Redesign of the International Timetabling Process (TTR)

Project results

(Version 0.6)

Index

Version history

Version	Date	Description
0.1	28 February 2017	Document created by Philipp Koiser
0.2	1 March 2017	Corrections and input by RNE SG and WG 2&3 leaders
0.3	3 March 2017	Input and corrections by TTR Core Team
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0. Introduction

Incomplete harmonisation of timetabling procedures between European countries makes it difficult to cooperate at an international level. To remedy this unsatisfactory situation, both RNE and FTE agree that changes to these procedures are needed. These two organisations are united in their goal to improve the timetable planning process. Thus, a joint FTE-RNE project was launched which is supported by ERFA (European Rail Freight Association).

As a result of some years of planning, the redesigned timetabling process is now available. This document describes the corner stones of this new comprehensive international planning process and describes the entire process timeline from X-60 (5 years prior to the timetable change) until the last day of the timetable period. The annexes of this document contain the basic IT requirements as well as the draft implementation plan, which will come into effect starting in June 2017.

1. Components of the redesigned timetabling process

The redesigned timetabling process consists of several components. These were structured as follows:

1.1 Temporary Capacity Restrictions (TCRs)
1.2 Timetabling strategy and advanced planning
1.3 Capacity model with capacity partitioning
1.4 Request method "Annual request"
1.5 Request method "Rolling Planning request"
1.6 General process components
    1.6.1 Leading entities
    1.6.2 Priority rules
    1.6.3 Commercial conditions
    1.6.4 KPIs

1.1 Temporary Capacity Restrictions (TCRs)

Description

The proper coordination and communication of temporary capacity restrictions (TCRs) is a key factor for the provision of reliable capacity information, based on which high quality paths can be created. Although works are important for keeping the infrastructure in good shape, bad coordination leads to a waste of capacity. The commercial needs of IMs and applicants have to be considered. The planning of TCRs starts as early as 5 years prior to the timetable change, with iterations leading to the maturity needed for the capacity model at X-12, and defining major, medium and minor impact TCRs. Even after X-12, the planning of minor impact TCRs continues and unforeseen TCRs need to be included.

Current state

At the moment, the international coordination of TCRs is regulated in the RNE Guidelines for Temporary Capacity Restriction on Rail Freight Corridors. The European Commission is planning on introducing TCRs as part of the timetabling timeline (Annex VII of the Directive 2012/34/EU). A tool which will support coordination is currently under development at RNE. It is based on findings of the TTR project and will, in its first release, provide support to RFC TCR coordinators.

Target state

TCRs are planned and communicated well in advance. IMs consult applicants to identify their commercial needs in sufficient time. The impact of each TCR on timetables is analysed, with increased maturity in each iteration, until they are fixed in the Capacity Model. After TCRs have been fixed, only minor changes should be made. This should ensure the reliability of available capacity and optimal usage of international rail capacities. An international tool enables the coordination and communication of TCRs.

To Dos / TTR Elements

- Process of TCR harmonisation with neighbour IMs starting at X-60
- Involvement of stakeholders regarding TCRs
- Involvement of neighbouring IM(s) in decision regarding TCR impacting their network(s)
- Permanent involvement of TT department in decisions regarding TCRs
- Calculation of estimated impact for each TCR
- Development of and agreement on scenarios for handling traffic during TCR at an early stage
- Agreement on TCRs with major impact by X-18 at the latest
- Agreement on TCRs with medium impact by X-12 at the latest
- Assignment (Fixing) of TCRs with major and medium impact at X-12 to quarter day, duration, location and impact
- Publication of TCRs in network statement at X-12
- Publication of final, fixed TCRs with major and medium impact at X-4
- Consultation process for applicants regarding TCRs with minor impact (at least 6 months prior to operation)

1.2   Timetabling strategy and advanced planning

Description

A more precise planning of timetables must include the creation of a capacity strategy. Such a strategy should provide insight into the IMs' and applicants' intentions for the upcoming timetable periods, including the management of traffic streams. It is also necessary to analyse traffic flows, taking into account the available infrastructure. Therefore, the careful planning of TCRs shall result in a well-balanced strategy in which IMs', applicants' but also the national economic interests are harmonised at an international level.

