transfer, the company whose ID is in the Capacity Manager field will be responsible for handling the product. The transfer itself can happen anytime during the Elaboration phase.

## From IM to RFC

In our example, there is already a BA on an RFC line, but still in the hand of VPE. If they decide to transfer this BA to RFC7, VPE can do it with a Capacity Product Coordination Message.

### Capacity Product Coordination Message:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: XX – Capacity transfer
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: XX – Capacity transfer
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB will receive **Capacity Product Coordination** message as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: XX – Capacity transfer
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

## From RFC to IM

Transferring the capacity can happen vice versa and, in this case, the RFC will transfer the capacity to the IM. Of course, the RFC will do this on the GUI of the Central Tool, but the IM/AB will be notified. In our example, there is a PP that is a good candidate for this showcase.



### **Capacity Product Coordination Message** sent to VPE:

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: XX – Capacity transfer
- MS: 1 – Creation
- Identifier:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### **Publication of a product**

In a previous use case (setting green light) we wrote that the Capacity Manager and the Affected IMs must set green light. Based on this, the publication is possible only for the Capacity Manager of a product. Of course, if the Capacity Manager is an RFC, the IM/AB will get notification about the publication.

### **Publication by an IM/AB**

As VPE is the Capacity Manager for BA – 3032 – 2022321745\*1 – 00 – 2022, it's possible for them to publish it. When there is an affected IM, the Central Tool will inform them about this change.

VPE sends **Capacity Product Details Message** to publish the band:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: XX – Publish capacity
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: XX – Publish capacity
- Related Reference
  - Related Type: Capacity Product Details Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB gets **Capacity Product Details Message** as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: XX – Publish capacity
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### **Publication by an RFC**

As today, Pre-arranged Paths are published by the RFCs. We have one in our example for RFC7 and it's possible for him to publish. The C-OSS Manager user would this on the GUI of the Central Tool, but the IMs/ABs involved will get the notification.

VPE gets **Capacity Product Details Message** as notification

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: XX – Publish capacity
- MS: 1 – Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

### ***Close product before publication***

As for any dossier, the Central Tool shall support the closure of a product. We are still before the publication, meaning the closure is possible at any time for the Capacity Manager company. The Capacity Manager can be either an IM/AB or an RFC, depending on the former settings.

### **Closed by an IM/AB**

VPE shall send **Capacity Product Coordination message** to close their band:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 31 – Close dossier
- MS: 1 - Creation

- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 31 – Close dossier
- Related Reference
  - Related Type: Capacity Product Coordination Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB will receive **Capacity Product Coordination message** as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 31 – Close dossier
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### **Closed by an RFC**

When an RFC, in our case RFC7, decides to close a capacity product, he would do it on the GUI of the Central Tool. In this case, the involved IMs/ABs will be notified. Let's take the example when RFC7 would close his Pre-arranged Paths.

VPE gets **Capacity Product Coordination Message** as notification

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: 31 – Close dossier
- MS: 1 – Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

## Withdrawal a product

Once a product becomes obsolete, there should be an option for the Capacity Manager to withdraw that from the offer. This is true; however, it shall match certain pre-conditions:

- The capacity product is **published**: if it's not the case, there is nothing to worry about, because the product is not yet public. If the Capacity Manager wants to get rid of this product, it can use the close product option.
- The capacity product is **not used** by anyone (Applicant): if the product is already used by someone, e.g. requested or even reserved, the withdrawal is not possible. The option of removing the rest of the capacity from the offer is still valid, but for that, please check the capacity return use case.
- Withdrawal is possible **only for Capacity Manager**

As a result of the withdrawal, the capacity product will go back to the Elaboration phase.

### Withdrawal by an IM/AB

VPE shall send Capacity Product Not Available message to withdraw their band:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 29 - Withdrawal
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation**:

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 29 - Withdrawal
- Related Reference
  - Related Type: Capacity Product Not Available Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB will receive **Capacity Product Not Available message** as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 29 - Withdrawal
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)

- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### Withdrawal by an RFC

When an RFC, in our case RFC7, decides to withdraw a capacity product, he would do it on the GUI of the Central Tool. VPE gets Capacity Product Not Available Message as notification that RFC7 has withdrawn a PP.

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: 29 – Withdrawal
- MS: 1 – Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

### Return capacity from a product

It was already mentioned partially under the Withdrawn use case. When a product is published and also used by someone, e.g. requested or even reserved, but the Capacity Manager would like to reduce the rest of the capacity, this procedure should be used.

*Notice: according to the current RFC process, inside a given timeframe, usually inside 30 days window, even the Central Tool can return the capacity and then the IMs/ABs can use that capacity for their ad-hoc business.*

As a result, the product will remain in the Published phase, but with reduced capacity (the published calendar is updated). The returned capacity becomes free and the IMs/ABs can include their planning for other processes.

Depending on the percentage of the return, it can be either full or partial. Even if this can be applied for Capacity Bands too, in order to avoid too much additional TOIs, we use here 32 – Path cancelled full or 33 – Path cancelled partially.

*Notice: even the full return is available, it doesn't make much sense. If that's the case, it's recommended to use the withdraw option.*

### What can we return?

If there were only Pre-arranged Paths and Catalogue Paths, the answer would be simple: calendar days. However, this procedure applies for the Capacity Bands too, where the Capacity Manager can reduce the available slots too.

### Returned by an IM/AB

VPE shall send **Capacity Product Not Available message** to return the capacity in their band:

- Message header:
  - Sender: 3032 (VPE)

- Recipient: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 32 – Path cancelled full/33 – Path cancelled partially
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

As an answer, Central Tool sends back **Receipt Confirmation:**

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 7 – Capacity Bands
- TOI: 32 – Path cancelled full/33 – Path cancelled partially
- Related Reference
  - Related Type: Capacity Product Not Available Message
  - Related Identifier: CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022

ÖBB will receive **Capacity Product Not Available message** as a notification:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE)
- TOR: 7 – Capacity Bands
- TOI: 32 – Path cancelled full/33 – Path cancelled partially
- MS: 1 - Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*145876 – 00 – 2022; BA – 3032 – 2022321745\*1 – 00 – 2022
- Affected IM: 0081 (ÖBB)
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 3032 (VPE)

### Returned by an RFC

VPE gets **Capacity Product Not Available Message** as notification that RFC7 has returned capacity from a PP via the GUI.

- Message header:
  - Sender: 1006 (RFC7)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 8 – Pre-arranged Paths
- TOI: 32 – Path cancelled full/33 – Path cancelled partially
- MS: 1 – Creation
- Identifiers:
  - CR – 3178 – \*\*\*\*\*123475 – 00 – 2022; PP – 3032 – 2022321748\*1 – 00 – 2022
- Involved RFCs: 1006 (RFC7)
- Capacity Manager: 1006 (RFC7)

### ***Modified a product (alteration)***

Alteration process on capacity products is not available. If there is a need to apply a change for a certain part of a capacity product, the following approach shall be followed:

- Withdraw the product, if possible, do the update and publish again
- If the withdrawal is not possible, then return the capacity from the product and publish new capacity with the updated information.

### ***Close product after publication***

The procedure and the messages are the same as for the closure before publication, however, the same pre-conditions are valid as for the withdrawal.

## **4. Capacity Requests (X-11 to X+12)**

At X-11, all the capacity which were prepared during the Advanced planning phase are published as the capacity products. These published capacity products are used by Applicants to requests their capacity needs for the annual timetable, rolling planning and ad hoc (including short-term ad hoc) traffic.

### **4.1. Annual requests**

Capacity requests for the annual timetable, including the examples are provided in the chapter [5.4. Path Management module](#) (under the national implementation).

According to the TTR Process, a new path request deadline is moved to X-8.5 (the initial path request deadline was at X-8).

### **4.2. Rolling Planning requests**

The Rolling Planning requests can be placed at any time by respecting the deadline between X-4 to X-1 before the first day of operation.

Description of the rolling planning requests process and especially multi-annual requests shall be provided in the separate specification document.

### 4.3. Ad hoc and short-term ad hoc requests

The explanation of the short-term ad hoc concept requests is roughly described in the chapter [4.8. Capacity Broker](#).

This chapter describes the concept itself but the detailed description shall be provided in a separate specification document (will be provided as an annex to this document).

## 5. Modules (Microservices)

TTR IT Landscape modules cover all the functionalities of business processes. In figure 1, the basic overview of data exchange between modules is done. Communication and data exchange between the modules will be explained in more details in each of the modules' topic. The more detailed description of the data flow between the modules can be found in **Annex 3** of this document.

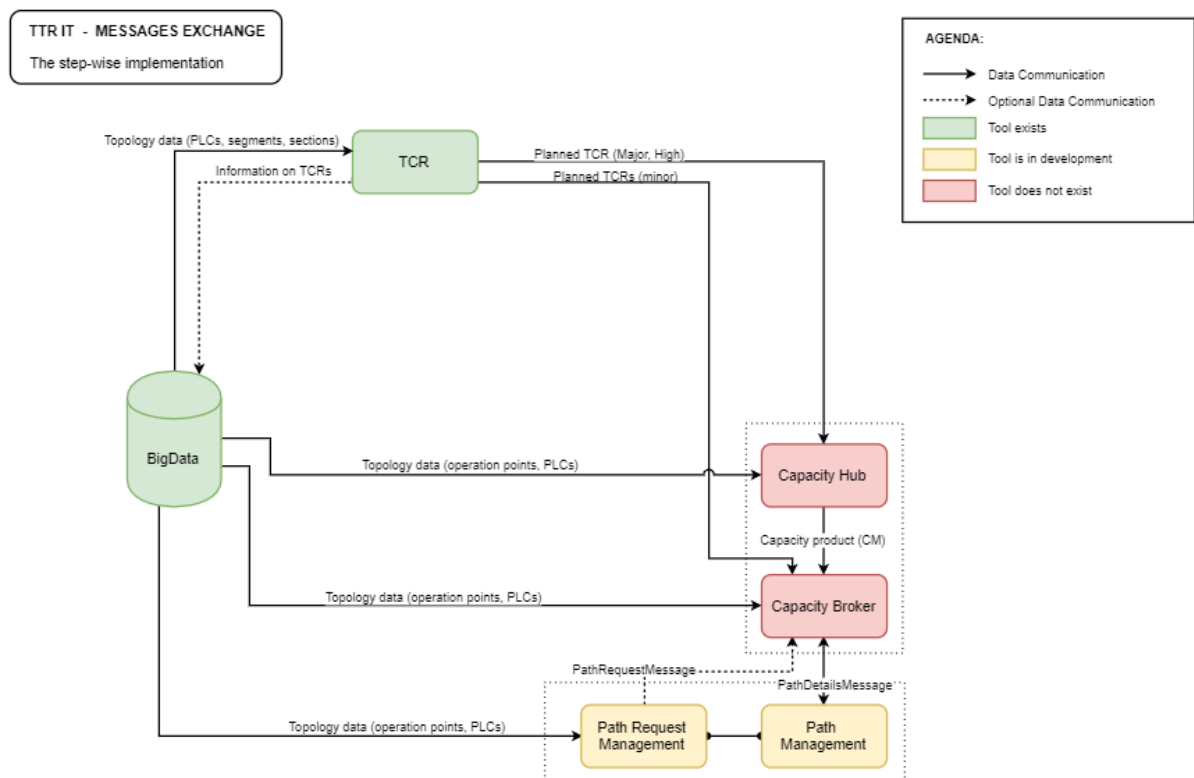


Figure 20 - Basic data flow between modules



## 5.1. Messaging module

The Messaging module is the main module to ensure and establish communication between Central TTR IT framework (RNE central systems) and external systems of IMs and applicants and is the single point of connection between the systems. The module is completely based on the TAF/TAP TSI messages exchange.

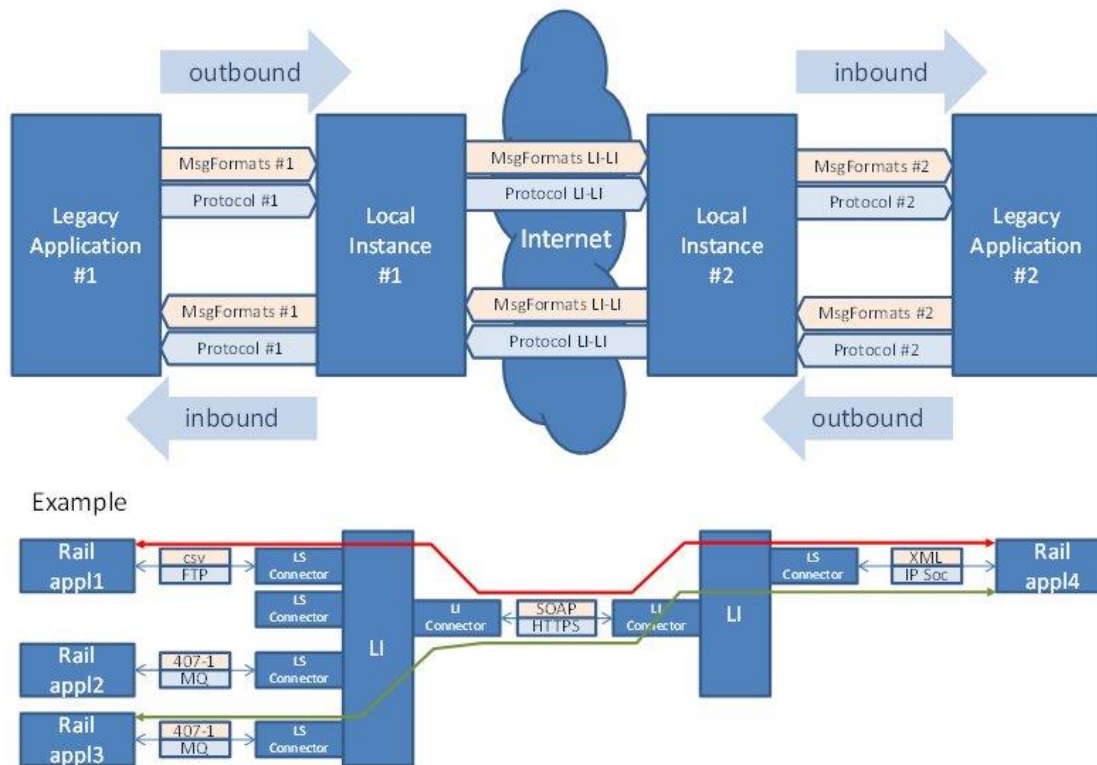


Figure 21 - Message Transfer based on Configurable Protocols and Message Formats

National/stakeholders' systems will communicate with the Central TTR IT Framework with TAF/TAP messages (extended with Sector messages like PathCoordinationMessage) through the Common Interface of the Messaging module. IMs have a possibility to use the Messaging module for communication with their RUs or other IMs.

