



Procedures for Capacity Model

Complementary document (handbook) to Description of the Timetabling and Capacity Redesign Process

Version 4.0

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Version history

VERSION	RESPONSIBLE	DATE	CHANGES
0.1	Sebastián Čarek Head of Sales & Capacity Process Management	2021-06-30	Creation of the initial version based on the "Description of the Timetabling and Capacity Redesign Process v2.00" and results of the Technical Workshop on CM, inclusion of remarks from the TTR project leaders
0.2	Sebastián Čarek Head of Sales & Capacity Process Management	2021-08-27	Remarks from the TTR Process Group incorporated.
0.3	Zsolt Ungvári Capacity Manager Ádám Kertai Head of Capacity Process Management	2021-09-17	Remarks from the TTR Process Group incorporated.
0.4	Zsolt Ungvári Capacity Manager Ádám Kertai Head of Capacity Process Management	2021-09-29	Remarks from the TTR Process Group incorporated.
0.5	Zsolt Ungvári Capacity Manager Ádám Kertai Head of Capacity Process Management	2021-10-20	Remarks from the Sales & Timetabling and Legal Matters Working Groups incorporated.
0.6	Zsolt Ungvári Capacity Manager Ádám Kertai Head of Capacity Process Management	2021-10-27	Remarks from the TTR Process Group and Legal Matters Working Group incorporated.
1.0	RNE General Assembly	2021-12-07	Approval of the version 0.6 by the RNE General Assembly on 7 December 2021
1.1	Zsolt Ungvári Capacity Manager	2022-03-03	Updated description of Capacity Needs Announcements
1.2	Zsolt Ungvári Capacity Manager	2022-03-16	Remarks from the TTR Process Group incorporated
1.3	Zsolt Ungvári Capacity Manager	2022-03-31	Remarks from the Legal Matters and Timetabling Working Groups incorporated.
2.0	RNE General Assembly	2022-05-31	Approval of the version 1.3 by the RNE General Assembly on 31 May 2022
2.1	Zsolt Ungvári Capacity Manager	To be confirmed	Updated description of Capacity Model variants
2.2	Zsolt Ungvári Capacity Manager	2022-06-01	Remarks from the TTR Process Group & TCR WG incorporated
2.3	Zsolt Ungvári Capacity Manager	2022-06-21	Remarks from the TTR Process Group & TCR WG incorporated
2.4	Zsolt Ungvári Capacity Manager	2022-10-13	Remarks from the Timetabling Working Group incorporated
3.0	RNE General Assembly	2022-12-06	Approval of the version 2.4 by the RNE General Assembly on 6 December 2022
3.1	Zsolt Ungvári Adv. Cap. Planning Mgr.	2023-12-21	Updated description of market involvement and harmonisation of Capacity Models
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3.3	Zsolt Ungvári Adv. Cap. Planning Mgr.	2024-02-20	Alignment to the agreements made by the CM AG

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3.4	Zsolt Ungvári Adv. Cap. Planning Mgr.	2024-03-21	Remarks from the Advance Capacity Planning WG incorporated
4.0	RNE General Assembly	2024-05-16	Approval of the version 3.4 by the RNE General Assembly on 16 May 2024

Disclaimer, application and transition period

This document is intended as a handbook for the implementation of the so-called Capacity Model of the TTR Process as described by RNE. As neither legislation nor IT-systems are currently adapted to enable all the elements of TTR, individual TTR elements can only be implemented by the infrastructure managers to a limited extent for the upcoming timetable periods, starting in December 2024. If and when the legislation and IT-systems fully enable the implementation of all the elements of TTR, the different RNE handbooks on those elements may be updated accordingly and be applied to the process. The exact details for the transitional period are elaborated in the Basic Requirements.

Infrastructure Managers and Allocation Bodies may adapt their internal processes and Network Statements in line with the Procedures for Capacity Models from X-36¹, where X denotes the first timetable referring to the complete rollout of TTR. The deadlines defined in sub-chapter 5.1.2 may be applied after the complete roll-out of TTR Capacity Model.

The Basic Requirements contain the description of the geographical scope, which might be defined differently for the first years of implementation.

This Handbook contains elements referring to the period after X-18, these parts of the Handbook are subject to adjustments according to future process development (e.g. Capacity Supply Handbook).

¹ Please note that the current version of the Handbook does not describe (yet) the final TTR target picture

1. Introduction and scope of this document

An essential part of the TTR process is advance planning. The Capacity Model is built based on the main planning principles for traffic and temporary capacity restrictions (TCRs), which are published in the Capacity Strategy. The main benefits obtained from a Capacity Model are firstly, transparency in capacity usage, and secondly, the detection of potential capacity conflicts and congestions already at an early stage, allowing for more time to mitigate the situation with suitable measures.

This document describes the process by which Infrastructure Managers and Allocation Bodies (hereafter IMs) have to prepare the Capacity Models in line with TTR principles. IMs shall follow these procedures in their entirety and harmonise their internal processes in order to promote internationally coordinated capacity management processes over the single European railway area.

2. Reference documents

This handbook follows and is based on the principles set out in the:

- **Description of the Timetabling and Capacity Redesign Process** version 3.0², which includes further description and glossary of terms used in this document.
- **Procedures for Capacity Strategy** version 3.0³
- **Procedures for Temporary Capacity Restrictions** version 2.0⁴
- **The Handbook also deals with matters regulated in Directive 2012/34/EU**, especially:
 - Article 38(2) on the prohibition to allocate paths beyond 1 TT period (exception framework agreements),
 - Article 39(1) on national frameworks for capacity allocation,
 - Article 40(1) on cooperation of IMs for efficient creation of infrastructure capacity,
 - Article 40(5) on assessing the need and organizing pre-arranged international train paths for freight trains,
 - Article 42 on framework agreements (capacity reserve for 5 years, subject to exceptions)
 - Article 45 on Scheduling,
 - Article 46 on the coordination process,
 - Article 48(2) on reservation of capacity for foreseeable ad hoc requests,
 - Article 53 on infrastructure capacity for maintenance works,
 - Annex VII parts prescribing provisions about the TCR Planning and definition of provisional international train paths.
- **Commission implementing regulation (EU) 2016/545 on framework agreements**
- **Regulation 913/2010**, especially:
 - Article 14(3) and (5) on pre-arranged paths and reserve capacity.