Current state

Currently, timetabling strategies exist at a national level only. Although, there is a small degree of international harmonisation concerning specific lines, these harmonised strategies only have limited priority in case of national path conflicts and are not mandatory at a European level.

Target state

A capacity strategy – including a timetabling strategy and TCR planning – is available, serving as a baseline for the creation of specific timetables. This strategy should be implemented top down, from general European traffic flows to specific lines. IMs, RFCs and applicants cooperate in order to create such a strategy for the entire international network, provide insight into expected traffic developments and improve timetable approaches in order to procure a larger share of the modal split for railways. This strategy needs to be based on the available as well as planned new infrastructure.

To Dos / TTR Elements

- National process for consultation of applicants timeframe 5 years in advance of current timetable
- Capacity strategy: IMs' common view on cross-border lines
- Consultation of applicants for upcoming Network Statement
- Feasibility studies at an earlier stage

1.3   Capacity model with capacity partitioning

Description

The key characteristic of the redesigned timetabling process lies in the consolidation of all known capacity elements (available capacity, expected traffic volume, etc.) into a single entity: The capacity model. In this model, all data regarding a specific timetable period will be available by X-12 and based on this data, the creation of the actual timetables should start. Being the core element of the pre-planning phase, its main function is to display available capacity, partition the expected traffic according to its attributes. It also safeguards capacity for Rolling Planning requests and provides basic information to all stakeholders of the timetabling process.

Current state

A general capacity model is currently not available. Safeguarding of capacity is being done to a certain degree via Pre-arranged Paths and catalogue paths. However, such approaches are currently limited to either the Rail Freight Corridors or to bilateral agreements between IMs.

Target state

The capacity model is exists at European level, based on the common capacity strategy. It covers all traffic expected on lines relevant to international traffic and is shared among European infrastructure managers and RFCs. Applicants participate in the creation of the model prior to X-12 through their capacity needs announcements, base their planning on this model and submit requests according to available capacity. The capacity model also provides the information needed for pre-planning paths together with end customers.

To Dos / TTR Elements

- Specifics of safeguarded capacity in capacity model
- Definition of a model for digital exchange of capacity
- Up to date reference files
- Definition of capacity products (especially IT specification)
- Definition of capacity bands (especially IT definition)
- Border/line harmonisation (path planning) in capacity model
- Creation of capacity model for international lines, together with neighbouring IMs

- Inclusion of all requirements related to capacity (including TCRs) into a single capacity model per line
- Definition of capacity types and needs (i.e. product portfolio) in the capacity model
- Preparation of system paths for Rolling Planning and pre-planned paths for Annual timetable
- Publication of pre-planned paths for Annual timetable capacity in capacity model
- Publication of slots for Rolling planning in capacity model
- Continuous consideration of TCRs in timetable
- Publication and ongoing update of slots for Rolling Planning up to 36 months ahead
- IT tool for booking and managing pre-planned paths for Annual timetable capacity and slots for Rolling Planning capacity

1.4 Request method "Annual request"

Description

For traffic which is defined in detail long before the operation starts and which requires early contracting for commercial and competition reasons, it is essential to provide feedback as early as possible. For this purpose, the annual timetable requests offer the possibility of early requests and early response. Due to the possibility that it might not be feasible to meet an early deadline but traffic itself follows similar patterns, such requests can also be placed at a later time, making use of residual capacity.

Current state

Currently, there is only one request method which resembles the annual timetable request. However, the lead times are longer and all requests are being transmitted and processed at the same time due to the lack of safeguarded capacity for later requests. This leads to a situation where applicants who already know all the details for their request at an early time receive their offers late. At the same time applicants who do not know their request details until a very late time are forced to submit requests that act as place holders which later need to be modified to reflect the correct details. This also leads to workload peaks for human resources during the various process steps.

Target state

When applicants know details at an early time, requests for paths can be made very early. Capacity intended for this kind of traffic will be assigned and published in the capacity model. The response time of IMs is shortened and an early offer shall provide the possibility for early contracting with end customers (e.g. opening ticketing systems). Late requests can be placed, based on residual pre-planned or unplanned capacity, with a shortened response time for IMs.