The Common Interface (CI) will be used in the Messaging Module due to its functionality of "reliable messaging", in order to be able to react appropriately to the communication breakdown between the systems. The Common Interface is already productively intensively used in real-time messaging (especially in RNE TIS) and has been proven as a reliable system for messaging by offering the possibilities of storing and resending the messages that failed in the delivery.

The communication will be done similarly as today between national systems and RNE PCS system.

The CI is a technical tool that supports the interoperable exchange of messages and is a part of the Common Components System (CCS).

CI can be locally installed in customers' datacentres, it is peer to peer application (a message transformation middleware), which does the transformation from legacy format of messages into common or shared metadata format (XML) and vice versa. CI can also exchange other customer-specific messages if the conditions concerning the message structure are met.

Messages are sent and received through an open message queue, which is the interface between the Translation & Validation layer of the Common Interface and the Security & Transport layer of the Common Interface. The Security and Transport layer manages the delivery and receipt of messages to and from the public network side of the Message Queue. The Translation and Validation layer and API layer manage the receipt of data from and delivery of data to the systems in use on the internal side of the Message Queue.

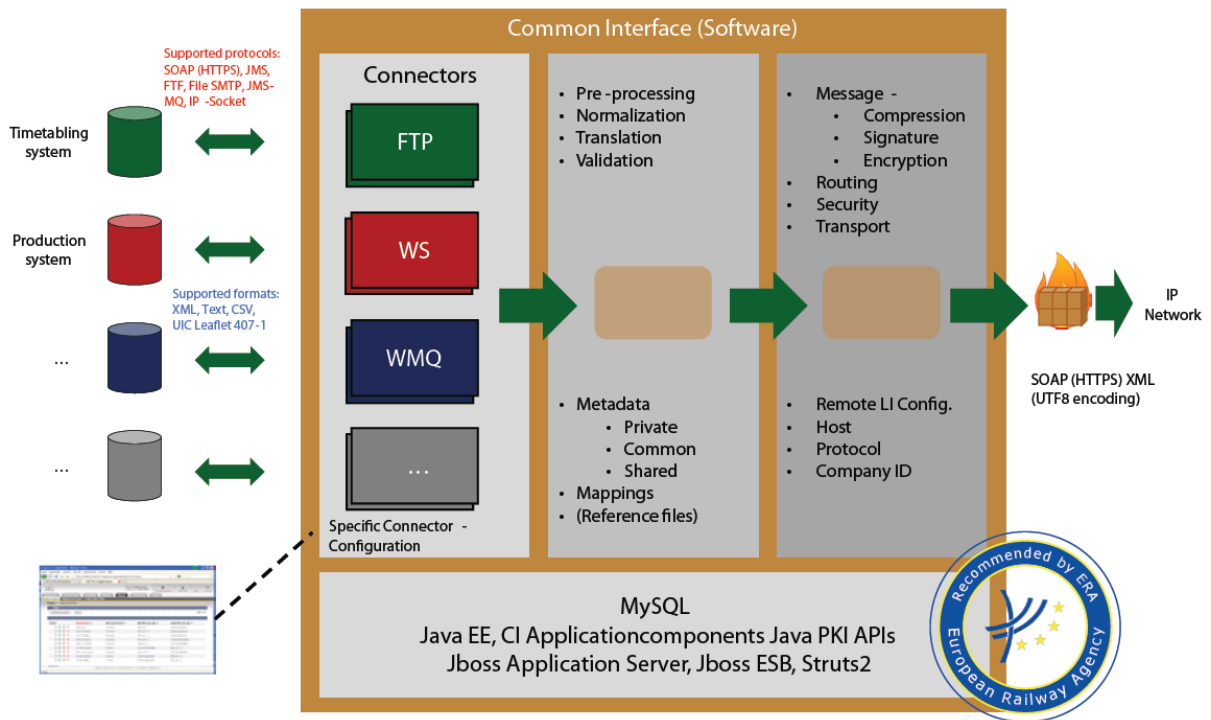


Figure 22 - Functional structure of the CI

### 5.1.1. Centralized master data

Access to the Master data is not needed since the Messaging module is used to support a message exchange between the modules of the Central TTR IT framework and external (stakeholders) systems.

#### Minimal requirements

Using the version 2.1 of the Common interface (CI).

#### Additional requirements

Support a bilateral communication (data exchange) between IM and RU partners without consulting a central system.

### 5.1.2. Integration options

All the communication between the Central TTR IT framework and national systems (and vice versa) should be sent through the Messaging module and messaging must be established within the TAF/TAP TSI.

## **Minimal requirements**

### Object updates

All objects defined in the modules

### Schema and message definition

All TAF/TAP TSI based messages defined in the modules

### Endpoint and communication

Communication between all modules inside the central TTR IT framework and national systems

## **Additional requirements**

Ensure the communication between partners on the bilateral bases (exchanging TAF/TAP TSI messages or customer-specific messages) and support them to not create different interfaces to establish communication with each stakeholder. The stakeholders may use one point of connection to communicate with others.

### **5.1.3. Connection to other modules**

## **Minimal requirements**

Support message exchange between all modules and between central TTR IT framework and national systems in all directions

## **Additional requirements**

Support exchange of the customer specific messages (bilateral communication between partners).

### **5.1.4. Central implementation**

There is no need for any additional development of the CI to support the first phase of the TTR IT Landscape implementation in the sense of the functionality.

The settings in the RNE CI should be made for the companies that still did not establish a connection to CI.

The CI configuration should be simplified by implementing the wizard for the “step-by-step” procedure from Remote LI, via Heartbeat to Outbound Routing configuration. The idea is to dramatically speed up the process of the configuration, especially for the newcomers. Also, the guidance for the users should be provided, which will reduce the configuration errors which in the most cases cause major delays in CI to CI communication establishing. The details about the proposal of this “step-by-step” wizard development is described in the **Annex 5**.

Another development to improve the CI is related to development of APIs for Monitoring. Currently, there is possibility to integrate CI in monitoring tools via SNMP events which can be broadcasted from CI. However, for the applications which have the possibility of seamless integration (which is now state-of-the-art), it would be useful that CI provides an API which can be used on demand for, at least, querying of message validation and broadcasting status. This is just a minimal set of API methods that would help a lot in the integration of CI in the application landscape. It can be implemented as REST or SOAP.

Details about the proposal for the API (for monitoring) development, is described in the **Annex 6**.

Additional possibility, that could be considered is development in CI to be able to exchange data using json. Such a specification shall be prepared after implementation of the minimum TTR IT Landscape requirements for the TT2025 (described in this document).

### 5.1.5. National implementation

To start communicating and exchange messages with the central TTR IT framework, some prerequisite must be done. These prerequisites include set up of the local interface (LI) and establishment of the heart bit between the systems. There are documents that explain in detail how to install and set up the CI.

## 5.2. BigData module

The BigData tool was developed as a collaboration tool for topology visualization and handling topology modifications on the map. The BigData contains railway network topology and contains specialized views of that topology adapted to each RNE's system.

The BigData tool synchronizes data with CRD (Central Reference File Database) and contains the whole set of information as the CRD database. The CRD as a centralised database that stores Location codes and Company codes required by European regulation and makes them available to users. The CRD introduces the concept of "Primary locations" and "Subsidiary locations". In addition, in the BigData the segments and sections data are created.

Considering some international Rail Topo Models (e.g. RINF, IRS 30100), we can say that the BigData is based on the macro level infrastructure data. It is considering the implementation of the RINF database and with this data, the BigData database will be cover the meso level network. For the future, the implementation of a meso level network model is necessary.

The general requirements to the necessary infrastructure data from TTR's point of view (defined by Core Group 6) are the following (see **Annex 9 - TTR needed infrastructure data for more details**):

- Segment
  - Identification – PLCs of the connected nodes with their country codes
  - Distance – needed for the presentation purposes in the capacity model and capacity supply
  - Validity
  - Line
  - Number of tracks
  
- Track
  - Identifier
  - Validity
  - Speed
  - Electric system
  - Train control system
  - Max. axle load
  - Gauge
  - Length

### 5.2.1. Centralized master data

As the first step of the TTR IT Landscape implementation, **the RNE BigData should be the Master data for all modules of the central TTR IT framework.**

It is important that every module uses the same infrastructure data.

Each module will have its own database to store transactional (raw) data created inside the module.

#### Minimal requirements

The latest version of the BigData tool, with the completely integrated CRD as a data source for ground topology, will be used as a minimal requirement and the first step for the BigData module implementation.

IMs and ABs continuously update data in the CRD by providing the latest infrastructure information. It is necessary that IMs/ABs and CRD database has the same infrastructure data to avoid “non-existence” or wrong data presentation.

#### Additional requirements

For the second step and the whole BigData module implementation, additional information on the tracks and locations should be provided. This additional information includes the data related to the electricity, number and type of tracks (single, double, fast track for passenger, tracks for freight, etc.), line category, etc. The meso level network model should be defined and implemented.

To fulfil this requirement, BigData database will be extended and synchronized with the RINF database or provided infrastructure data from the national systems in a standardized way, to describe the infrastructure for upcoming timetable years.

### 5.2.2. Integration options

The frequent synchronization of the company and geo-topology data with the CRD database is necessary to keep data up to date. Companies deliver their infrastructure data to the CRD database and this data is synchronized with the BigData database and will be reused by modules of the central TTR IT framework.

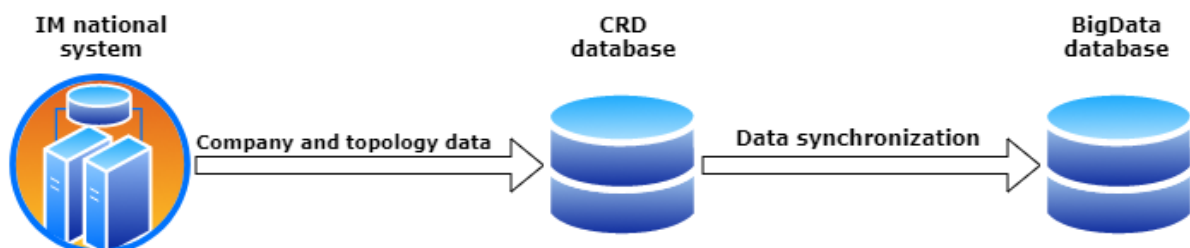


Figure 23 - Topology data synchronization

#### Minimal requirements

##### Object updates

Synchronizing the data using the views exposed through database synonyms. The following objects are synchronized: Country, Company, Location (Primary location, Subsidiary location).

### Schema and message definition

To provide master data for every module, the views created in the BigData database will be used.

### Endpoint and communication

#### **TCR Tool (TCR)**

- BigData -> TCR Tool (input data) – master topology data like Company, Locations, Segments, Sections, Layers
- TCR Tool -> BigData (output data) - reference database views as TCR exports synonyms

#### **Path Management (PM)**

- BigData -> (input data) – master topology data like Company, Locations, Segments, Sections, Layers

#### **Path Request Management (PRM)**

- BigData -> TCR Tool (input data) – master topology data like Company, Locations, Segments, Sections, Layers

### **5.2.3. Connection to other modules**

#### **Minimal requirements**

The BigData will exchange infrastructure data with the following modules: Path Management, Path Request Management, TCR

#### **Additional requirements**

Provide a view on the topology data for external systems in case of stakeholder's request. Data shall be provided via the Messaging module.

### 5.3. Capacity Needs Announcements (CNA)

It is foreseen that RUs should indicate and expressed their needs about the trains in the next timetable year.

Currently, there is no internationally used application for this purpose. The intention is to use the "Capacity Wish" form which is currently in use (**Annex 8** of this document). RUs will indicate the volume, length range, weight range, types of locomotives in use, a rough idea of a timetable, calendar and schedule.

Related to decision from the FTE members, data will be imported directly to the Capacity Hub module (ECMT) using the CNA Excel file structure (see Annex 8).

There will not be developed a separate module for the Applicants.

#### 5.3.1. Centralized master data

It is necessary to have access to the Master data for communication with IMs in order to be able to indicate the operation points in the "Capacity Wish" form. For Master data, the overview of lines and agglomeration of the stations on the lines is needed. Since the CNA is not the official request, and it is too early especially for freight railway undertakings to specify the precise location, the agglomerated stations should be provided in the master data (infrastructure topology from BigData database).

#### Minimal requirements

CNA Excel file structure for the creation and import CNA data. According to this Excel file structure, the ECMT functionality for the import and export must be developed.

#### Additional requirements

No additional requirements defined.

#### 5.3.2. Integration options

##### Capacity Needs Announcements

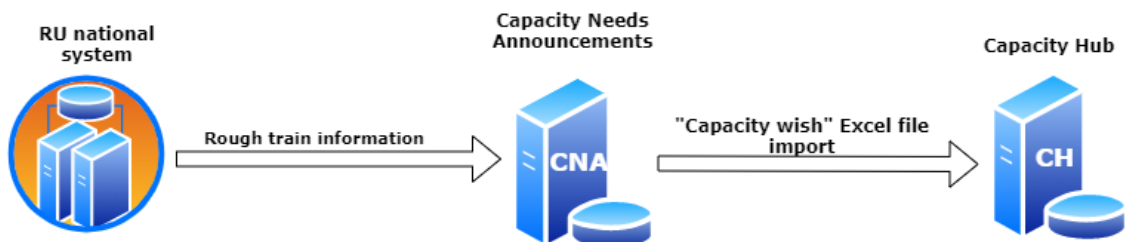


Figure 24 – Capacity Needs Announcements data exchange

## **Minimal requirements**

### Object updates

Capacity needs announcements can be edited until submission. The capacity needs announcements can be adapted after submission in order to provide the IM with more precise data for planning of the capacity. The objects that should be exchanged are the following: Train, Number of trains per line.

### Schema and message definition

The minimum data set in the message is the dataset given in the CNA Excel file structure defined in the Annex 8.

### Endpoint and communication

#### **Capacity Hub**

- CNA -> Capacity Hub (input data) – sending of CNA objects via the CNA Excel file structure.

### **5.3.3. Connection to other modules**

#### **Minimal requirements**

Connection to Capacity Hub to exchange the CNA Excel file information.

## **5.4. Path Request Management (PRM)**

Preparation and harmonization of path request between the partners, based on the train prepared in Path Request Management module, including the capacity products indication, will result in the construction and delivery of the path request in high quality.

The RNE Path Coordination System (PCS) is developed towards preparation and harmonization, as well as submitting of Path Request. The new release of PCS designed for "Empty Envelope Concept", does the sub-path division of the requested timetable of the train, without touching the Train object. It solely focuses on preparation and harmonization of the "clean" path request, which helps IMs to deliver the draft and final timetables more quickly and efficiently.

### **5.4.1. Centralized master data**

It is necessary to have access to the Master data for communication with IMs in order to be able to indicate the operation points (infrastructure topology from BigData database) in the path request.

#### **Minimal requirements**

Current PCS version with the EEC function.

#### **Additional requirements**

Connection to Capacity Broker



## 5.4.2. Integration options



Figure 25 - Path Request Management module data exchange

The communication with Path Management module, currently integrated into the PCS system, is necessary in the case of separation of the modules. The messaging must be established within the TAF/TAP TSI framework for the path request process.