3. Added value of Capacity Models

- Supports the harmonisation of cross-border capacity planning,
- Provides an overview on available capacities on a European scale,
- Provides an overview concerning the infrastructure sections where possible future capacity bottlenecks can occur,
- Enables the unified clustering of TCRs,
- Enables the unified impact calculation of TCRs,
- Facilitates the consultation on traffic solutions during TCR periods by providing a standardised, transparent platform for every involved stakeholder,

² Accessible via: https://cms.rne.eu/system/files/long_description_of_the_ttr_process_v3.0_2021-12-07_0.pdf

³ Accessible via: https://rne.eu/wp-content/uploads/HB_Capacity_Strategy_3.0_2023-05-31.pdf

⁴ Accessible via: https://rne.eu/wp-content/uploads/2022/12/HB_TCR_2.0_2022-12-06.pdf

- Provides a good base to implement smart functionalities in the future (optimisation etc.).

4. Capacity Model IT system

RailNetEurope provides the European Capacity Management Tool ([ECMT](#)), which shall be used for the submission of Capacity Needs Announcements (CNAs), international coordination, publication, and consultation of Capacity Models⁵.

ECMT has to support both the Applicants and IMs in carrying forward the CNAs and Capacity Models from one timetable period to another, with the possibility to make adjustments according to new capacity needs.

5. Capacity Model process

This process defines the stakeholders which are involved in capacity modelling, the timeline to be followed by IMs, and the process steps that should be executed during the particular sub-phases of the Capacity Model process.

5.1. Stakeholders and Timeline

5.1.1. List of involved stakeholders and their role

Stakeholder	Roles and involvement
Applicant	<p>A railway undertaking or an international grouping of railway undertakings or other persons or legal entities, such as competent authorities under Regulation (EC) No 1370/2007 and shippers, freight forwarders and combined transport operators, with a public-service or commercial interest in accessing infrastructure capacity to meet existing or future market demand.</p> <p>In line with the above definition the possible Applicants are the following: RU Applicants: A railway undertaking (RU) or an international grouping of railway undertakings. Non-RU Applicants (for example): Competent authority (e.g. national/local MoT, etc.) Shippers / Freight forwarders</p>
IM	Infrastructure Manager (or Allocation Body) in charge of the Capacity Model.
Involved IMs	Infrastructure Manager (or Allocation Body) that is or might be concerned in or affected by the Capacity Model in question.
Other involved stakeholders	<p>An organisation which might be involved in the Capacity Model process:</p> <ul style="list-style-type: none"> • National and local infrastructure funds • Transport associations and transport organisers • Relevant supranational institutions
Operator of service facility	Any public or private entity responsible for managing one or more service facilities or supplying one or more services to railway undertakings referred to in points 2 to 4 of Annex II of Directive 2012/34/EU of the European Parliament and of the Council.

⁵ Please note that the exact visualisations in the IT-tool can differ from the figures which are shown in this Handbook

5.1.2. Timeline for Capacity Model (including Capacity Needs Announcements)

The following table shows the main milestones in the Capacity Model phase⁶.

Timeline	Milestone/Action
X-36	Start of the Capacity Model phase
From X-30	Harmonisation of initial Capacity Models
X-26	IMs invite the Applicants to submit Capacity Needs Announcements (CNAs) exclusively on changing/new needs
X-24	Deadline to submit Capacity Needs Announcements in ECMT
X-22.5	The Applicants, who submitted CNA(s) are notified via ECMT about the result of the IM's analysis (Considered/ Not (fully) considered). For not considered CNAs, whenever it is possible, the IM suggests an alternative ⁷ , which could then be incorporated into the draft Capacity Model.
X-21.5	The Applicants, who received alternative suggestions from the IMs, decide if the alternative is appropriate.
X-21	Deadline to publish draft Capacity Models. The Capacity Models are accessible for all Applicants
X-18	Deadline to publish final Capacity Models
X-12 ^{6,8}	Deadline to publish draft extended Capacity Models (inclusion of volumes planned after X-18 e.g. additional ad hoc volumes)
X-11 ^{6,7}	Deadline to publish the final version of the extended Capacity Models

5.2. Definition of Capacity Models

5.2.1. Definition of draft Capacity Models (X-36 to X-21)

At X-36, IMs start work on Capacity Models in line with the framework published in the respective Capacity Strategy, namely in chapter 3: Traffic planning principles and traffic flows.

The initial Capacity Models shall consider the information already available to IMs (e.g. concluded Framework Agreements, Capacity Models & Capacity Supplies of previous timetable years, studies, and own forecasts). Furthermore, the neighbouring IMs shall be contacted to exchange information regarding the possible developments at borders, and discussions can also be conducted with Applicants to collect additional information on expected development in market demand in order to meet an increase in demand and facilitate for newcomers to enter the competition.

5.2.1.1 Market involvement – CNA submission (X-26 – X-24)

The available information which has already been gathered on future traffic needs on the IM-side can be enriched based on the Capacity Needs Announcements, therefore, at X-26 the IMs invite the Applicants to submit CNAs for national and international traffic needs via the ECMT-tool.

The aim of CNAs is to contribute to the more precise long-term planning of volumes by providing additional information on future needs, and to facilitate the identification of capacity bottlenecks at

⁶ After the full implementation of TTR the Capacity Model timeline will end at X-18, therefore, the Capacity Model extensions will be phased out and the preparation of Capacity Supply will begin at the same time.

⁷ Alternative solution to be provided on general level, not for particular CNA submitters.

⁸ In case the final Capacity Model (published at X-18) reflects to the business needs properly, then the creation of extended versions is not mandatory.

an early stage. In this way the Applicants can contribute to the identification of pressure points where the level of service should be increased or is subject to change.

Considering the already available sources used for defining Capacity Models (a detailed list can be found in point 6.4.) the Applicants are invited to submit CNAs exclusively on changing/new needs, which are not covered by concluded Framework Agreements and Rolling Planning capacity rights. Besides additional capacity needs, the reduction of future needs is also essential information for the IMs, therefore, Applicants are asked to also share their plans in this regard⁹. During the CNA submission period the basis for comparison regarding changing needs is the actual working timetable (e.g. CNAs for TT2027 shall consider changes comparing with TT2024) excluding when the same need was already submitted at the previous CNA period(s). The Applicants shall not consider any TCR in connection with Capacity Needs Announcements.