To Dos / TTR Elements

- Requests for ATT placed on time
- Path elaboration ATT placed on time
- Border harmonisation (ATT requests placed on time)
- Respecting frozen zone for TCRs with major and medium impact between X-8 and X-4
- Draft offer for ATT requests placed on time
- Requests for ATT placed after deadline
- Path elaboration ATT placed after deadline
- Border harmonisation (ATT requests after the deadline)
- Draft offer for ATT requests placed after the deadline

- Residual capacity from ATT
- Observations related to path offer
- Post-processing
- Final offer
- Major/minor changes to path requests
- Withdrawal of requests (full or partial)
- Acceptance / final allocation
- Path modification (annual requests)
- Path alteration (annual requests)
- Full or partial cancellation (annual requests)
- Update of the digital exchange model

1.5   Request method "Rolling Planning request"

Description
In order to meet market requirements, the TTR project has identified the urgent need for a requesting method for traffic with details known at a later time. The Rolling Planning was created to be able to request paths at any time and to still provide high quality paths. The Rolling Planning is based on safeguarded capacity, which is dedicated to later requests and which is assigned to this purpose in the capacity model. Quick response times and multi-annual request validity should provide the flexibility necessary in order to react to the volatile market while at the same time still providing stability for upcoming timetable periods.

Current state
Currently, only a few elements of the Rolling Planning can be found in the various ad hoc processes of European infrastructure managers. Pre-arranged Paths and catalogue paths are available for freight but lack the priority, the network approach and, partially, international harmonisation. Regarding multi-annual validity, Framework Agreements play a minor role. However, due to the restrictive process for concluding Framework Agreements, which has to be done very early, this instrument does neither meet the need of the volatile market nor does it provide the required stability.

Target state
Rolling Planning is available as a request method at any time. Safeguarded capacity – which has been designed by IMs in cooperation with applicants and other stakeholders - provides high quality paths according to market needs. Multi-annual requests are possible. The applicants make use of the possibility to consult IMs in the creation process to bring safeguarded capacity as close to real needs as possible.

To Dos / TTR Elements
- Rolling Planning requests
- Path elaboration RP
- Border harmonisation (RP request)
- Offer including quick response time (for RP request)
- Observations related to offered slot for upcoming TT period(s) in case of RP
- Path modification RP
- Path alteration (RP)

- Full or partial cancellation RP (path in current TT)
- Slot modification RP
- Full or partial cancellation RP (slot for upcoming TT period(s))
- Slot alteration (upcoming TT period(s))
- Definition/update of digital exchange model
- Description of handling of not requested RP capacity between 4 weeks prior to the scheduled day of operation up to the day of operation

1.6 General process components

Some of the components to be implemented need to be applied during the entire process.

1.6.1 Leading entities

Description
For each process step it is important to have clearly assigned responsibilities. A leading entity is required to steer the process and to ensure that agreements are being made and deadlines are being met.

Current state
Although leading entities are already an integral part of the current process, the level of enforcement is quite low.

Target state
Leading entities fulfil their role actively and enforce deadlines.

1.6.2 Priority Rules

Description
Priority rules are rules to determine the highest priority in case of conflicting bids. Such rules are necessary to provide the IMs with the means to determine which aspect of a potential conflict to focus on and to provide the best possible solution.

Current state
RFCs use priority rules for conflicting PaP requests. At national level, priority rules are being applied, but without international harmonisation. This leads to very complex situations in case of conflicts, the resolution of which is very time consuming.

Target state
Priority rules are harmonised and applied throughout Europe and easy to use. Note: The goal in case of conflicting requests is to find solutions for all requesting applicants. Rejection due to unavailable capacity shall be avoided.

1.6.3 Commercial conditions

Description

In order to steer the process, to prevent misuse from any side, and to encourage the use of the correct tools provided in the process, commercial conditions will apply. It is essential to note that TTR does not harmonise the monetary value of commercial conditions but provides a framework which can be applied without exception throughout Europe in order to eliminate the confusing variety of ways commercial conditions have been established.

Current state

Harmonised commercial conditions do not exist. Each IM has a different set of commercial conditions. Applicants have to base their calculation on a wide variety of commercial conditions and therefore need experts for each IM on whose territory the applicant operates.

Target state

Harmonised and clearly defined commercial conditions are applied throughout Europe. All IMs use the same set of commercial conditions.