### Minimal requirements

#### Object updates

Harmonization of path request objects between RU partners.

Communication to Train Harmonization module to receive the Train timetable and send the UpdateLinkMessage.

Communication with Path Management module by sending the path request and receiving the path details information.

Objects that will be used are a train, path, rolling planning slot, TCR, number of trains per line.

#### Schema and message definition

The full range of TAF/TAP TSI framework messages like Path Request, Path Coordination, Path Details, Path Confirmed, Path Details Refused, Path Cancelled, Object Info and Update Link messages must be supported.

#### Endpoint and communication

##### **Path Management (PCS)**

- PRM -> PM (input data) – communication via standard TAF/TAP TSI messaging framework using PathRequestMessage, PathCoordinationMessage, PathConfirmedMessage, PathDetailsRefusedMessage, ObjectInfoMessage, ReceiptConfirmationMessage
- PM -> PRM (output data) – communication via standard TAF/TAP TSI messaging framework using PathDetailsMessage, PathCoordinationMessage, PathCanceledMessage, UpdateLinkMessage

### Additional requirements

Communication to Capacity Broker - to be defined for inquiry of capacity

## 5.4.3. Connection to other modules

### Minimal requirements

Connection to Train Harmonization module

Connection or integration with Path Management module

## **Additional requirements**

Connection to Capacity Broker module

### **5.5. Path Management (PM)**

Path Management module has all the functionalities to work with the path requests and to harmonize them. It further optimizes international path coordination by ensuring that path requests and offers are harmonized by all involved parties. It will work together with Broker module to harmonize paths for all RUs requests.

The RNE PCS is an application for path requests, path management and pre-constructed product publication. It is an international application for ordering and harmonizing new and late path requests, ad-hoc path requests and feasibility study requests. PCS is also used for path modification and alteration.

#### **5.5.1. Centralized master data**

PCS was developed with a stand-alone infrastructure dataset. The following information is stored:

- Operation points with names, country ISO and Primary Location Codes
- The validity period of operation points

Considering some international Rail Topo Models (e.g. RINF, IRS 30100), we can say that the tool is prepared for macro level infrastructure data, but only with nodes. For the future, the implementation of a mezzo level network model is necessary.

PCS has locally stored the code lists that are part of TAF/TAP TSI. Based on former discussions in the TAF/TAP TSI Community, these code lists, including national codes and national messages shall be part of a Central Repository.

## **Minimal requirements**

As part of TTR implementation, PCS shall be connected to RNE's central database for topology, called RNE BigData. Further on the locations and any other infrastructure related data should be originated from RNE BigData.

Code lists related to PathInformation element shall be synchronized from a Central Repository, e.g. TrainActivity, BrakeTypes, NetworkSpecificParameters, etc.

## **Additional requirements**

Based on the defined stops (operation points), PCS shall always generate a route. In the timetable, only the stops shall be presented, rest shall be stored in the route (e.g. run through points).

PCS shall check if the defined PlannedTrainTechnicalData fits the selected geography (RNE BigData requirement):

- Catenary information
- Gauge information
- Speed information
- Etc.

## 5.5.2. Integration options

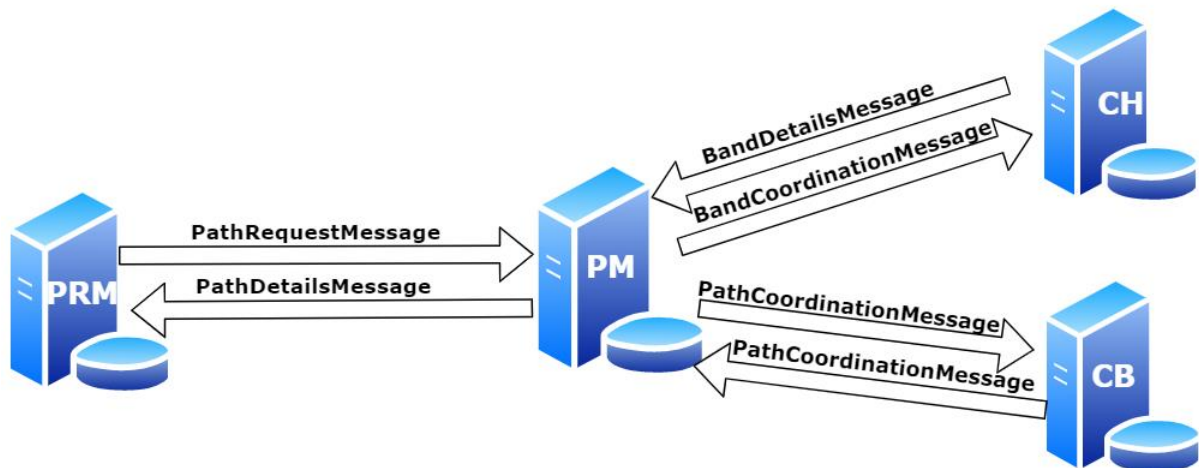


Figure 26 - Path Management module data exchange

### Minimal requirements

#### Object updates

Capacity band object with its process shall be implemented.

Process steps and harmonization shall be moved to the path level (sub-path in PCS) from the dossier Applicant - IM pair level.

Case Reference (dossier in PCS) shall be able to contain paths with different process types and harmonization status.

Path object shall be updated to the latest state of PathInformation element of TAF/TAP TSI.

#### Schema and message definition

XSD proposal for capacity handling (fields for pre-arranged paths, catalogue paths, capacity bands).

Message proposal for handling catalogue paths shall be defined for TAF/TAP TSI (not necessarily the new message, but perhaps new Type Of Information (TOI), new optional fields).

XSD proposal for a technical link among timetable period related objects for the multi-annual request/allocation.

Process proposal for Capacity updates shall be prepared (for catalogues and capacity bands).

#### Endpoint and communication

##### **Path Request Management**

- PRM -> PM (input data) – communication via standard TAF/TAP TSI messaging framework using PathRequestMessage, PathCoordinationMessage, PathConfirmedMessage, PathDetailsConfirmedMessage, PathDetailsRefusedMessage, ObjectInfoMessage, ReceiptConfirmationMessage, ErrorMessage
- PM -> PRM (output data) – communication via standard TAF/TAP TSI messaging framework using PathDetailsMessage, PathCoordinationMessage, PathCanceledMessage, UpdateLinkMessage, ErrorMessage, PathNotAvailableMessage

##### **Capacity Hub**

- CH -> PM (input data) – communication via standard TAF/TAP TSI messaging framework using BandDetailsMessage, BandNotAvailableMessage, BandCoordinationMessage
- PM -> CH (output data) - communication via standard TAF/TAP TSI messaging framework using BandCoordinationMessage (e.g. rolling planning)

## Capacity Broker

- CB -> PM (input data) - communication via standard TAF/TAP TSI messaging framework using PathCoordinationMessage, PathDetailsRefusedMessage, PathNotAvailableMessage, PathDetailsConfirmed
- PM -> CB (output data) – communication via standard TAF/TAP TSI messaging framework using PathCoordinationMessage

Common Interface endpoint shall be opened for PCS.

PCS shall be able to send and receive TAF/TAP TSI messages related to working with the available objects. Foreseen messages: ReceiptConfirmation, ErrorMessage, PathDetails, PathCoordination, PathRequest, PathDetailsConfirmed, PathDetailsRefused, PathNotAvailable, UpdateLink, ObjectInfo, new messages for capacity bands.

### 5.5.3. Connection to other modules

#### Minimal requirements

Capacity Hub module

- Paths, catalogue paths and capacity bands shall be created and updated (also in case of request) in Capacity Hub.

Path Request Management module

- Path Requests shall be taken over from the Applicant part (PRM module) of PCS to the Path Management of PCS
- Path Request and Path Details shall follow the same process
- Next to the Path ID, the Path Request ID shall be also stored in the path object of the Path Management
- PCS (PM) shall allow linking several Path Details to one Path Request
- The link between the Train object and the path objects shall be stored and ensured
- After allocation PCS shall be able to generate daily objects, daily path variants and provide the data to the Train harmonization.

Capacity Broker module

- PCS shall keep a dedicated part where the Broker can store the running timetable calculations. This functionality could be useful because later on it will be possible to compare to response from the Broker and official offer from the IM in the timetable.
- PCS shall allow the Broker to update its timetables with the received running time calculations.

#### Additional requirements

TCR module

- Potential conflicts with TCRs shall be shown during the path request and path elaboration phase

### 5.5.4. Enhancement of the functionality

#### Minimal requirements

##### Multi-annual allocation

A new technical link shall be implemented among timetable period related objects (dossiers, sub-paths).

Rolling Planning as a composite process type shall be implemented (composite = the process itself can be shorter, longer depending on the date of submission and the first day of

operation. In some cases, it's a simple path request process, in other cases several rounds of iteration with capacity request and allocation)

The right part (version) of the composite Rolling Planning process shall be applied for paths according to date of submission and the first day of operation.

#### Daily calendar

Calendar days of a path, catalogues and capacity bands shall be stored in a daily calendar instead of the currently used bitfield.

For permanent support of the TAF/TAP TSI message, until they are not changed, the daily calendar shall be exported to bitfield.

Additional information shall be stored for the running days, like:

- Number of available slots for capacity bands
- Different flags of allocation for paths

### **Additional requirements**

#### Multi-annual allocation

A new view shall be implemented where all objects, related to one of the new technical links, can be handled.

### **5.5.5. Central implementation**

As a central tool, PCS already supports all necessary TAF/TAP TSI messages needed for path requesting and harmonization.

The multi-annual request, for multiple timetable periods, should be developed in the PCS. Currently, in the PCS, it is possible to create a rolling planning request only for one year (yearly timetable) using the “Rolling planning” process type. In this case, the same messages that are used for the path request and harmonization shall be used for the rolling planning as well.

Requesting a multi-annual path, users should be able to select “Rolling planning” process type any time of the year for any timetable period (max 36 months) that is available for dossier creation.

The development of the multi-annual path should take into account the following:

### **5.5.6. National implementation**

This topic provides a guide for IMs/ABs to synchronize their timetables with PCS from the national systems. It does not cover the whole RU – IM communication, because of the focus on the PCS – IM communication as a special dialect of the TAF-TSI communication.

The following messages should be integrated:

Message	Description
Path Request Message	PCS will deliver the path requests to the IMs with Path Request messages
Path Details Message	IMs can send all of their offers to PCS with Path Details message
Path Confirmed Message	PCS will deliver the information about the acceptance of the Final Offer to IMs with this message

Error Message	In case there is any mistake regarding the update, PCS will send back Error messages with PCS specific error codes inside
Path Details Refused Message	PCS will deliver the information about the rejection of the Final Offer to IMs with this message
Path Coordination Message	IMs can send all of their updates before the offer with Path Coordination message. Also, all notifications from PCS (except RU originated) are sent via Path Coordination message
Path Not Available Message	IMs need an option to delete an existing path in PCS. They can do it with this message

It is important to highlight that the Receipt Confirmation message is not mentioned in the list. For PCS communication it's not necessary. It's important to state that PCS is a synchronous system, meaning there is no option for waiting for a message for minutes, hours or sometimes even days. For further details, please check the special use case that deals with the Receipt Confirmation message.

### **Identifiers in PCS**

PCS is prepared to handle TAF TSI identifiers and even more, they are mandatory in the dossiers. However, as most of the agencies are not ready yet to work with these identifiers, the system is able to generate them automatically. The logic is simple; when the user wants, it's possible to include the id, if not, the system takes care of it. Let's see the logic in practice for the different identifiers.

### **TRAIN ID**

During the dossier creation and in the Open phase, the dossier creator agency is allowed to select the company whose company code will be part of the Train ID. Then it's also possible to define the core element. The timetable period is coming automatically from the timetable period of the dossier (also known as Case Reference). The variant is set to 00 by default.

When the user creates the path requests in the dossier (called as sub-paths in the Applicant timetable) and their origin/border/destination varies, then the user must link them to different Train ID variants.

#### What happens, when the user doesn't provide the Train ID?

PCS will generate a Train ID. If the creator agency has UIC ID, then it will be added as company code, if not, then PCS will add 3178 as RailNetEurope. For the core element, the dossier ID will be used, and the variants are automatically increased as a sequence if there is a change in the origin/border/destination.

<Example>

TR - 3178 - \*\*\*\*\*215987 - 00 - 2020, where 215987 is the dossier ID.

</Example>

### **PATH REQUEST ID / PA ID**

There is a slight difference compared to the Train ID. Companies can still define their own PR ID/PA ID, but only if it's a machine to machine communication, meaning via an interface. PCS has its fields in the schema, called `tsi_path_id`. This field keeps the PR ID in the Applicant timetable, and the PA ID in the IM timetable.

## What happens, when the user doesn't provide the PR ID/PA ID?

It can happen quite easily. Basically, it is the case for all the GUI users. PCS follows the same logic as for the Train ID, but now not the dossier ID will be inserted to the core element, but the PCS path ID, which is an internal PCS identifier. Company codes are entered with the same logic as for the Train ID, but the variants here are always 00.

<Example>

PA - 3032 - \*\*\*\*\*488078 - 00 - 2020.

We may check it more details in the Path Request paragraph.

</Example>

For IMs, it's **important** to **store all** the **IDs** you **receive**, because you should **send them back**. Also, please note that as you can see, the **system is able to handle your own, national identifiers**.

## *Network-specific parameters vs National IM parameter*

PCS and TAF TSI have the common option and these are apart from the common train parameters each IM has the possibility to define his national IM parameters for covering the national particularities. These parameters can be defined on the following levels:

- **Dossier level:** in TAF TSI this would mean message level network-specific parameter

- Example in PCS XML schema:

```
...
<processtype_id>H</processtype_id>
  <national_im_parameter id="78118">
    <name>D01 - Vertriebskanal</name>
    <value>PCS</value>
  </national_im_parameter>
...
```

- Example in TAF TSI XML schema:

```
...
</ns1:PathInformation>
  <ns1:NetworkSpecificParameter>
    <ns1:Name> D01 - Vertriebskanal </ns1:Name>
    <ns1:Value> PCS </ns1:Value>
  </ns1:NetworkSpecificParameter>
</ns1:PathCoordinationMessage>
```

- **Path section level:** in TAF TSI this would mean planned journey location level network-specific parameter

Both are working with a name/value pair. In addition to the TAF TSI options, in PCS the IMs can define the required format of the parameter and the application checks their entry format. That is why it is needed always respect the defined format of the parameter, otherwise, PCS will send back an error message.