In order to ensure that all relevant actors are involved in the collection of future needs, the following stakeholders especially are encouraged to submit CNAs:

Passenger needs		Freight needs
PSO ¹⁰ traffic	Non-PSO ⁸ traffic	
➤ PSO authority	➤ Railway Undertaking	<ul style="list-style-type: none"> ➤ Railway Undertaking (for production models) ➤ Shipper/intermodal operator (for trends)

During the preparation of CNAs, the concerned stakeholders communicate with each other (e.g. in case of PSO traffic the RUs shall contact the PSO authority) and strive to agree on which entity will submit the initial CNAs on behalf of the parties involved in a certain traffic. The aim is to avoid duplicate announcements for the same transport needs, in particular for freight needs.

The CNAs shall be submitted on the international level in a harmonised way in case of passenger traffic from origin to destination and regarding freight needs from/to the first/last known location. The detailed list of minimum content of CNAs can be found in Annex E.

The harmonisation of CNAs falls fully under the responsibility of Applicants, and their harmonisation efforts are supported by ECMT.

In order to ensure the implementation of discrimination-free processes, it is essential that the submission of CNAs does not lead to any kind of pre-allocation or reservation of capacities for particular Applicants. It can be considered just as an additional information source on future business needs to the long-term planning activities of IMs. The IMs are obliged to keep all submitted CNAs and any connected communication strictly confidential as far as permitted by relevant legislation.

By X-24, all Applicants can submit Capacity Needs Announcements in a standardised format (see Annex E), which shall be used in all networks. CNAs are regularly exchanged and discussed between the concerned IMs. The CNA process chart can be found in Annex D.

⁹ ECMT shall support the Applicants while making announcements on completely disappearing needs (reduced changes can be submitted as changing ones)

¹⁰ Public service obligation

5.2.1.2 Market involvement – Analysis of CNAs (X-24 – X-21)

After X-24 the IMs start to analyse the submitted CNAs, then at X-22.5 the Applicants are notified about the IMs' conclusion on submitted CNAs, which can be the following:

1. Considered: The submitted CNA will be taken into consideration during the creation of the draft Capacity Model. The IMs are not obligated to consider any TCR in connection with the submitted CNAs.
2. Not (fully) considered: The IMs are not in the position to consider the CNA during the creation of draft Capacity Model.

In connection with the CNAs cannot be (fully) considered in the draft Capacity Model, the IM, whenever it is possible suggests an alternative¹¹ at X-22.5, which the Applicant(s) will check by X-21.5. If the Applicant(s) deem the suggested alternative as appropriate, the draft Capacity Model can be defined accordingly. Otherwise, the Applicant(s) communicate to the IM by X-21.5 what the constraints are for the alternative. The communication on the alternative possibilities is supported by ECMT. There is no additional consultation/capacity shortage dialogue organised on a mandatory basis in this period.

The IM is responsible for the definition of the Capacity Model and for concluding which CNAs can be fully considered in the Capacity Model. The conclusion on submitted CNAs refers only to the draft Capacity Model, it does not guarantee that all considered CNAs will be included into the final Capacity Model as volumes, as there might be capacity conflicts to be justified during the consultation of the draft Capacity Models. The consideration of a CNA does not mean the mandatory linkage of the CNA with a particular Capacity Model volume in the IT-tool. Furthermore, the incorporation of a considered CNA into the final Capacity Model does not automatically mean that the parameters indicated in the CNA will be included in the Capacity Supply as provided by the Applicant.

The final goal of TTR is European-wide sectoral harmonisation, therefore, the IMs should avoid incorporation of partial CNAs¹² into the draft Capacity Model. In cases where one of the IMs is not able to consider an internationally relevant CNA, the Applicants shall be given the opportunity to update the CNA (for instance exclude the territory/withdraw the CNA). However, the infrastructure managers shall cooperate to strive for meeting any demand for international rail traffic, as expressed in CNAs or during the other steps of the allocation process.

In this period (X-24 – X-21) Applicants can be contacted by IMs in case any clarification is needed. With the support of ECMT IMs perform a plausibility check of the data, attempt to detect multiple data entries for the same traffic demand, and try to compare the external input with own traffic forecast hypothesis.

5.2.1.3 Harmonisation of draft Capacity Models (X-30 to X-21)

The IMs start the first round of international harmonisation with the involved IMs after X-30, when the initial Capacity Models are available in ECMT, which supports the IMs efforts during the whole harmonisation process. The IMs have to ensure the publication of internationally aligned draft Capacity Models at X-21 in ECMT.

The harmonisation of Capacity Models shall be conducted both on the level of border points and on traffic flows¹³. The main focus shall be on multi-network (i.e. international) volumes, however

¹¹ Alternative solution to be provided on general level, not for particular CNA submitters.

¹² *Partial CNA means that the concerned IMs came to different conclusions on a submitted CNA, e.g., a CNA was submitted for a volume from the network of IM "A" to IM "C" via IM "B". IM "B" does not consider the CNA in the draft CM but IM "A" and "C" yes. In these cases, the Applicants shall be invited to choose the next steps (keep the CNA regarding IM "A" and/or "C" or withdraw the whole CNA).*

¹³ During the first harmonisation attempt(s) the focus will be on the harmonisation of volumes at borders with a possible outlook to the international traffic flows

additionally in the longer term the possible effects of changing national volumes on the international ones will have to be considered as well. The harmonisation of Capacity Model volumes shall be done primarily on bilateral level i.e., with the involvement of neighbouring IM. The Capacity Model volumes are defined until either the last Primary Location Code (PLC) on the IM's network or a pre-defined handover point, hence, the aim of bilateral harmonisation is to make sure that each volume has its own pair on the territory of the neighbouring IM.

In addition, in case of closely interdependent border sections or for harmonising volumes on the traffic flow level the scope can be extended to the regional/corridor level (e.g. in case of travel time sensitive traffic such as high speed or night volumes / particular freight volumes). In order to facilitate the regional/EU level harmonisation of Capacity Model volumes, in case of necessity, a platform can be established (similar to RNE Technical Meetings on the harmonisation of international path offers) and meeting(s) can be organised e.g. at X-26 and X-21.5.