1.6.4 Key Performance Indicators (KPIs)

Description

TTR will provide a timetabling process that is as close to reality as possible. However, this also requires monitoring and improvements. To measure the effectiveness of the process KPIs will be applied.
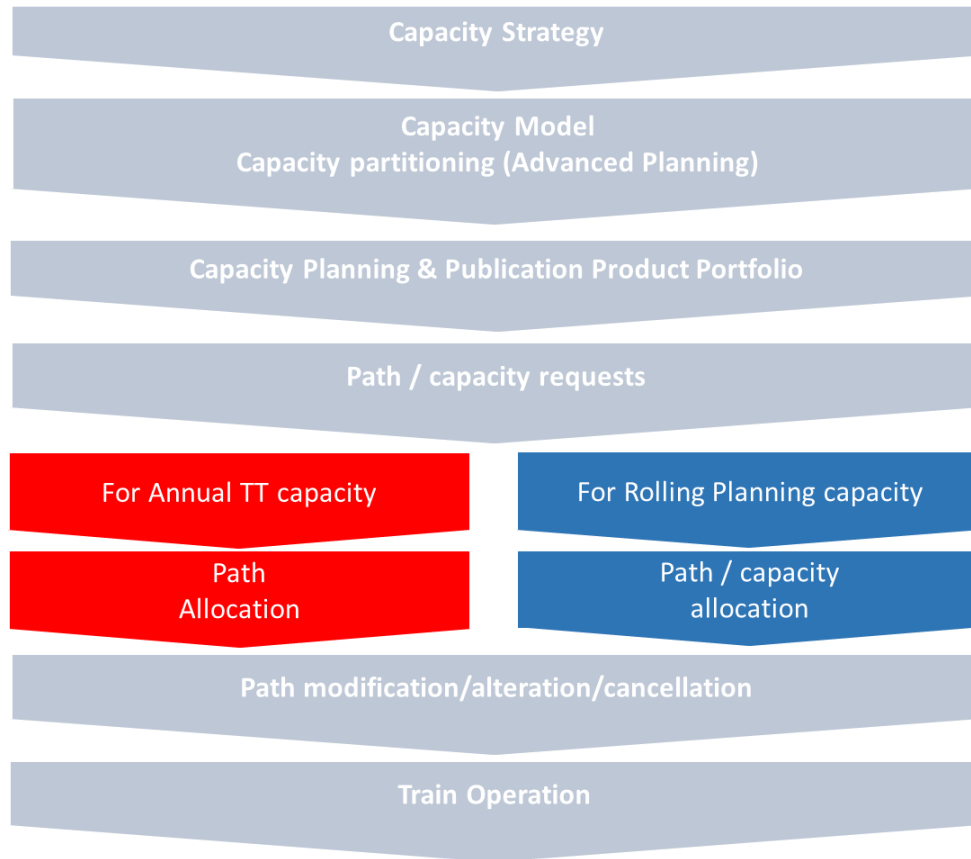
Current state

Due to fact that there is no common IT system used by all IMs and RUs for all process steps and for all paths, only a small number of KPIs can be calculated.

Target state

European KPIs will be applied to measure the quantity and quality of paths from advanced planning to operations, as well as compliance with frameworks and deadlines.

2. Process timeline

2.1 Overview of the entire process

2.2 Process timeline

Activity / process step	Time	Explanation
Capacity strategy	X-60 – X-36*	IMs' long-term capacity planning for a specific line, part of a network or entire network. Between IMs, various planning approaches exist. Therefore, coordination is needed
Capacity model	X-36* – X-18	A capacity model is built, based on IMs' capacity strategy, market requirements (e.g. new concepts), major/medium TCR and maintenance requirements for a specific line, part of a network or entire network. This model shows: • Capacity for commercial traffic • TCR (capacity needed for known restrictions; day-specific)