Possible formats in PCS:

- String
  - Min numbers of characters >= 1

- Max number of characters  $\leq 256$
- Single choice list
- Multiple choice list
- Number
  - Min number of digits  $\geq 1$
  - Max number of digits  $\leq 12$
- Date
  - dd.mm.yyyy
  - yyyy-mm-dd
- Time
  - hh:mm:ss
  - hh.mm
- Datetime
  - dd.mm.yyyy hh:mm:ss
  - dd.mm.yyyy hh:mm

### Loco Types

Since version 2.2.3. loco types are handled with a composite identifier in TAF TSI. In PCS, it's also possible for the IMs to publish that are allowed to run on their network (it was developed a couple of years before the TAF TSI XSD change). However, there is a slight difference between the two structure. Let's check first the TAF TSI structure.

- Type Code 1: it's always 9
- Type Code 2: general vehicle type
  - 0 Miscellaneous
  - 1 Electric locomotive
  - 2 Diesel locomotive
  - 3 Electric multiple-unit set (high speed) [power car or trailer]
  - 4 Electric multiple-unit set (except high speed) [power car or trailer]
  - 5 Diesel multiple-unit set [power car or trailer]
  - 6 Specialised trailer
  - 7 Electric shunting engine
  - 8 Diesel shunting engine
  - 9 Special vehicle
- Country code
- Series number

PCS has its own TAF TSI generator and there the locos are stored in this format, but as they are stored originally in PCS, not all the options are supported. The main difference is the Type Code 2 because PCS stores that information in three fields and can generate the code based on their combination:

- Engine type: diesel, electric, hybrid, steam
- Top speed
- Multiple units: yes/no

From this information, PCS can tell whether a loco is in Type Code 2 "1", "2", "3", "4" or "5", but not more than that.

Country code is originated from the IM's UIC ID that published the loco type.

The series number is not always kept in 4 digits because not every IM was able to publish their loco types with UIC numbering. If you are planning to use TAF TSI communication, please check first your loco types in PCS.



## Example description

The example mentioned in the scope topic (see 1.2. topic), shows a PCS dossier (216481) that contains two trains (one core element with two variants). The example itself is a 2RU - 2IM situation with ÖBB (0081) - RCA (2181), VPE (3032) - GYSEV-C (2143) pairs. The leading agencies are in the second pair.

The reason for the two trains is the two different destinations in Hungary (please check the outline below). The trains are split according to weekdays (1-5) and weekends (6-7).

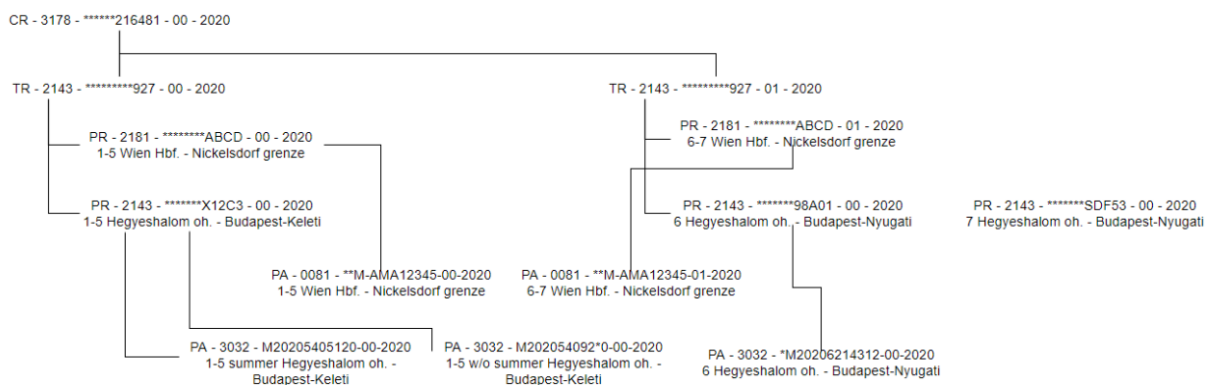
RCA splits its path requests according to the trains. However, GYSEV-C has two path requests for the second train variant, one for Saturdays (6) and one for Sundays (7).

ÖBB prepares one-one paths as an offer to the received path requests. VPE sends two paths for the weekdays; one for the summer period and for the rest. However, the requests for the weekends cannot be met, that is why they send offers only for Saturdays.

The example tries to demonstrate also the actions when a partner finished already the harmonization (set green light in PCS), however, the neighbor changes something at the border. In this case, PCS (the application itself) automatically downgrades the harmonization status of the partner.

## Objects

The following objects will be used during the example.



For the demonstration purpose different kind of concepts are used for the identifier generation:

- RCA prepares the different path requests with the same core element and utilizes the variants to make differentiation
- GYSEV-C generates always fully random (but unique) core elements for the Path Requests and leaves the variant 00.
- ÖBB, similar to RCA, prepares the different paths with the same core element and utilizes the variants to make differentiation
- VPE, similar to GYSEV-C, generates always fully random (but unique) core elements for the paths and leaves the variant 00.

## **Use case overview**

Before jumping into the details, please find here an overview of the use cases that we tried to cover with this example.

### **Path Request**

1. Get information about Path Request
2. Pre-accepted Offer

### **Path Elaboration and Post-Processing**

3. Timetable updates as work in progress
4. IM would like to delete a path from PCS
5. Setting green light in PCS and informing the partner IMs
6. Sending an update affecting the border
7. Offer (draft or final) is sent to the Applicants
8. Setting red light in PCS and informing the partner IMs
9. Rejecting dossier in PCS
10. Sending an update that contains calendar days of existing paths
11. Leading applicant withdraws the dossier
12. Leading IM closes the dossier

### **Observation and Acceptance**

13. IM gets back the dossier from Observation
14. Leading applicant closes the dossier
15. Applicant's decision in the Acceptance phase

### **Active Timetable**

16. Close dossier

### **Receipt Confirmation and Error message**

17. The necessity of Receipt Confirmation
18. Error Message from PCS
19. Error Message to PCS

### **Path modification / Path Alteration**

*To be developed in a separate Handbook document.*

## **Path Request**

Applicants have already finished their harmonization and they submitted path requests in PCS. Let's check what happens in the different process types:

- New Path Request: dossier arrives at Path Request phase
- Late Path Request: dossier arrives at Path Elaboration phase
- Ad-Hoc Path Request (currently supported via TAF-TSI connection): dossier arrives at Path Elaboration phase
- Rolling Planning Path Request: dossier arrives at Path Elaboration phase
- It's clear that for most of the process types the "Path Request" is only a milestone. The exception is the New Path Request where the leading IM has to release the dossier to Path Elaboration (change request is pending to change this too). To do that the

Leading IM can send Path Coordination to PCS with TOI 07 (create offer). In this case, the message has the following elements:

- Message header:
- Sender: 3032 (VPE as leading IM)
- Recipient: 3178 (RNE)
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 07 – Create an offer
- Identifiers: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

It's enough to have one message with one path. It doesn't matter how many paths are existing, because the IM makes its actions on the dossier or on the dossier Applicant – IM pair.

### What happens in PCS?

It's more important to note what happens in PCS when the leading Applicant sends the dossier to path request. PCS copies the Applicant timetable to an IM timetable block.

In our example there are five path requests (2+3), which are represented with sub-paths in PCS:

- ÖBB receives PR - 2181 - \*\*\*\*\*ABCD - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 - 2020
- VPE receives PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PR - 2143 - \*\*\*\*\*SDF53 - 00 – 2020

As part of the copy of the timetables, PCS creates five sub-paths in the IM timetable. However, as the TAF TSI identifiers are mandatory and there was no IM activity so far in the dossier, it must generate its own PA IDs:

- ÖBB: PA - 0081 - \*\*\*\*\*412000 - 00 - 2020; PA - 0081 - \*\*\*\*\*412001 - 00 - 2020
- VPE: PA - 3032 - \*\*\*\*\*412002 - 00 - 2020; PA - 3032 - \*\*\*\*\*412003 - 00 - 2020; PA - 3032 - \*\*\*\*\*412004 - 00 – 2020

When an IM doesn't have an interface connection, the GUI user can start working on these paths immediately. However, if the IM has a connection, the first moment when they start sending their own IDs, PCS deletes the prepared sub-paths. After that, when the IM sends with IDs that are already known by PCS, PCS will update the paths accordingly, because the system knows the ID pairs, e.g.:

PCS path ID 412005 = VPE path PA - 3032 – M20205405120 - 00 - 2020

### Get information about Path Requests

We already saw what happens in PCS, but how does the IM get information that path requests arrived? In this case, PCS broadcasts Path Request messages to the affected IMs as the following.

To ÖBB two messages will be sent.

- Message header:
  - Sender: 2181 (RCA)
  - Recipient: 0081 (ÖBB)

- Broker: 3178 (RNE) with PCS LI number
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 4 – Harmonization completed
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 – 2020

To VPE three messages will be sent.

- Message header:
  - Sender: 2143 (GYSEVC)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE) with PCS LI number
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 4 – Harmonization completed
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*SDF53 - 00 – 2020

The content of the messages is trivial. They get Train Information and Path Information. It's up to them, whether they use the Train Information element, but the Path Information shall be imported to their system. As said before, all the IDs shall be stored, because they must be used later when the IM provides an answer. Just as a reminder, the IM cannot answer two path requests with one path.

### **Pre-accepted offer**

PCS is able to handle Ad-Hoc path requests with a pre-accepted offer; however, it's handled with a special process type. Right at the beginning of the dossier creation, the leading Applicant shall select the Ad-Hoc path request process with a pre-accepted offer.

In this case, the IMs get this information with the Path Request messages. For example, ÖBB would get two messages with the following information.

- Message header:
  - Sender: 2181 (RCA)
  - Recipient: 0081 (ÖBB)
  - Broker: 3178 (RNE) with PCS LI number
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 19 – Pre-accepted offer
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 00 – 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 – 2020

## *Path Elaboration and Post-Processing*

The below written use cases are valid basically for Path Elaboration and Post-Processing, but most of them can be used in any phase where the IMs have editing rights, e.g. Feasibility Study Elaboration, Path Modification Elaboration, Path Alteration Conference.

### **Timetable updates as work in progress**

In this step, the IMs are updating their timetable in PCS. In this example, it will be demonstrated with VPE. As presented in the Objects part, VPE has three paths to offer. To do so, VPE shall send three **Path Coordination message** like the following. Please note that as we wrote previously, even though VPE will send three paths, it doesn't mean they send one for each path request. They could not make the Sundays, but they send different offers for the weekdays.

Three Path Coordination messages with:

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 2 – Harmonization in process
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 - 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

This mechanism can be used either for creating new paths in PCS or updating an existing one. With this action, the IM can create or update the timetable, parameters or calendar of the path. If a location is not mentioned in the path that was part before, PCS will interpret as a delete. For calendar changes, the IM shall send only a new calendar bitfield with the message.

As part of the notification service, PCS will send (forward) these messages to ÖBB (or all involved IM of the dossier, if there are more) as **Path Coordination messages** like the following.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 2 – Harmonization in process
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 - 2020

- Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

### **IM would like to delete path from PCS**

Normally, with PCS web-services this action is quite simple. The IM can use the updateDossierRUIMPair operation and it should not mention the particular paths. PCS will interpret this action as a delete. In TAF TSI, the messages are sent path by path, meaning there is a need for a dedicated message to cancel a path in PCS.

The IM can rely on the **Path Not Available message** with the following content.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2- Request
- MS: 1 – Creation
- TOI: 21 – No alternative available
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

With this action VPE would delete PA - 3032 – M202062114312- 00 – 2020 from the dossier.

As part of the notification service, PCS will send (forward) these messages to ÖBB as **Path Not Available message** as the following.

- Message header:
- Sender: 3178 (RNE)
- Recipient: 0081 (ÖBB)
- TOR: 2- Request
- MS: 1 – Creation
- TOI: 21 – No alternative available
- Identifiers: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

### **Setting green light in PCS and informing the partner IM about it**

Changing the harmonization status is important in PCS and TAF TSI either. There is a slight difference that in PCS the harmonization status (the so-called acceptance indicators) are set on the pair level and not on the path level. Meaning, it's enough to send only one of the paths with its identifier. It saves communication on the IM side but also needs an adaptation. Be careful that until you are not done with your paths, don't send this message to PCS, because it will set your light to green for all included paths of yours.

Setting the green light is one thing, but PCS will inform your partners about this action. That is why they can expect message broadcasting from PCS on behalf of you. Let's see an example, when VPE would set a green light in the dossier and PCS would inform ÖBB about this action.

VPE shall send one **Path Coordination message**.

- Message header:
  - Sender: 3032 (VPE)
  - Broker: 3178 (RNE)

- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 04 – Harmonization completed
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

ÖBB will get three **Path Coordination messages**.

- Message header:
  - Sender: 3178 (RNE)
  - Broker: 0081 (ÖBB)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 4 – Harmonization completed
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120- 00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 - 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

### **Sending an update affecting the border**

How to send an update is covered in one of the previous use cases. We know how to do that; however, it was not yet mentioned, what happens in PCS when an IM sends an update that changes something on the border from the following element:

- Timetable
- Dwell time
- Calendar
- Location

PCS, the application itself, checks this action, and by design, it downgrades the green light of the affected IM to yellow. It must be communicated via TAF TSI messages too. PCS will send all the paths of the initiator IM to the affected IM. It can check then the impact, and if there is nothing else to do, it can set a green light again as explained in another use case.

Let's take our example. ÖBB sends an update that changes something at Nickelsdorf grenze, the border location. The sent message looks like as it's described in the "Timetable updates as work in progress" step.

VPE receives two **Path Coordination messages** from PCS.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 4 – Coordination update
- Identifiers:

- First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 00 - 2020; PA - 0081 – \*\*M-AMA12345-00 - 2020
- Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 - 2020; PA - 0081 – \*\*M-AMA12345-01 – 2020

As you can see, the notification works pretty much the same as for the “Timetable updates as work in progress” use case, however, it’s important that VPE is aware of the fact, its light was downgraded to yellow.

### **Offer (draft or final) is sent to the applicants**

It’s a privilege of the leading IM to send out Draft Offer and Final Offer. However, as we are using PCS in this example, it’s also possible to rely on PCS’ automatic promotions. Regarding the New Path Request process, when all the IM lights are green, it promotes the dossier to Draft Offer and Final Offer on the deadline according to the RNE timetabling calendar. For Late Path Request and Ad-Hoc Path Request process it checks also the timetabling calendar first (for LPR we have to be after the NPR deadlines) and it promotes the dossiers that are ready, every midnight.

The Applicants will receive the Path Details messages with the proper information. If that’s the case, PCS shall only send the notification to the IMs that Draft Offer or Final Offer was sent out.

Please note that Draft Offer is used only in New Path Request and Rolling Planning processes. For the others, the Final Offer is used only and those are followed by the Acceptance phase.

IMs will get back Path Coordination messages about their paths.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
  - TOR: 2 – Request
  - MS: 1 – Creation
  - TOI: 09 – draft offer or 16 – final offer

If the leading IM insists to do this action alone, not relying on PCS, it can send also one Path Details message (we talked already about the difference between dossier and paths) with the proper type of information. In our example, VPE should send the following **Path Details message**.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 2143 (GYSEV-C)
  - Broker: 3178 (RNE) with PCS LI number
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 09 – draft offer or 16 – final offer
- Identifier:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

As it’s a change, affecting the whole the dossier, the same notification will be sent out by PCS to the participating IMs as above.