Content-wise, in addition to the mandatory layers¹⁴, the harmonisation shall also consider Layer 3 (Basic categories) in case of passenger traffic, Layer 4 (Basic parameters) mainly in case of freight traffic, and Layer 5 (Capacity product type) if the IMs taking part in the harmonisation defined these optional layers in the Capacity Model phase¹⁵. Considering that Capacity Model volumes are based on hourly time-information, the harmonisation between the IMs is done primarily on hourly basis. Nevertheless, ECMT will also support minute-based harmonisation to fulfil the needs of IMs intending to go beyond the default scope in this period.

The IMs are free to consider dwell times at handover stations based on their individual considerations.

In case the harmonising IMs define different Capacity Model variants (as laid down in point 6.3.) then these additional variants shall be taken into account to ensure the best possible match at the borders.

Use cases in connection with the harmonisation of draft Capacity Models can be found in Annex I.

5.2.1.4. Construction & publication of draft Capacity Model (X-24 to X-21)

Between X-24 and X-21, IMs analyse the collected input from different sources (e.g. CNAs, studies), and create the draft Capacity Models.

At X-21, IMs publish the draft versions of the nationally and internationally coordinated Capacity Models. In order to ensure the transparent and non-discriminatory treatment of all applicants, and to be able to fully utilise the benefits of the Capacity Models, the draft and final Capacity Models shall be made available and accessible in digital format for each potential Applicant (e.g. in RNE ECMT). The publication of draft Capacity Models can be accompanied by a cover document (to be published at the IM's and RNE's websites), which can provide additional explanation and background on conclusions made at the definition of draft Capacity Models.

5.2.2. Finalisation of the Capacity Model (X-21 to X-18)

During this sub-phase, any reported inconsistency has to be removed and the Capacity Models fine-tuned and finalised. The final Capacity Models shall be coordinated and internationally harmonised.

5.2.2.1. Market involvement – Consultation based on the draft Capacity Model

The Applicants will have the opportunity to generate Capacity Model overviews based on the draft volumes in ECMT and submit their comments/remarks to the concerned IM(s). Furthermore, ECMT will support the comparison of submitted own CNAs with the published draft Capacity Model volumes.

¹⁴ As laid down in point 6.2.

¹⁵ Multi-annual effect has to be duly considered at a later stage

In case of necessity the IMs organise capacity shortage dialogues with the aim of solving remaining open issues regarding not fully considered CNAs and to answer received comments/remarks to the draft Capacity Model. As preparation for these dialogues the involved CNA submitter entities should be contacted to ask whether they wish to reveal their identity and necessary minimum data to ensure effective discussion on the possible solutions. In order to ensure a transparent and discrimination free process, the IMs shall invite all Applicants¹⁶ to these dialogues. Considering the hourly based nature of Capacity Models any kind of official dialogue in this phase is possible on the basis of volumes and there is no discussion foreseen on detailed paths with minutes.

The capacity shortage dialogues may be supported by simulating different scenarios (e.g., socio-economic modelling)¹⁷.

5.2.2.2 Harmonisation of final Capacity Models (X-21 to X-18)

The IM has to ensure that the changes planned to be made in the harmonised draft Capacity Models are coordinated with the involved IM(s) allowing the on-time publication of harmonised final Capacity Models at X-18 in ECMT. The scope and principles to be followed during harmonisation are the same as laid down in point 5.2.1.3.

Use cases in connection with the harmonisation of final Capacity Models can be found in Annex I.

5.2.3. Capacity Partitioning (at X-18)

At X-18, IMs perform the so-called "capacity partitioning" within the Capacity Model, it can also be understood as the publication of the final Capacity Model in ECMT. By applying this capacity partitioning procedure, the capacity of a railway line section is set aside in the Capacity Model for dedicated purposes:

- Volumes for passenger traffic,
- Volumes for freight traffic,
- Temporary Capacity Restrictions.

It should be ensured that high-quality capacity products will be set aside for both market segments (passenger and freight).

The partitioning shall be set at least for the whole timetable period and for the traffic volumes for a standard non-TCR weekday variant. It is up to the IMs to perform more detailed capacity partitioning where needed, this partitioning can differentiate capacity from the product point of view:

- Annual timetable volumes for both passenger and freight,
- Rolling Planning volumes (also covering multi-annual needs),
- Ad hoc volumes,
- Unplanned capacity (usable later for any volumes above).

In a non-discriminatory and competition neutral way IMs should, as far as possible, consider the probable business needs of the involved stakeholders while they are making decisions on the application of detailed capacity partitioning.

Access to the final Capacity Models shall be ensured to all Applicants, therefore, a link to the relevant IT tool (RNE ECMT) shall be included on the website of the IM.

The IMs must set up joint procedures for cases when an agreement with the Applicants and other involved stakeholders cannot be reached even after iterative consultation. This might consist of the

¹⁶ Based on the past experiences and submitted CNAs the IM has a good view on the possibly affected Applicants (e.g. experience = current operators, concluded Framework Agreement = current & new, CNA = new entrants to the market)

¹⁷ Exact details of the possible application of socio-economic modelling will be added at a later point of time.

congestion declaration and/or the application of allocation principles to prioritise certain traffic volumes. The procedures shall be published in the Network Statement.

5.2.4. Extension of the Capacity Model (X-18 to X-11)

If there is a need for adjusting the published Capacity Models due to changed business needs or updated information on traffic needs during TCR periods, the Capacity Models can be extended. The draft version of the extended Capacity Models shall be published at X-12. In connection with the planned changes in the Capacity Model consultation will be held with the involvement of Applicants. If an amendment has effects on the Capacity Models of neighbouring IMs, then these changes have to be coordinated, as well. If coordination cannot be agreed, the change must not take place.

The final version of the extended Capacity Models shall be published at X-11.

After the full implementation of TTR the Capacity Model lifecycle will end at X-18 with the publication of the final Capacity Models. Therefore, point 5.2.4. will have to be revised, accordingly.

6. Capacity Model content

This chapter provides an overview on the Capacity Model content, which consists of a 24-hour overview reflecting market needs (traffic part) and in case of variants for TCR periods on the capacity consumed by TCRs. The Capacity Model overviews are based on hourly information, therefore, any kind of publication of minute-based information is not foreseen on mandatory basis. The input sources to be used in the construction of the Capacity Models are described as well as the outputs at different milestones.

6.1. Creation of the Capacity Models

The creation of the Capacity Models can be divided into three phases.