		For lines with cross-border traffic, harmonisation/coordination with RFC and neighbouring IMs is needed. The model needs to be updated regularly, at least yearly.
Capacity partitioning	X-36 – X-18	The commercially available part of the capacity model is partitioned, according to market needs, axis by axis, for use in two operational modes • Capacity (either pre-planned or simply available) for Annual requests • Capacity for Rolling Planning requests The pre-planned capacity (either for Rolling Planning requests or yearly base), is defined and shared with relevant stakeholders. The Rolling Planning capacity will then be safeguarded to ensure that due to the existence of two operational modes it remains unchanged until shortly before start of operation. The partitioning logic may change axis by axis and year by year as long as it does not impact capacity already assigned to Rolling Planning. RFCs are involved in the process.
Consultation phase	X-18 – X-16	Applicants will be consulted on various issues (intended capacity offer, Network Statements, TCRs)
Capacity planning	X-16 – X-12	Based on the partitioned capacity model, and capacity needs announcements, a feasible timetable model according to axis characteristics will be elaborated. For cross-border lines, activities shall be harmonised between IMs and RFCs.
Publication Product Portfolio	After X-12	<u>Capacity for Annual Timetable requests:</u> In the form of Pre-planned Paths. <u>Capacity for Rolling Planning requests:</u> Providing a number of possibilities based on capacity bands for a defined time window, incl. principal characteristics: • Line/section-related • Parameters (length, speed, weight, etc.) • Standard running time

		In order to be able to request Rolling Planning capacity for up to 36 months, available Rolling Planning capacity needs to be published not only for the upcoming timetable period but also for the two subsequent periods. Internationally harmonised commercial methods/conditions will prevent the blocking of capacity.
Types of path requests	ongoing X-8.5	There is only one process in which the applicants' choice is between either the Annual or Rolling Planning request method, per traffic. Rolling Planning requests: At any time for up to 36 months ahead of operation, responded to on a first-come, first-served basis, as long as the operation period starts between 1 and 4 months after the request Annual requests: • For traffic to be asked for one year or less at the defined deadline • Requests placed after the deadline will be processed based on the residual capacity for annual requests.
Path/capacity allocation Rolling Planning requests	Ongoing	Path elaboration based on dedicated capacity for 1st TT period (current or upcoming) and elaboration of a slot, which will be converted to a path year by year for the upcoming annual timetable period(s). Allocation on the basis of first-come, first-served. • Path offer for current TT period • Capacity commitment (slot) for upcoming TT period(s)
Path allocation Annual requests	X-8.5 ⇨ X-6.5 X-5.5 X-5.25	Path elaboration based on annual timetable dedicated capacity or available capacity and conflict resolution procedure in case of conflicting requests. • Draft offer, start observation phase • Final offer, start acceptance phase • Final allocation
Path allocation annual timetable requests placed after deadline	After X-5.25	Path elaboration based on residual capacity for Annual timetable requests
Path modification*/alter-ation**/cancellation* * = requested by applicant	After allocation	Minor modifications: IMs take them into account

** = requested by IM (e.g. in case of TCR at short-notice)		Major modifications: Cancellation of allocated path/slot and new request
		Alteration = IMs offer an alternative, acceptance by applicant is required
		Partial or full cancellation of path: possible
Train operation		Train operates according to the path allocated by the IM and as accepted by the applicant

*) An extension to X-48 should be considered in the next steps

3. Annexes

3.1   Annex I: Basic IT analysis

In order to implement the process, IT systems are required:

- Possibility for harmonising TCRs and timetables internationally has to be provided.
- Consultation of applicants and relevant stakeholders in all process steps is required.
- Centralised capacity data is necessary for quick response times.
- Interconnection between capacity components (e.g. capacity model, requests)
- Interfaces between systems (national and international) have to be established to provide for proper communication.
- Using the TAF-TSI framework for data exchange and data modelling.

The basic IT analysis can be found in Annex I

3.2   Annex II: Implementation plan

As described in the previous chapters, it is necessary to gradually transfer the current timetabling process to the defined target state. Therefore, it is necessary to define all actions necessary for each element to reach its target state, analysing the legal, IT and organisational requirements.

Additionally, experience needs to be gathered to improve the proposed process prior to a comprehensive roll-out. This will be achieved through pilots. To execute improvements of the process, a change management process will be implemented.

All these tasks are subject to the proposed implementation plan in Annex II.

4. List of abbreviations

ATT	Annual timetable
ERFA	European Rail Freight Association
FTE	Forum Train Europe
IM	Infrastructure manager
IT	Information technology
KPI	Key Performance Indicator
PaP	Pre-arranged Path
RFC	Rail Freight Corridor
RNE	RailNetEurope
RP	Rolling Planning
RU	Railway undertaking
SG	Secretary General
TAF-TSI	Telematics applications for freight service-Technical specification for interoperability
TCR	Temporary Capacity Restriction
TT	Timetable
TTR	Timetable Redesign
WG	Working Group