## Setting red light in PCS and informing the partner IM about it

From the PCS point of view, there is not such a big difference between setting green or setting red light in the system. The procedure is quite similar to in the other use case. It's enough to send one Path Coordination message with the proper information. There is only one additional thing: PCS requires a mandatory comment for the reason of the rejection. This must be pasted to the Path Coordination message, into its free text field on the message level.

If VPE likes to set a red light, the following **Path Coordination message** should be sent.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 03 – Harmonization rejected
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

Again, same as for the green light, ÖBB will be informed about this change by PCS.

ÖBB will get three **Path Coordination messages**, with the same free text field delivering the reason for rejection.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 03 – Harmonization rejected
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120- 00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020

## Rejecting dossier in PCS

Leading IM has the chance to reject a dossier. The procedure is almost the same for all process types, only the TOI is different. In the “New Path Request” process and “Rolling Planning” Process we have “Draft Offer”, but in the others, we only have “Final Offer”. This is the main difference.

In the New Path Request and Rolling Planning processes, the leading IM (VPE in our example) shall send one **Path Coordination message** like the following.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2 - Request
- MS: 1 – Creation

- TOI: 43 – Preparation of draft offer rejected
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020<sup>1</sup>

In Late Path Request and Ad-Hoc Path Request process, the leading IM (VPE in our example) shall send one **Path Coordination message** like the following.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 15 – Preparation of final offer rejected
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312- 00 – 2020<sup>1</sup>

As part of the PCS notification service, the system shall broadcast this information. Thus, ÖBB will get two **Path Coordination messages** for its two paths (because the whole dossier was rejected by the leading IM).

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 2 – Request
- TOI: 43 – Preparation of draft offer rejected/15 – Preparation of final offer rejected (depending on the process type)
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 00 - 2020; PA - 0081 – \*\*M-AMA12345- 00 – 2020<sup>1</sup>
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 - 2020; PA - 0081 – \*\*M-AMA12345- 01 – 2020<sup>1</sup>

## Sending update that contains calendar days of existing paths

It was already described how to send updates to existing paths. However, there is a special use case, when an IM sends an update that affects the already existing paths in the system that are not in the message. What are we talking about?

Imagine a situation where you have two paths in PCS:

- First runs on 1-5
- Second runs on 6-7

Then the IM sends Path Coordination message with a new path for running days 5-6. PCS, as the application itself, is avoiding double booking on the running days. Calendar days are working as a switch by design. Even if the update arrives via an interface, this switch works, and PCS removes the selected days from the other calendars. As previously mentioned, the change in the dossier will result in Path Coordination messages to the participating IMs about the change. Why is it then so special? Because, in this special case, the notification service is sent to the initiator IM too. He will also get the message(s) about the changed path(s). In

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<sup>1</sup> PA can be sent only if it's known. As it's a rejection, it could be that it's rejected immediately, before the IMs sent any of their own PA(s) to PCS.

this special case, he will get two Path Coordination messages with their identifiers and the changed calendars.

### Leading applicant withdraws the dossier

Until the end of Path Elaboration, the leading Applicant has the chance to withdraw the dossier. As always, it has to put there a mandatory reason to explain this action (similar to the rejection).

In our example, GYSEV-C is the leading Applicant. If they decide to withdraw the dossier, every participating IM shall get this information. PCS will send the information to the IMs on behalf of their partner Applicants (sender). Let's check this from VPE point of view. They will get three **Path Request messages**.

- Message header:
  - Sender: 2143 (GYSEV-C)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 2 - Request
- MS: 2 – Delete
- TOI: 29 - withdrawal
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

The same is happening between RCA and ÖBB, regardless that GYSEV-C is leading because the partner of ÖBB is RCA.

### Leading IM closes the dossier

If it becomes clear, for any reason, that there is no further need for a dossier, the leading IM has the chance to close it. This option is available for them in Path Elaboration, Post-Processing and also later in Active Timetable.

In our case, VPE is the leading IM. It's enough for them to send only one **Path Coordination message** like the following.

- Message header:
  - Sender: 3032 (VPE)
  - Recipient: 3178 (RNE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 31 – Close dossier
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120- 00 – 2020

As part of the PCS notification service, the system shall broadcast this information. Thus, ÖBB will get two **Path Coordination messages** for its two paths.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 0081 (ÖBB)
- TOR: 2 – Request
- TOI: 31 – Close dossier
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 00 - 2020; PA - 0081 – \*\*M-AMA12345-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2181 - \*\*\*\*\*ABCD - 01 - 2020; PA - 0081 – \*\*M-AMA12345- 01 - 2020

### **Observation and Acceptance**

#### **IM gets back the dossier from Observation**

Observations phase is available only in “New Path Request” and “Rolling Planning” processes. In this phase the Applicants have max. 4 weeks to analyse the Draft Offer and provide feedback. Please note that in PCS they can only make comments in a standardized way to the paths they are concerned about.

Then, the dossier is moved to the Post-Processing phase either by the leading Applicant or by PCS’ automatic promotion.

If you check it carefully, it means multiple notifications:

- When the Applicant makes a comment to a path (optional for them, not sure you get a notification for this)
- When the dossier reaches Post-Processing, meaning IMs can edit it again

Let’s see what kind of messages would be sent by PCS in these situations.

GYSEV-C made an Observation on a path and VPE gets a **Path Request message**.

- Message header:
  - Sender: 2143 (GYSEV-C)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- TOR: 2 – Request
- MS: 1 – Creation
- TOI: 12 – observation - complete
- Identifiers:
  - CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120- 00 – 2020

The Observation itself is delivered in the free text field of the Path Request message on the message level. It happens only when a path is commented by an Applicant and this message is sent only to the affected IM.

When the dossier arrives at Post-Processing, each participating IM shall get this information. That is why PCS will send out **Path Coordination message** to all IMs with their paths. Let’s check it from VPE’s point of view. They will get three Path Coordination messages.

- Message header:
  - Sender: 3178 (RNE)

- Recipient: 3032 (VPE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 07 – Create offer
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

### Leading applicant closes the dossier

PCS provides the possibility for the leading Applicant in Observations phase to close the dossier. In this case, the dossier will not go back to the IMs in the Post-Processing phase.

In our example, GYSEV-C is the leading Applicant. If they decide to close to the dossier, every participating IM shall get this information. PCS will send the information to the IMs on behalf of their partner Applicants (sender). Let's check this from VPE point of view. They will get three **Path Coordination messages**.

- Message header:
  - Sender: 317RNE
  - Recipient: 3032 (VPE)
- TOR: 2 - Request
- MS: 1 – Creation
- TOI: 31 – Close dossier
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

### Applicants' decision in Acceptance phase

In Late Path Request and Ad-Hoc path request processes the applicants can make several decisions after the first offer from the IMs:

- Accept the offer: in PCS, this would move the dossier to Active Timetable
- Reject the dossier: in PCS, this would move the dossier to Closed
- Send back to Path Elaboration

IM will get **Path Confirmed messages** if the Applicants accepted the Final Offer.

- Message header:

- Sender: 2143 (GYSEV-C)
- Recipient: 3032 (VPE)
- Broker: 3178 (RNE)
- MS: 1 – Creation
- TOI: 17 – final offer accepted
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

Please note that compared to the other messages, in Path Confirmed message, the following elements are not required:

- Type of request
- Path Information

IM will get **Path Details Refused messages** if the Applicants rejected the Final Offer.

- Message header:
  - Sender: 2143 (GYSEV-C)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- MS: 1 – Creation
- TOI: 25 – offer/final offer rejected (without revision)
- Identifiers:
  - First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
  - Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
  - Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

Please note that compared to the other messages, in Path Confirmed message, the following elements are not required:

- Type of request
- Path Information

IM will get **Path Details Refused messages** with special TOI if the Applicants return the dossier to Path Elaboration.

- Message header:
  - Sender: 2143 (GYSEV-C)
  - Recipient: 3032 (VPE)
  - Broker: 3178 (RNE)
- MS: 1 – Creation
- TOI: 27 – offer/final offer rejected (revision required)
- Identifiers:

- First message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M20205405120-00 - 2020
- Second message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*X12C3 - 00 - 2020; PA - 3032 – M202054092\*0- 00 – 2020
- Third message: CR - 3178 - \*\*\*\*\*216481 - 00 - 2020; TR - 2143 - \*\*\*\*\*927 - 00 - 2020; PR - 2143 - \*\*\*\*\*98A01 - 00 - 2020; PA - 3032 – M202062114312-00 – 2020

Please note that compared to the other messages, in Path Details Refused message, the following elements are not required:

- Type of request
- Path Information

### **Active Timetable**

#### **Close dossier**

In Active timetable, either the leading Applicant or the leading IM has the chance to close the dossier. The procedure works exactly the same as it is written in the former close dossier use cases.

### **Receipt Confirmation and Error message**

#### **The necessity of Receipt Confirmation**

As said before, PCS works as a synchronous system, that is why the Receipt Confirmation message is not required.

By default, when a dossier arrives first at an IM phase, the IM's acceptance indicators are blue. This is changed to yellow whenever there is an update from the IM.

We do not support receiving Receipt Confirmation, thus please don't send them when you are communicating with PCS.

Normally, the IM should confirm the Path Request with RC before the dossier is promoted to the Path Request phase in PCS. This is done automatically in PCS (synchronous) and PCS sends RC as a broker to the Applicant in the name of the IM to the Applicant.

#### **Error message from PCS**

The integration of the Error Message is rather important. PCS has its own errors ([link](#)) and it would send back to the IMs in the standard Error Message. For example, VPE would try to send an update with an unknown traction mode, PCS would send back the following message.

- Message header:
  - Sender: 3178 (RNE)
  - Recipient: 3032 (VPE)
- MS: 1 – Creation

- TypeOfError: 1 – Functional (except 501, when it's PCS system error, then it's 2 – Technical)
- Severity: 2 – Fatal
- ErrorCode: 281 – Unknown traction mode
- FreeTextField: Error code description, e.g. The request contains traction mode which can't be resolved in the system.

### **Error message to PCS**

Same as for the Receipt Confirmation, we don't support this.

### ***Path Modification / Path Alteration***

*To be developed in a separate Handbook document.*



## 5.6. Temporary Capacity Restriction (TCR)

To keep the infrastructure and its equipment in good condition (maintenance) and to allow infrastructure development in accordance with market needs, TCRs are necessary. Regarding the Annex VII and TCR Guidelines, IMs are obliged to publish all known TCRs (national and international) with major, high, medium or minor impact on the traffic.

TCR module is a module for the international harmonization of all known TCRs. TCR module has a possibility to visualize the TCRs and helps IMs in a coordination process to decrease the negative influence of TCRs on the operation. The TCR is described by the location on the network, the reason for the restriction, the time expansion, the operational consequences: traffic impact, traffic measurements and classifications. The next important information transmitted from this module is the coordinated and harmonized TCRs. Also, it gives the possibility to RUs to comment TCRs in a consultation phase before the TCRs publishing. Since the Annex VII, all TCRs should be published internationally and nationally.

The RNE TCR Tool has developed with the goal of creating a single place with all information about available TCRs. This tool will be used for a stepwise implementation, but also for the final TTR IT Landscape implementation.

The TCR tool will be fed by data from IMs' national systems via TAF/TAP TSI based technical interface. In the case that IMs do not have a tool for the TCR management in their company, they will be able to use already defined Excel file to import needed data. Also, there is a possibility to manually enter data via the Graphical User Interface (GUI) of the TCR tool itself.

### 5.6.1. Centralized master data

RNE TCR tool is the first application connected to the centralized master data (the BigData) database. Data that is used and synchronized from the BigData database is as follows:

- Primary Location Codes (PLCs)
- Segments
- Sections
- Section-Segment relation
- Companies
- Layers

#### **Minimal requirements**

For the import of TCRs, already developed Excel and XML file structure will be used. Companies that developed their own TCR systems, will be able to use the TAF/TAP based interface.

TCRs must be manually coordinated between IMs and commented by RUs using the TCR Tool and using the already implemented process and process steps. Information on the required activity in the tool (IMs coordination or consultation in the case of RUs) and needs to do some activity in the tool, will be sent to the user's e-mail.

#### Deviation route

In the case of line unavailability because the TCRs, traffic could be re-routed. For this purpose, it is possible to enter a deviation location and deviation border in the TCR tool. IM defines the deviation location and deviation border within the own network, where the rail traffic shall be re-routed.

## Additional requirements

Some additional functionality, that will be defined by TCR WG members, could be implemented or used in the tool, like the following:

- information about the number of tracks on the line,
- catenary information,
- inform all parties about deviation routes to optimize the deviations.

### 5.6.2. Integration options

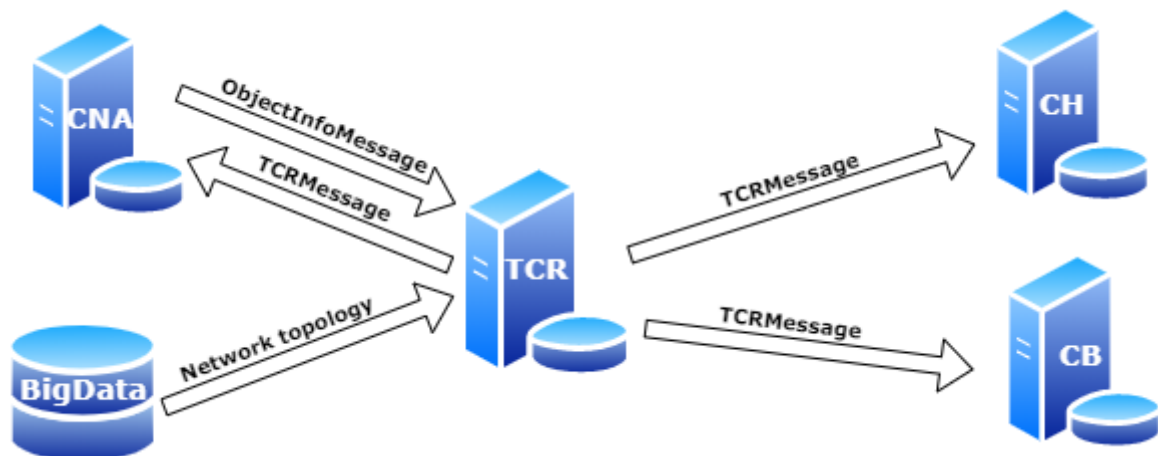


Figure 27 – TCR module data exchange

## Minimal requirements

### Object updates

TCR object shall be extended with the mandatory content of the TCR object in the TAF/TAP TSI schema.

The structure of the import files (Excel, XML) shall be extended with additional TCR attributes.