6.1.1. Inclusion of the intended capacity usage line (ICL)

The Capacity Model contains the intended capacity usage line, which indicates the maximum number of volumes which can be accommodated without paying special attention to capacity planning / extraordinary traffic management measures (examples for counting this value can be found in Annex G).

The intended capacity usage line has to be defined for every railway line, it will also be possible to define different intended capacity usage lines for a single railway line (e.g. in case of the usage of different Capacity Model variants). By default, the nodal stations and marshalling yards are not included into the calculation.

The aim for the calculation of the intended capacity line on one hand is to provide a clear picture on the planned capacity situation and to detect pressure points where the IMs have to make additional efforts to ensure the stability of the timetable. On the other hand, the IMs and applicants will have a clear picture on the number of unplanned capacities, which would be available for ad hoc requests during the concerned timetable period.

In order to guarantee the stability/robustness of a timetable, an IM plans a certain number of paths. Due to increased capacity requirements at certain hours (e.g., rush hour), an IM can selectively raise the intended capacity usage line. This leads to an increased risk that punctuality will suffer in the event of minor irregularities. For the timetable system to recover in these cases, it is important that after a temporary increase in the number of paths, the number of possible paths is reduced to the standard value.

ECMT shall automatically indicate if one volume goes above the intended capacity usage line and it should open the Capacity Model, which needs to be checked. It is possible to create Capacity Models containing planned objects above the intended capacity usage line, but in order to maintain stability of the timetable it is recommended to try to avoid these situations to the extent it is possible. IMs can declare the possible capacity overshoot.

6.1.2. Feeding of the Capacity Model

The time data of the volumes should be uploaded into the ECMT on the Primary Location Code (PLC)¹⁸ level for each railway line. The input should determine at least one time data per railway line (given that there are two major hubs and between them two parallel lines (e.g. one high-speed and one conventional)), so the time data should refer to the planned line. The description of the Capacity Model object structure (Capacity Model import sheet) can be found in Annex E.

6.1.3. Generating the Capacity Models by ECMT

In practice, the Capacity Models are not pre-defined, the tool can create them based on the needs of the users. The Capacity Models can be generated in three different formats¹⁹:

Network level overview	Line level overview	Segment overview
<p>General overview on capacity on a very high level (e.g. capacity situation of a selected country)</p>	<p>Capacity situation on a selected line to facilitate the cross-border harmonisation and creation of variants (e.g. during TCR periods)</p>	<p>Capacity situation between two PLCs (e.g. to gather information on the planned volumes for a border section)</p>
<p>Mostly used by higher management levels, Ministry of Transport, etc.</p>	<p>Mostly used by IMs, Applicants</p>	<p>Mostly used by IMs, Applicants</p>

The generated Capacity Model overview considers the hourly departure time in case of segment view at the origin PLC or in case of line level overview at each origin/run-through PLC. The duration of the occupation of the volumes will not be considered in the Capacity Model.

For TCR consultation purposes the IMs can either utilise the PLC-based railway line overview (please see point 6.1.5) or use the section overview of Capacity Models. In the latter case the IMs should determine the point of the split, where significant timetable or traffic operation differences occur, such as beginning or ending services, different number of trains, train mixture and/or train sequence. Further descriptions of the visualisation possibilities can be found in Annex C.

Taking into account that the IMs have the possibility to upload different Capacity Model variants for different periods it shall be possible to indicate in ECMT for which day/period the Capacity Model overview should be generated.

The below calendar displays a case where the IM has defined the following variants for the TT period for a section of a railway line²⁰.

- Non-TCR standard day (green) – (has to be prepared on a mandatory basis)
- Variant for the last working day of the week in school periods (light green)
- Variant for weekends (blue)
- Variant for weekdays during school holidays (yellow)
- Variants for Major and High impact TCRs (red) (have to be prepared on a mandatory basis)

¹⁸ Primary Location Code (PLC) as defined by TAF TSI Standard

¹⁹ The exact visualisation of overviews can differ from these examples

²⁰ The variants besides the mandatory ones ("Non-TCR standard day" and "Variants for Major and High impact TCRs") are listed as examples, additional variants can be defined freely by the IMs based on the needs.

Railway line Dresden Hbf → Berlin Hbf



2024		MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	
CAPACITY MODEL - CALENDAR VIEW - TT2024 RAILWAY LINE Dresden Hbf --> Berlin Hbf, SECTION Dresden Hbf --> Elsterwerda																		
JAN		1	2	3	4	5	6	7	52	JUL	1	2	3	4	5	6	7	27
		8	9	10	11	12	13	14	1		8	9	10	11	12	13	14	28
		15	16	17	18	19	20	21	2		15	16	17	18	19	20	21	29
		22	23	24	25	26	27	28	3		22	23	24	25	26	27	28	30
		29	30	31					4		29	30	31					31
FEB					1	2	3	4	5	AUG			1	2	3	4	31	
		5	6	7	8	9	10	11	6		5	6	7	8	9	10	11	32
		12	13	14	15	16	17	18	7		12	13	14	15	16	17	18	33
		19	20	21	22	23	24	25	8		19	20	21	22	23	24	25	34
		26	27	28	29				9		26	27	28	29	30	31		35
MAR					1	2	3		9	SEP						1		35
		4	5	6	7	8	9	10	10		2	3	4	5	6	7	8	36
		11	12	13	14	15	16	17	11		9	10	11	12	13	14	15	37
		18	19	20	21	22	23	24	12		16	17	18	19	20	21	22	38
		25	26	27	28	29	30	31	13		23	24	25	26	27	28	29	39
											30							40
APR		1	2	3	4	5	6	7	14	OCT		1	2	3	4	5	6	40
		8	9	10	11	12	13	14	15		7	8	9	10	11	12	13	41
		15	16	17	18	19	20	21	16		14	15	16	17	18	19	20	42
		22	23	24	25	26	27	28	17		21	22	23	24	25	26	27	43
		29	30						18		28	29	30	31				44
MAY				1	2	3	4	5	18	NOV					1	2	3	44
		6	7	8	9	10	11	12	19		4	5	6	7	8	9	10	45
		13	14	15	16	17	18	19	20		11	12	13	14	15	16	17	46
		20	21	22	23	24	25	26	21		18	19	20	21	22	23	24	47
		27	28	29	30	31			22		25	26	27	28	29	30		48
JUN					1	2			22	DEC						1		48
		3	4	5	6	7	8	9	23		2	3	4	5	6	7	8	49
		10	11	12	13	14	15	16	24		9	10	11	12	13	14	15	50
		17	18	19	20	21	22	23	25		16	17	18	19	20	21	22	51
		24	25	26	27	28	29	30	26		23	24	25	26	27	28	29	52
											30	31						1