Additional needed messages for TCR handling (e.g. coordination process) could be defined

### Schema and message definition

XSD proposal of TCR shall be updated and defined for TAF/TAP TSI

The TAF/TAP TSI messages' proposal for handling TCR will be developed in the TCR Tool

### Endpoint and communication

#### **BigData**

- BD -> TCR (data synchronization) – topology data using the views exposed through database synonyms (company, location, segment, section, layer)

#### **Capacity Hub**

- TCR -> CH (output data) – the published TCRs data will be pushed to Capacity Hub
- CH -> TCR – communication via standard TAF/TAP TSI messaging framework using SearchTCRMessage to receive information about specific TCRs or planned and coordinated but not yet published TCRs

## Capacity Broker

- TCR -> CB (output data) – the published minor TCRs data will be pushed to Capacity Hub
- CB -> TCR – communication via standard TAF/TAP TSI messaging framework using SearchTCRMessage to receive information about planned minor TCRs that are not yet published. This message shall be used to get information about the maintenance window.

Common interface endpoint shall be opened for TCR.

TCR Tool shall be able to receive and send TAF/TAP TSI messages related to working with the available objects. Foreseen messages: ObjectInfoMessage, TCRMessage, SearchTCRMessage, TCRImportMessage

### 5.6.3. Connection to other modules

#### Minimal requirements

##### BigData module

- The topological data to select or present TCRs on a map at a line or location
- Data is synchronized using the views exposed through database synonyms (company, layer, section, segment, location), on a monthly basis but, in case of need, it could be more frequently (weekly or daily basis).
- The locations, segments and/or sections of the GeoEditor tool will be extended with a custom attribute “TCR\_IM\_Coordination” which value will be used for the automatic calculation of the involved IMs in the TCR coordination

##### Capacity Hub module

- After the TCR coordination and publication, TCR data will be available to Capacity Hub module internally (in the TTR IT central framework – central system) via the TAF/TAP interface. The message that will be used is TCRMessage.

##### Capacity Broker module

- Provide information about the planned minor TCRs

After the implementation of the RINF data into BigData database, additional attributes shall be incorporated into the TCR tool messages (like a number of tracks on the line, catenary information and similar).

#### Additional requirements

In the future, all TCR data will be exchanged between other modules using only the TAF/TAP TSI. For this purpose, the SearchTCRMessage and TCRMessage will be used.

### 5.6.4. Central implementation

Currently, the TCR messages and objects do not exist in the TAF/TAP TSI schema. Due to a large number of TCRs that should be imported into the TCR tool from the national systems, it is not feasible to use the functionality of the manual creation or data import. Therefore, the technical interface (TAF/TAP TSI based) between the national and central system must be implemented.

The TCR tool should support all the messages necessary to exchange the TCRs data.

### 5.6.5. National implementation

This topic provides a guide for IMs/ABs to synchronize their TCRs with TCR tool from the national systems. The focus is on the IM – TCR Tool communication as a special dialect of TAF-TSI communication.

The following messages should be integrated:

Message	Description
TCR Message	IMs will deliver TCRs with their description to the RNE central TCR tool
TCR Canceled Message	IMs can be able to cancel (deactivate) the TCR. TCR will not be deleted but deactivated, and not able to be modified any more.
<b>TCR</b> Response Message	This message is the response to a TCRMessage. It contains the status and a report of the import (returns a syntax, semantics and data validation information)
<b>Search</b> Capacity Product Message	The IMs and RAs will be able to search for TCRs, but also other capacity products, by specific parameters. They will not ask for the information on the object (e.g. ObjectInfoMessage) but search all objects that meet the search criteria.
Capacity Product Message	This message is the response to a SearchCapacityProduct message. It may contain information about the TCRs, Capacity bands, Catalogue paths or Pre-arranged paths, matching the SearchCriteria defined in the SearchCapacityProduct message.

### *An identifier in the TCR Tool*

TCR Tool and messages are prepared to support TAF TSI identifier (TCRID element). During the TCRs import, IMs are able to define the identifier's parts by entering company code and TCR ID as a core element. In the case of manually creating a TCR, only the TCR ID is required as the core element and the company code will be added automatically by the tool, depends on the login information.

The technical specification for the national implementation is provided in the **Annex 4** of this document.

### 5.7. Capacity Hub (CH)

Capacity Hub module is a module for capacity modelling, planning and product development. Capacity Hub module collects all data from the IMs (available capacities, bands and TCRs) and RUs (capacity needs announcements) side and gives an overview on the available capacity and TCRs in an early stage of planning. It safeguards capacity for RP requests, and it is responsible for answering on the capacity requests in the advanced planning phase.

Capacity Hub module has implemented some sort of AI which allows automatic detection of affected companies and affected neighbours to give them information when something is changed during the capacity planning. That is an intelligent help for the coordination.

Automatic conflict detection of the planned capacity and TCRs or RUs announcements and planned capacity when data is posting and give automatic information about that.

RNE is working on TTR pilot's application for Capacity Planning, called Electronic Capacity Modell Tool (ECMT). As part of the stepwise implementation of TTR IT Landscape, the existing applications **could be taken into account**.

The below written high level summary of requirements that could bring ECMT to that level that can fulfil the requirements of the TTR process and TTR IT Landscape.

### 5.7.1. Centralized master data

Due to some constraints, the ECMT is being developed with a stand-alone infrastructure dataset. The following information is stored:

- Operation points with names, country ISO and Primary Location Codes
- Operation points linked to lines
- Operation points linked to each other with distances

Considering some international RailTopo Models (e.g. RINF, IRS 30100), we can say that the tool is prepared for macro level infrastructure data, but in the future, at least meso level looks reasonable.

#### **Minimal requirements**

As part of TTR implementation, ECMT shall be connected to RNE's central database for topology, called RNE BigData. Further on the locations, lines and any other infrastructure related data should be originated from RNE BigData.

Line information in ECMT shall be extended with track number information (RNE BigData requirement).

New Capacity product messages should be implemented into the TAF/TAP TSI and necessary interfaces developed.

Provide the capacity model overview.

Accept frequent ongoing update of slots for rolling planning (frequency to be defined – minutes, hours, days...).

Notification on border-times / parameters inconsistency, notification of the applicants on the request inconsistency or capacity reduction.

#### **Additional requirements**

Route finder option shall be implemented in the tool and the chart or any other figures shall be shown on the generated route.

Route definition shall be also supported via point selection on map.

Operation point information in ECMT shall be extended with geo location information.

## 5.7.2. Integration options

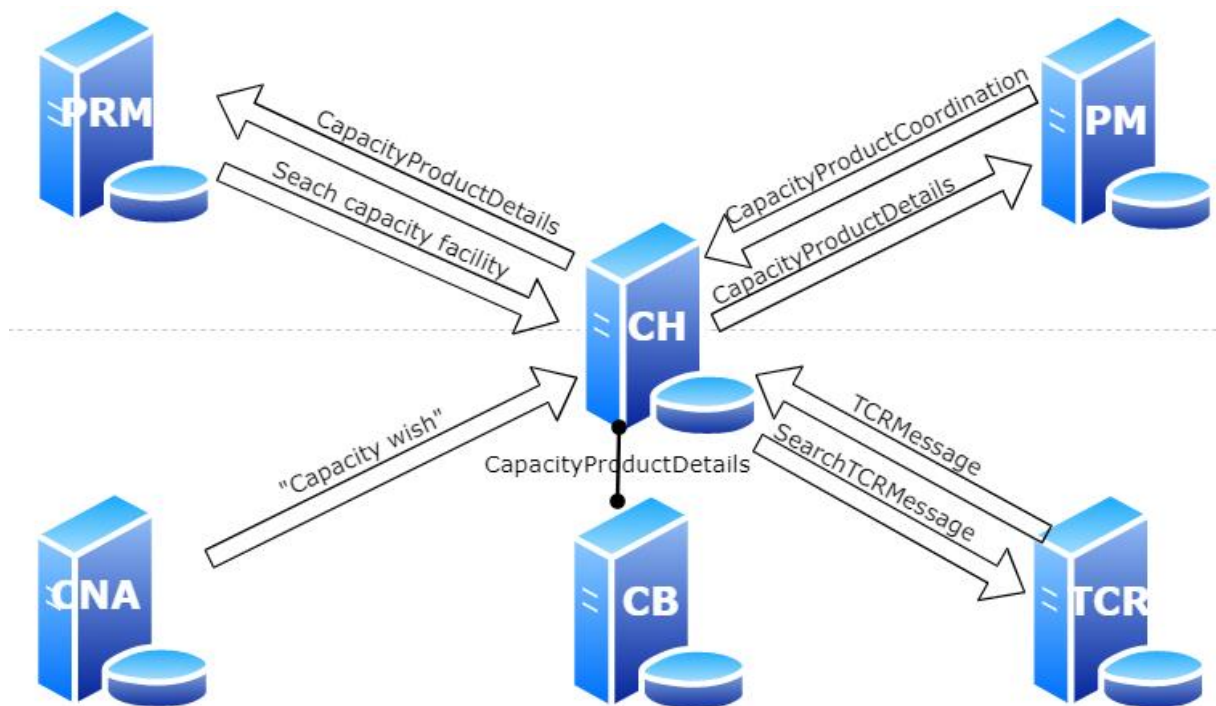


Figure 28 - Capacity Hub data exchange

During the TTR pilots, ECMT is working with simplified objects. The following objects are available: path, catalogue path, TCR, capacity band. In the future ECMT shall be to communicate with other modules, thus the simplified objects might be extended.

### Minimal requirements

#### Object updates

Catalogue path and path object shall be extended with the mandatory content of the PathInformation element of TAF/TAP TSI.

TCR object shall be extended with the mandatory content of the TCR object of TAF/TAP TSI.

Additional elements shall be added to the capacity band object, based on the catalogue path and path object updates.

Additional updates shall be done to the particular objects based on the structure of Capacity Needs Announcements (see it later)

#### Schema and message definition

XSD proposal of the capacity band shall be defined for TAF/TAP TSI

Message proposal for handling capacity bands shall be defined for TAF/TAP TSI.

#### Endpoint and communication

##### BigData

- BD -> CH (data synchronization) – topology data using the views exposed through database synonyms (company, location, segment)

### **Capacity Needs Announcements**

- CNA -> CH (input data) – information on the CNA objects – “Capacity wishes”. It’s needed to investigate the CNA structure and based on the outcome update of existing objects or creation of new objects shall be done

### **TCR**

- TCR -> CH (input data) – information on the published TCRs will be received.
- CH -> TCR - communication via standard TAF/TAP TSI messaging framework using SearchTCRMessage to query information about specific TCRs or planned and coordinated but not yet published TCRs. The result will be received by TCRMessage.

### **Path Request Management**

- PRM -> CH (input data) – Looking (search criteria) for published capacity facilities
- CH -> PRM (output data) – Information on published catalogue paths, capacity bands and TCRs via standard TAF/TAP TSI messaging framework using CapacityProductDetailsMessage

### **Path Management**

- PM -> CH (input data) – communication via standard TAF/TAP TSI messaging framework using the CapacityProductCoordinationMessage to exchange data about the requests.
- CH -> PM (output data) - communication via standard TAF/TAP TSI messaging framework to answer on the request using the CapacityProductCoordination, CapacityProductConfirmed, CapacityProductDetails, CapacityProductRefused, CapacityProductNotAvailable.

Common Interface endpoint shall be opened for ECMT

ECMT shall be ready to send and receive TAF/TAP TSI messages related to working with the available objects. Foreseen messages: ReceiptConfirmation, ErrorMessage, PathRequest, PathDetails, PathCoordination, TCRMessage, SearchTCRMessage, new messages for capacity bands (CapacityProductCoordination, CapacityProductDetails, CapacityProductConfirmed, CapacityProductDetailsRefused, CapacityProductNotAvailable) and the capacity needs announcements.

### **Additional requirements**

Implementation of some sort of Artificial intelligence (AI) which allows automatic detection of affected companies and affected neighbours to give them information when something is changed during the capacity planning.

Accepting and answering on RUs capacity needs announcements (recognize requests and allocate the safeguarded capacity if applicable).

Update of the existing objects or creation of new objects with a view to a defined CNA structure

#### **5.7.3. Connection to other modules**

ECMT itself is basically an application for presentation and publication of information. To have that information, the tool must receive the used objects from other modules of TTR IT Landscape. Please note that Capacity Broker will also work under the hood of the Capacity Hub, but that functionality will be described in the Capacity Broker module.

RUs and IMs have dedicated applications for certain objects and a communication stream shall be established among those applications and ECMT.

## Minimal requirements

### BigData module

- The topological data
- Data is synchronized using the views exposed through database synonyms (company, segment, location), on a monthly basis but, in case of need, it could be more frequently

### Temporary Capacity Restriction module (TCR module)

- The TCR objects shall be received and updated from the TCR module

### Path Request Management module

- Published catalogue paths, capacity bands and TCRs shall be available for Applicants. Capacity Hub shall be able to send this information to Path Request Management according to its search criteria.
- As the host of the broker algorithm, the tool shall be able to receive feasibility study requests. Further details are written in the Capacity Broker part.

### Train Harmonization module

- Published catalogue paths, capacity bands and TCRs shall be available for Applicants. Capacity Hub shall be able to send this information to Train Harmonization according to its search criteria.
- As the host of the broker algorithm, the tool shall be able to receive feasibility study requests. Further details are written in the Capacity Broker part.

### Path Management module

- Paths, catalogue paths and capacity bands shall be received and updated from/via Path Management.

## Additional requirements

### Capacity Needs Announcements module

- Investigation of the CNA structure
- Based on the outcome of the investigation update of existing objects or creation of new objects shall be done, if necessary
- New views shall be prepared for CNA presentation.

### 5.7.4. Enhancement of the functionality

Initially, ECMT is prepared as a publication tool for capacity products. However, with the implementation of TTR IT Landscape, some additional features shall be added to help the capacity planning (capacity calculation and optimization). UIC described a compression method in one of their leaflets that shall be applied for this.

## Minimal requirements

According to UIC Leaflet 406, ECMT shall be able to calculate

- Capacity on the node(s)
- Capacity on single track line section(s)
- Capacity on multiple track line section(s)

ECMT shall present the calculation results in a table according to the selected geography



## **Additional requirements**

ECMT shall show a classification of capacity consumption values on a selected network's map.

ECMT shall indicate conflicts among the objects, using the same capacity.

## **5.8. Capacity Broker (CB)**

### **5.8.1. Introduction**

Capacity Broker module is a module for capacity inquiry and request. Capacity Broker module uses harmonized Capacity Product Publication data as an input, and all inquiries and requests from the RUs side will be validated due to it. Capacity Broker summarizes all requests from the RUs side and gives the feedback if this requirement fits the available capacity or not, because there could be a problem due to TCR. It will solve the RUs problem with creation and harmonization of path requests due to maintenance works.