Capacity Model variant

- Non-TCR standard day for TT2024
- Variant for the last working day of the week in school periods for TT2024
- Weekend variant for TT2024
- School holiday variant for weekdays for TT2024
- Variant for Major impact TCR for TT2024
- Variant for High impact TCR for TT2024

15 December 00:01 Start of the timetable 2025

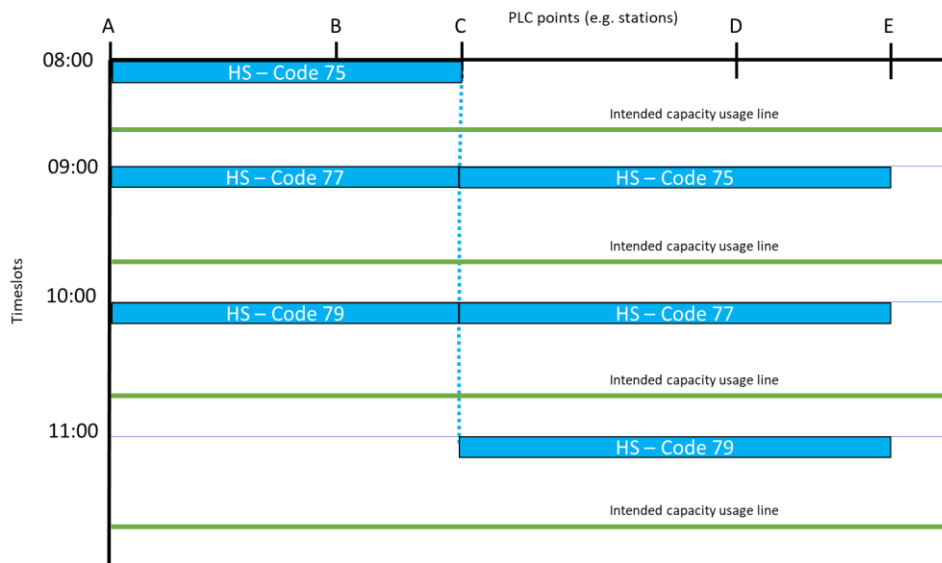
6.1.4. Cross-border sections

Cross-border sections shall be listed in ECMT to facilitate the harmonisation of volumes. The volumes published in neighbouring sections by neighbouring IMs have to be aligned to ensure seamless capacity product construction and train operation in the later stages. The outputs and granularity of cross-border Capacity Models shall be in line with the requirements defined by point 6.5.

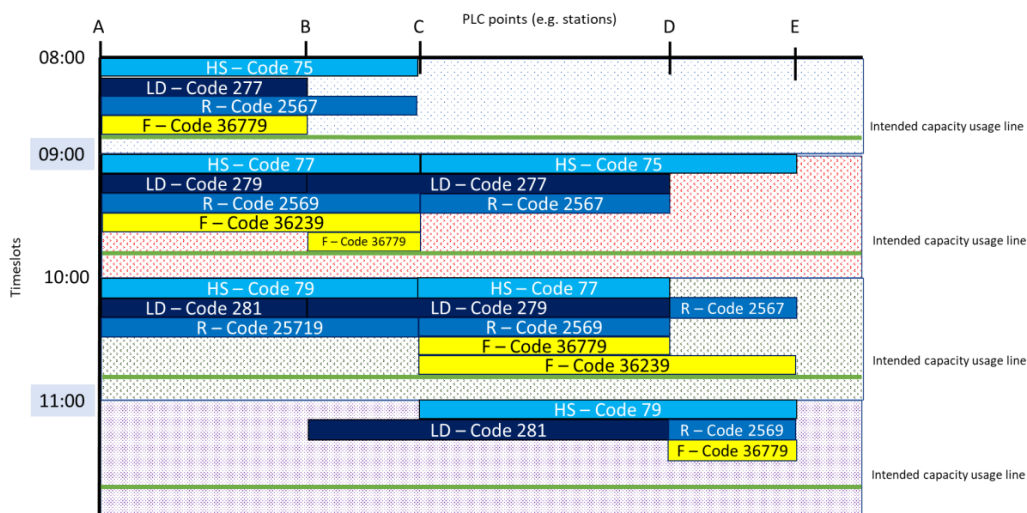
6.1.5. Verification of the uploaded information

The IMs should have the possibility to check the correctness of the uploaded information, therefore these verification tasks shall be also supported by ECMT. To fulfil this need, ECMT will be able to generate overviews on the railway lines based on the data, which was uploaded by the IMs regarding

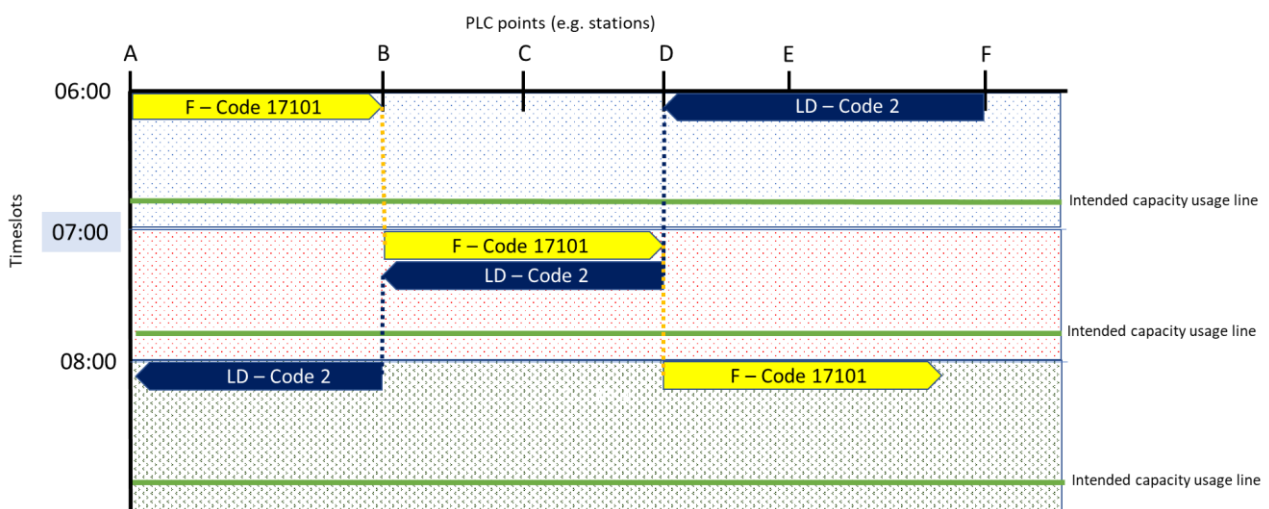
the concerned PLCs. The example on the possible visualisation of line level overviews can be found below:



Verification of the uploaded information – Example 1



Verification of the uploaded information – Example 2



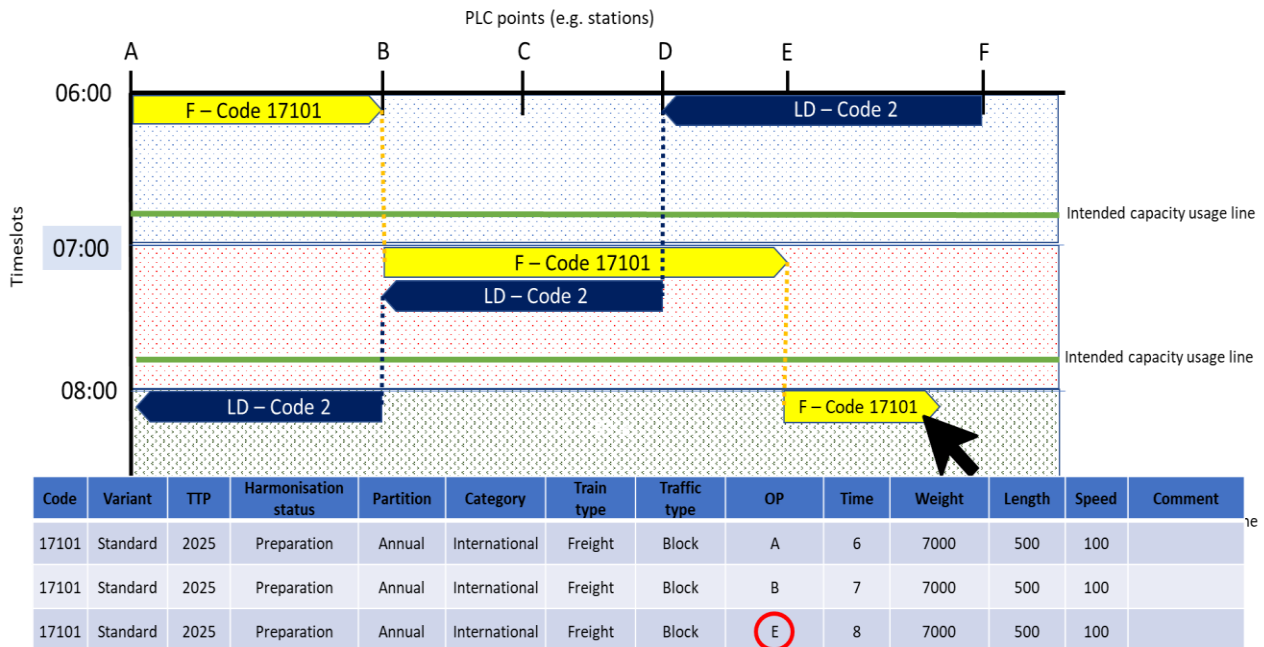
Verification of the uploaded information – Example 3 (single track line)

The line level overview can also be utilised for cross-border harmonisation and TCR-consultation purposes.

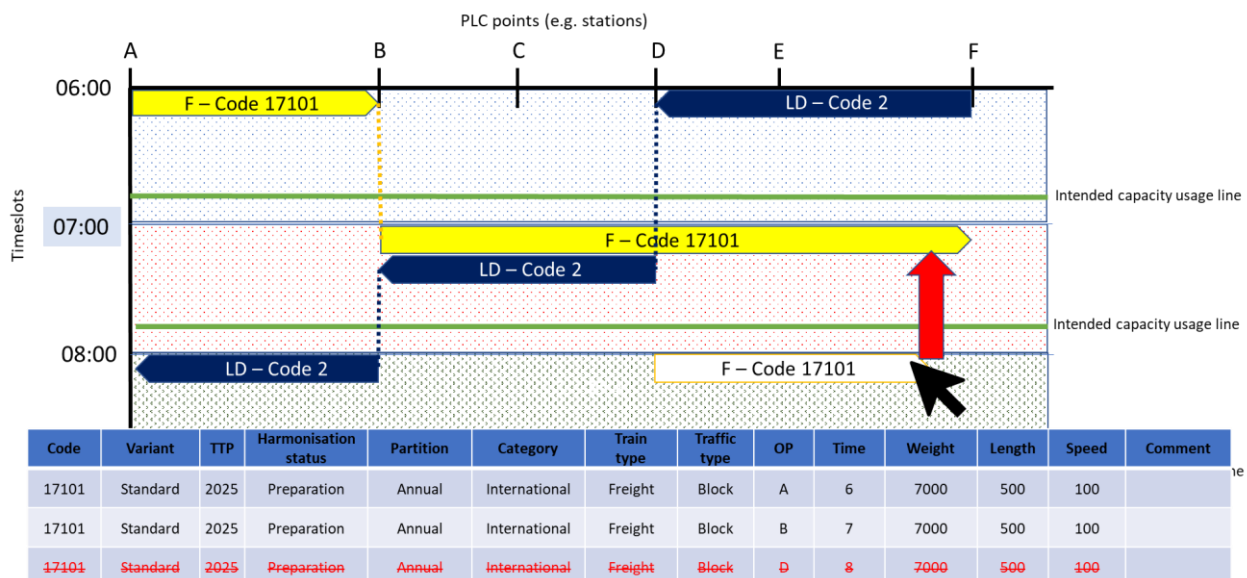
6.1.6. Modification of the uploaded data

The preparation of the Capacity Model contains several updating periods, therefore, ECMT shall support the smooth modification of the previously uploaded information possibly with easy-to-use solutions:

1. By clicking on the volume, the background figures appear, the database can be modified directly, and the visualisation shall be aligned to the new data by ECMT automatically.