Also, if the capacity is already booked, the Capacity Broker must be able to get this information from the IMs national systems in real-time. Capacity Broker module will check the available capacity with national IT systems before the offer of the path through the Path Management module. The final answer to the path requests should be done by IM and delivered back to the Broker which will broadcast the message to RUs via Path Management module.

Capacity broker doesn't exist as an application.

As there is no existing solution, in the last paragraph called just "Functionality", because enhancement is not applied here, the list of functionalities will be provided.

### **5.8.2. [www.rail-booking.eu](http://www.rail-booking.eu) concept**

Using and working with the Central TTR IT Framework must be easy and understandable with all the necessary information in one place. The approach should be similar to the booking systems to reserve a flight or a hotel room.

The aim is to implement such a concept to the TTR IT Landscape, to support the European booking system of the rail sector.

As it was explained in the topic above (topic 3.8.1.), the Capacity Broker is the main module that will deal with all Applicants requests and that shall be able to provide the first information of the availability of their requests.

The Applicants' demand is to provide their requests to one tool only and receive the answers from the same tool back. The manual data enter, for the Applicants who doesn't have their national tools, should be possible as well. For this purpose, the functionality of the Booking Frontend portal shall be implemented.

The Capacity Broker will consult all the request created manually through the Booking Frontend portal or sent by TAF/TAP TSI messages, check the pre-planned capacity in the central system and consult national IMs systems, collect data (offers from involved IMs) and prepare the harmonized offer to be presented on the portal and finally send to the Applicants systems.

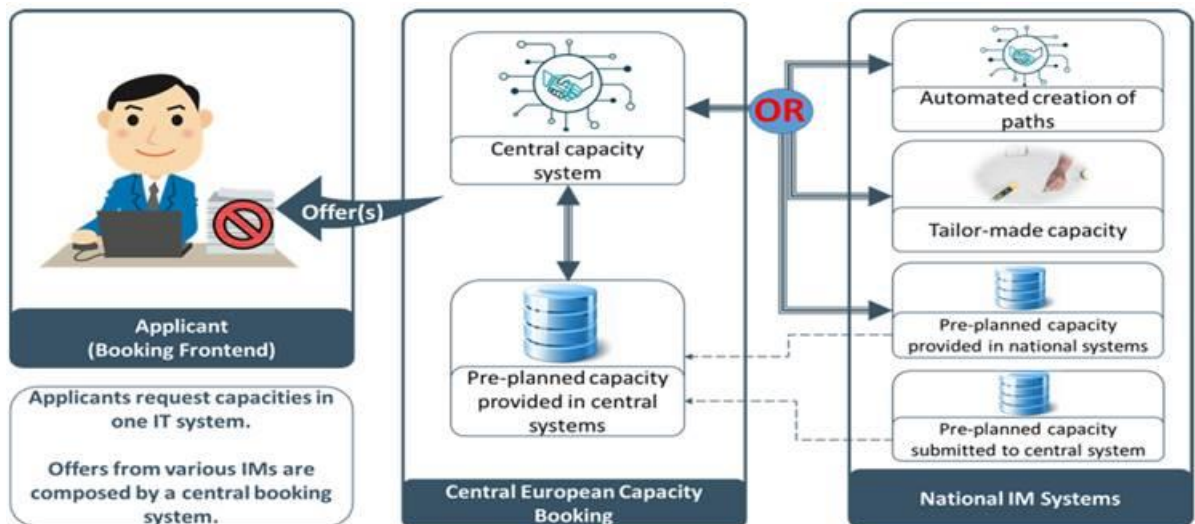


Figure 29 - [www.rail-booking.eu](http://www.rail-booking.eu) concept

As all capacity requests of Applicants will be sent and collected in one central booking system, also all offers provided by various IMs will be collected and composed in the same central booking system.

In general, two main functionalities of the rail booking concept are foreseen:

- Booking frontend portal
- Consulting the national systems

### Booking Frontend portal

The portal will support the following functionalities:

- to show all created requests by Applicant and received offers from IMs,
- to allow creation of a new capacity request with all the necessary data,
- search for a route, select a desired route from the available options (results) and check capacity for the selected route option,
- the list of created train information with all variants,
- the list of the path provided with linked train objects,
- price estimation for the path (connection to Sales module).

The Frontend portal may look like it is presented on the image 29.

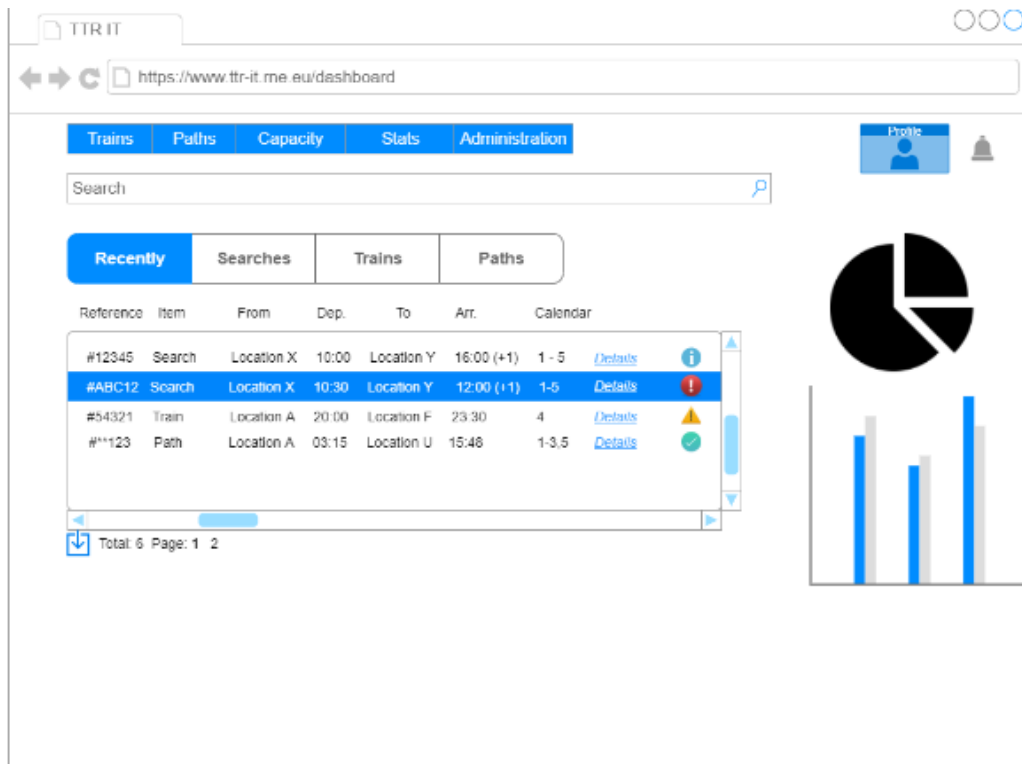
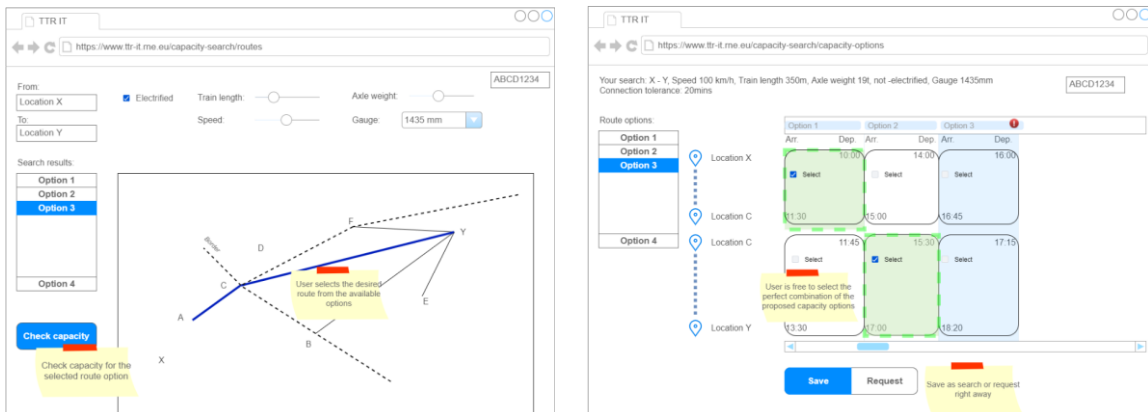


Figure 30 - Booking Frontend portal

Applicants can search for a capacity according to different train parameters (speed, length, axle weight, etc.), desired times and dates (departure, arrival, connection tolerance), routes, waypoints and so on.

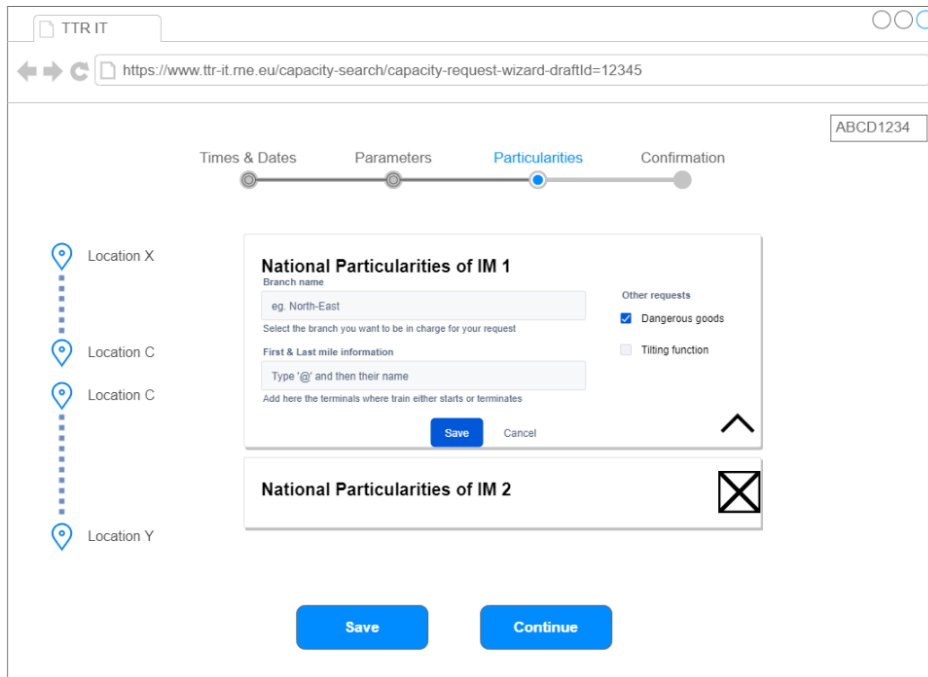


The search will return the list of available routes between the searched locations, and the user can select the desired route from the available options, and also check the capacity for the selected route.

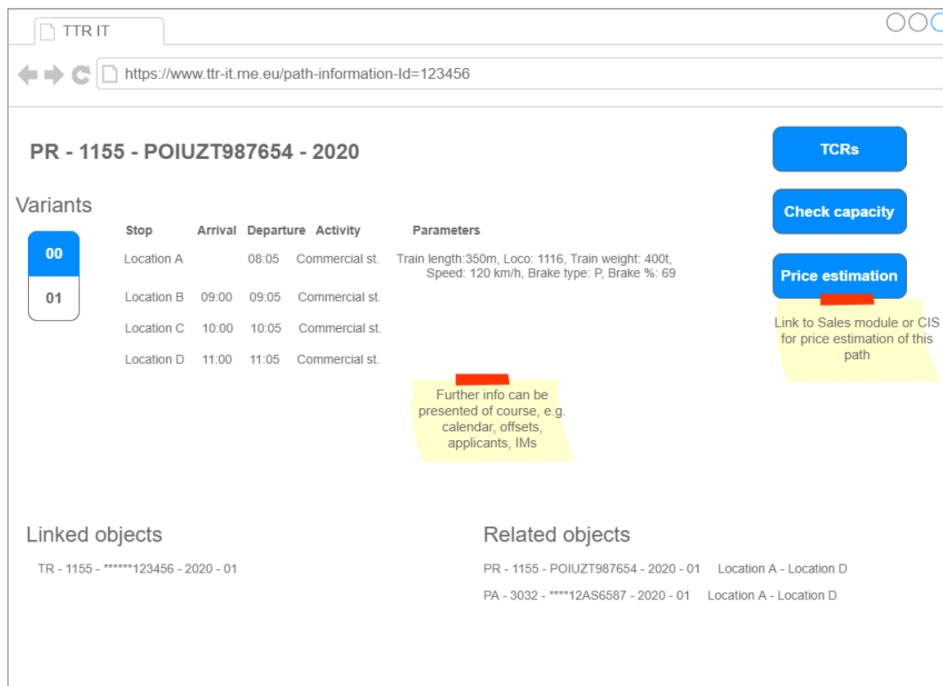
The list of possible routes between entered origin and destination will be presented and Applicants have possibility to select each and check the capacity on the route.

According to the connection tolerance on the border, a parameter entered in the search, the system will propose the route combination accordingly. Of course, the Applicants will have a possibility to select a perfect combination of the proposed route options for them, and request such a defined route immediately or save this search and selected combination for the later work.

The national particularities of the IMs shall be filled in as well, as it is presented in the following image.



In the prepared path request, Applicants can check the list of planned TCRs on the route, the price estimation for this path (connection to the Sales module), see the whole path request information with the variants, linked train objects, calendar, involved IMs and partner Applicants and so on.



The presentation of the whole selected path and visualisation of TCRs that is affecting the path, can be provided on the map overview.

## Consulting the national systems

The Capacity Broker will use the provided request parameters (locations, departure, arrival) and firstly check the pre-planned capacity that is provided to the central system and an overview on the possibility to fulfil the requirements will be provided. This capacities to the central system will be provided by IMs from their pre-planned capacities submitted in their national systems.

If the Applicants requests can be completely fulfilled or the automatically suggested path by the Capacity Broker is fine to the Applicants, this information will be sent to IMs' national systems with request to check the capacity nationally and provide the draft offer.

Even it is a demand that IMs publish their capacities to the central system, still it is not real to expect that all the capacities will be published. Therefore, there should be implemented a functionality of the Capacity Broker to send automatic request to national systems (national Broker systems) of the IMs who are affected by the request.

If there is no capacity provided to the central system or the proposed capacity doesn't fit to the Applicant, the request will be sent to the IMs' national systems to provide an answer. In such a situation the capacity shall be directly provided to the central system "on-line".

The national systems will be consulted in the following cases:

- There is no capacity provided to the central system,
- The received request does not fit to the provided capacity neither it is possible to find the fitting paths inside the parametrized time offset that is acceptable to Applicants,
- The proposal generated by the Capacity Broker is a very first draft information provided to the Applicant, but the final answer MUST be confirmed by IMs.

The IM national system (national "Broker" tool) can provide an answer by doing one of the following actions:

- automatically create a path, considering provided information and taking into account national TCRs.
- check their national pre-planned capacity, that is not provided to the central system, to prepare an offer.
- create a tailor-made capacity for the received request.

A created path proposal will be provided back to the central system and presented on the portal to the Applicants. The created path will be sent automatically to those Applicants systems who has it.

### 5.8.3. Centralized master data

The algorithm itself doesn't have any master data. Everything is stored either in the Capacity Hub (ECMT) or in the Path Request, Path Management (PCS) modules.

### 5.8.4. Integration options

The algorithm itself doesn't have any particular need for integration.

### 5.8.5. Connection to other modules

Details regarding the requirements are written in the modules or under the functionality, but the high-level process shall look like the following:

1. CB gets the request or wishes from Applicant via the Path Request Management module
2. CB checks the available capacity products in the Capacity Hub inside the defined time constraint
3. If there is not any capacity product available, the Broker checks its configuration whether there are IMs in the route who can provide automatic calculation
  - a) If yes, CB asks running time calculation from the IMs (real-time time connection to the IMs systems)
  - b) If not, CB calculates the running time itself
4. CB stores the information either received from the IMs or calculated itself in the Path Management
5. The broker sends feasibility result, a proposal to the Applicant

#### Minimal requirements

##### Capacity Hub module

- Capacity Broker (CB) shall be able to combine catalogue paths, capacity bands in the Capacity Hub according to the defined time constraint per segment (RNE BigData requirement)
- CB shall be able to calculate "tailor-made" running time based on the defined PlannedTrainTechnicalData and the infrastructure data. It shall be done either via RNE Data Warehouse using real Big Data solution or apply traditional physics for running time calculation.
- CB shall send a request to the DWH for checking historical data in planned train data. CB shall do reliability check of the received estimation.
- CB shall apply buffer time in the "tailor-made" running time calculation.
- CB shall avoid conflicts in the "tailor-made" running time calculation with other objects (TCRs, already allocated paths).

##### Path Request Management module

- CB shall be able to receive feasibility study requests from the Path Request Management.
- CB shall notify the Applicant about the completed feasibility study result.

##### Path Management module

- CB shall gather all the information for the offer of the feasibility study request in Path Management

#### Additional requirements

- The algorithm to find the best fitting capacity according to the inquiry request by RUs (will give information to RUs that their requests fit the available capacity or information that there is a problem due to TCRs or similar)
- IMs national systems must be able to respond on the capacity inquiries in real-time even if they did not publish the capacity product for the particular line or train characteristic. More precisely, if the RU makes an inquiry in the CB that does not only take into account the published capacity products, the IMs system must be able to answer if there was the available capacity to be used for the tailor-made offer (or combination of capacity product and tailor-made).
- The compilation and harmonisation of national paths at the hand over points

- The conflict resolution procedure (e.g. calculation of distance and running days in order to define the priority value)

### 5.8.6. Functionality

#### Minimal requirements

##### Workflow

- Path proposal preparation workflow shall be implemented in the CB.
- CB shall take the right running time calculation options based on the given workflow.

##### Collection of capacity products

- Broker shall be able to combine catalogue path, capacity bands in the Capacity Hub according to the defined time constraint per segment (RNE BigData requirement)

##### Gathering running time estimation from IMs

- Broker shall be able to store the list of IMs or infrastructure where automatic running time calculation is available nationally
- Broker shall contact automatically the national systems and request running time calculation based
- Broker shall update the Path Management with the received answers

##### Running time calculation via DWH

- Broker shall send a request to the DWH for checking historical data in planned train data.
- Broker shall do reliability check of the received estimation.

##### Own running time calculation

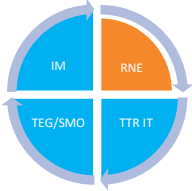
- In the worst case, the broker shall be able to do a calculation itself applying traditional physics formulas extending it with a buffer time as usual in timetabling.

### 5.9. Sales (S)

The Sales module does not exist as an application (only the CIS system exists, but it should be technically re-developed due to its old IT framework). In the future, the functionality of this module is foreseen to be implemented in the TTR IT Landscape as an additional module that will contain the following groups of the functionality:

- Commercial conditions
- Charging information (current CIS functionality which provides charge estimates)
- Network Statement (NS) digitalization (to be developed as a separate tool)

#### Summary

<p><b>Completeness:</b></p> <ul style="list-style-type: none"> <li>- Only a general overview of the module is described, and this module is still in preparation and not ready to be assessed</li> </ul>		
<p><b>Open issues:</b></p> <ul style="list-style-type: none"> <li>- Commercial conditions and allocation rules</li> <li>- Charging information system functionality</li> </ul>	<p><b>Reasons:</b></p> <ul style="list-style-type: none"> <li>- There is no common decision neither proposal what nor how it should be implemented</li> <li>- Feedback from Commercial Condition group is expected</li> </ul>	
<p><b>Plan to make this topic green:</b></p> <ul style="list-style-type: none"> <li>- After a decision on the Commercial conditions and allocation rules, a specification for implementation will be prepared</li> <li>- The involvement of the CIS (Charging information system) in the TTR IT Landscape is not defined yet. Depends on the conclusion from the group responsible for the CIS implementation.</li> </ul>		
<p><b>Dependency:</b></p> <ul style="list-style-type: none"> <li>- Feedback from the Commercial Condition group</li> </ul>		
<p><b>Timeline:</b></p> <ul style="list-style-type: none"> <li>- More detail description of this topic is planned for the 2<sup>nd</sup> TTR IT Landscape implementation step</li> <li>- The final draft specification of the Capacity messages should be ready until end of June 2020</li> </ul>		
<p><b>Implementation deadlines:</b></p> <ul style="list-style-type: none"> <li>- Will be implemented in the second implementation step</li> </ul>		

### 5.9.1. Centralized master data

Currently, the CIS is a completely stand-alone application with its own database that is fulfilled manually. The following information is stored:

- Countries, Locations, Lines, Line segments, Line categories
- Train parameters such as train types, traction types
- Additional parameters for the calculation specified by the IM
- CIS formula attributes

The connection with a central master data is needed for the topological data.

#### Minimal requirements

The Sales module will not be considered as a minimal requirement of the TTR implementation.

#### Additional requirements

As the Sales module does not exist, the paragraph „Functionality“ describes the possible functionalities of the implementation.

### 5.9.2. Integration options

#### Minimal requirements

##### Object updates

Commercial conditions should be defined and implemented with its process



Allocation rules should be defined  
Charging information defined, and the message to exchange the data with other modules  
NS digitalized data

#### Schema and message definition

XSD proposal of charging information shall be defined for TAF/TAP TSI

XSD proposal for the charging information handling (costs data) shall be defined for TAF/TAP TSI

#### Endpoint and communication

Common interface endpoint shall be opened for Sales module

Sales module shall be ready to send and receive TAF/TAP TSI messages related to working with the available objects

As the Sales module will include information that shall be publicly available by EU law, access to this module shall be granted to all interested users free of charge and if possible, without user registration to decrease administrative effort.

### **5.9.3. Integration options**

#### **Minimal requirements**

Path Request Management

- Charging information shall be provided for the information purposes

Path Management

- Charging information shall be provided for the information purposes

Applicant's GUI

- The Sales module shall be integrated into the GUI

#### **Additional requirements**

Shall be defined later, when the final version of the Commercial Conditions document shall be ready.

### **5.9.4. Functionality**

#### **Minimal requirements**

A possible implementation of the functionality that currently exists in the CIS system. A master data for this functionality shall be BigData module (from the topology point of view).

#### **Additional requirements**

The group responsible for Commercial Conditions shall define the functionality and the CIS Change Control Board shall consider if and how this functionality could be added to the CIS. A harmonized functionality of the Commercial conditions shall be related to the following:

- Path cancellation
- Non-usage of a path
- Cancellation of a partially non-used path
- Path modification
- Path alteration

## **Annex 1:** Proposal of new objects and messages (complete XSD schema)

The summary of modification proposal of the existing objects and elements in the current TAF TSI schema, as well as definition of new messages, can be found below:

New objects: BA as a capacity band, PP as a pre-arranged path, CP as catalogue path. Also, the BI as Business Identifier was added for testing the multi-annual aspect

New elements:

- NumberOfSlots: indicates the available slots per day inside a band
- AllocationStatus: indicates the different allocation status of a path per day
- TimeFrame: new element that is necessary for the capacity bands
- FromTime: part of the TimeFrame
- ToTime: part of the TimeFrame
- TrainWeightFrame: frame of parameters with ParameterQualifierCode
- TrainLengthFrame: frame of parameters with ParameterQualifierCode
- WeightOfSetOfCarriagesFrame: frame of parameters with ParameterQualifierCode
- LengthOfSetOfCarriagesFrame: frame of parameters with ParameterQualifierCode
- BandInformation: new element storing the information of the bands
- BandJourneyLocation: created based on the PlannedJourneyLocation, because the PlannedJourneyLocation cannot be used as it is
- BandTechnicalData: used in the BandJourneyLocation
- CapacityManager: optional field to cover RFC use cases for PaPs and RFC capacity bands. This is valid for the published capacity. Once it is requested, the
- CapacityTitle: like the PaP ID today
- CompositIdentifierPlannedMultiAnnualType – the ID structure is the same as the PlannedTransportIdentifier
- String1-12: CapacityTitle has this format based on the current PaP ID structure
- ReferenceLoco
- TypeOfPartition: Type of partition according to the TTR Process description

Updated existing elements:

- PlannedCalendar is extended with optional elements: NumberOfSlots, AllocationStatus
- TypeOfRequest values: 1 Path Study, 2 Ad-Hoc Path Request, 3 Path Modification/Alteration, 4 Annual Path Request, 5 Late Path Request, 6 Rolling Planning Path Request, 7 Capacity Bands, 8 Pre-arranged Paths, 9 Catalogue Paths
- RequestedCapacity replaced with RequestedCapacity
- CoordinatingIM: description was updated with RFCs

New messages:

- CapacityProductCoordinationMessage: for harmonization purposes either for a capacity band before publication or capacity offer to Applicant
- CapacityProductDetailsMessage: either used for publication of capacity bands or sending capacity offer to Applicant
- CapacityProductConfirmedMessage: when Applicant accepts a Rolling Planning capacity offer
- CapacityProductDetailsRefusedMessage: when Applicant rejects a Rolling Planning capacity offer
- CapacityProductNotAvailableMessage: for alteration by IM a similar message shall be used as for Path Alteration
- TCRMessage: to exchange (send) the TCRs data with the TCR module.
- TCRCanceledMessage:
- TCRResponseMessage:
- SearchCapacityProductMessage: shall be used to search all the capacity products
- CapacityProductMessage: is the response to the search capacity product message



taf ttr  
schema\_proposal.xsd







taf\_ttr\_codelist\_propo  
sal.xsd

**Annex 2:** Capacity product publication, Capacity product closure after publication, Capacity product capacity return, capacity product withdrawal

Since the images are too big to be shown in the document, there are attached as separate files.

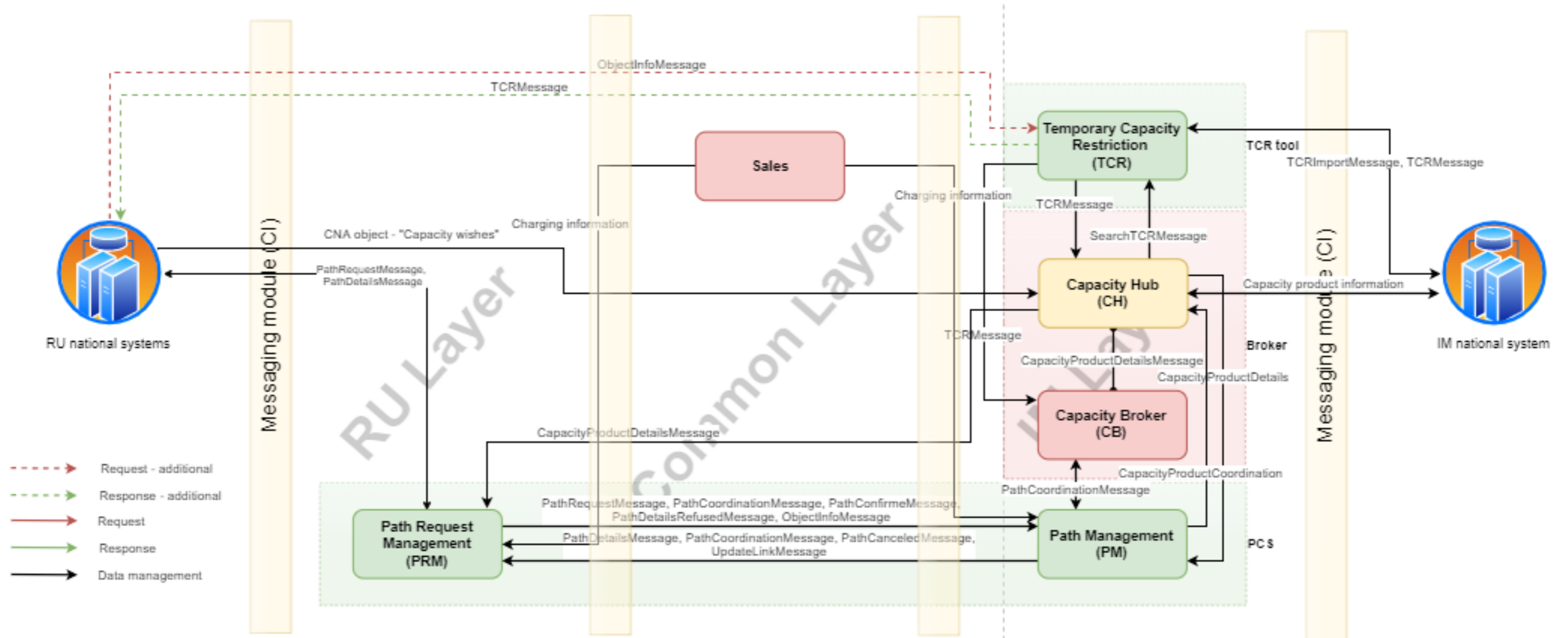
The files can be found below:

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Capacity product publication	 Capacity product publication v1.pdf
Capacity product closure after publication	 Capacity product closure after publica
Capacity product capacity return	 Capacity product capacity return v1.pc
Capacity product withdrawal	 Capacity product withdrawal v1.pdf

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Annex 3: TTR IT Message exchange – the first implementation step



## **Annex 4: TCR messages – XML and Excel specification**



Annex 4 - TCR  
messages, XML and E

## **Annex 5: Common interface “Step-by-step” wizard description**



Annex 5 - Common  
Interface Step-by-step

## **Annex 6: Common Interface API request description**



Annex 6 - Common  
Interface API request

## **Annex 7: Requesting a capacity via TAF/TAP TSI**



Annex 7 - Requesting  
capacity via TAF-TSI.d

## **Annex 8: Capacity Needs Announcements Excel file structure (to be updated)**



Annex 8 - Capacity  
Needs Announcement

## **Annex 9: TTR needed infrastructure data**



Annex 9 - TTR  
needed infrastructure