2. By moving the volumes directly in the graphical layer and ECMT shall make the necessary changes in the database, accordingly.



6.2. Traffic part of the model

The aim of the traffic part of the Capacity Model is to show, harmonise, and discuss in more detail the expected hourly volumes of capacity consumed by each commercial market segment. IMs might first prepare a reference hour overview, which is developed into a 24-hour time-space capacity

diagram. The traffic part of the model displays for each railway line per direction²¹ the following objects, accompanied by a set of parameters that are important to identify capacity consumption. For the sake of confidentiality, not all parameters could always be publicly accessible in the Capacity Model. The visualisation examples can be found in Annex C.

The following layers have been identified regarding the Capacity Models:

1. Layer	2. Layer	3. Layer	4. Layer	5. Layer ²²
<ul style="list-style-type: none"> • Passenger • Freight/ • Other (loco train etc.) • TCR 	<ul style="list-style-type: none"> • International • National • International or National²³ 	<p>Basic categories for passenger trains:</p> <ul style="list-style-type: none"> » high-speed trains » long-distance trains » express regional trains » regional trains <p>Basic categories for freight trains:</p> <ul style="list-style-type: none"> » wagonload » block » combined transport train (optional). <p>Categories in cross-border line sections must be harmonised (preferably already in the strategy phase).</p>	<p>Basic parameters for passenger trains:</p> <ul style="list-style-type: none"> stopping pattern (according to point 5.1) acceleration(m/s²) planned speed maximum train length <p>Basic parameters for freight trains:</p> <ul style="list-style-type: none"> average maximum standard train weight, » average maximum standard train length, » expected speed²⁴, » dangerous goods or extraordinary consignments (allowed or not), profile. <p>IMs should keep only the above basic parameters and avoid using additional ones if they are not entirely necessary.</p> <p>In the Capacity Strategy the parameters of the basic categories should be defined. The parameters of the basic categories can</p>	<p>Products:</p> <ul style="list-style-type: none"> » Annual Timetable request » Rolling Planning request » Ad-hoc volumes²⁵ » Unplanned capacities²⁶

²¹ At a later stage in case of single-track sections it will be possible to generate one Capacity Model for both directions.

²² The table is subject of adjustments based on the experience on the implementation of TTR along with the preparation of the Rolling Planning Handbook.

²³ Volume can serve both national and international needs.

²⁴ Defined by the IM. An applicant can submit certain parameters via CNAs, but the IM has to have the right to modify them if this would lead to better utilisation of capacity.

²⁵ On networks with an increased volume of ad hoc traffic, i.e., capacity requirements that cannot be planned in advance, capacity can also be partitioned for this kind of traffic.

²⁶ There might be some capacity left on a line. Depending on the usage of a line, this unplanned capacity can vary between ‘nothing’ and ‘a lot of’ – it can be displayed in the form of empty rows in the space in the diagram, or with colours on the network map. The methods of calculation of unplanned capacities can be found in Annex G.

			<p>vary between the different railway lines.</p> <p>The same volume can belong to different categories during the train run (A → B, long-distance passenger, B → C high-speed passenger).</p>	
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Layers No. 1 and 2 shall be filled on an obligatory basis, layers No. 3, 4, and 5 can be filled voluntarily by the IMs. The filling of optional layers can be done independently of each other, e.g. filling No. 3 and 4 is not a prerequisite for the filling of No. 5.

Furthermore, in case of a regular TCR window, or a particular TCR (if a Capacity Model variant was created for a specific TCR period) occupies a certain amount of capacity – it should be displayed in the 24h overview as TCR window/particular TCR.

6.3. Capacity Model variants

The IMs shall define for each day of the TT period, which Capacity Model variant should be considered during the generation of the Model in ECMT. In practice, it can mean that one variant is applicable on all days and theoretically it shall be also possible to set different Capacity Model variants for each day. The process steps regarding the definition of Capacity Models can be found in point 5.2.

Basically, the below Capacity Model variants can be constructed and published for a particular TT period:²⁷

- Standard non-TCR working day (mandatory)
- Variants for particular periods such as different days of the week, school days, weekends, summer/winter holidays etc (optional)
- Variants for particular TCR periods to provide an overview on the traffic flows during a specific TCR (mandatory for Major and High impact TCRs)
- Variants for TCR window periods (highly recommended)

6.3.1. Standard non-TCR working day

As minimum requirement the IMs shall define at least one standard non-TCR Capacity Model variant for the TT period, which then will be used during the generation of Capacity Models. The IMs shall strive to define this variant based on a working day, which represents the standard traffic situation as far as possible. The below calendar displays the minimum case where the IM defined one Capacity Model variant for the whole TT period for a section of a railway line.

²⁷ For cross-border sections the periods have to be aligned.

RNE CAPACITY MODEL - CALENDAR VIEW - TT2024		RAILWAY LINE Dresden Hbf --> Berlin Hbf, SECTION Dresden Hbf --> Elsterwerda																	
2024	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK			
JAN								52	JUL										
	1	2	3	4	5	6	7	1		1	2	3	4	5	6	7	27		
	8	9	10	11	12	13	14	2		8	9	10	11	12	13	14	28		
	15	16	17	18	19	20	21	3		15	16	17	18	19	20	21	29		
	22	23	24	25	26	27	28	4		22	23	24	25	26	27	28	30		
	29	30	31					5		29	30	31					31		
FEB					1	2	3	4	5	AUG				1	2	3	4	31	
	5	6	7	8	9	10	11	6		5	6	7	8	9	10	11	32		
	12	13	14	15	16	17	18	7		12	13	14	15	16	17	18	33		
	19	20	21	22	23	24	25	8		19	20	21	22	23	24	25	34		
	26	27	28	29				9		26	27	28	29	30	31		35		
MAR					1	2	3	9	SEP							1	35		
	4	5	6	7	8	9	10	10		2	3	4	5	6	7	8	36		
	11	12	13	14	15	16	17	11		9	10	11	12	13	14	15	37		
	18	19	20	21	22	23	24	12		16	17	18	19	20	21	22	38		
	25	26	27	28	29	30	31	13		23	24	25	26	27	28	29	39		
										30							40		
APR								14	OCT			1	2	3	4	5	6	40	
	1	2	3	4	5	6	7	14		7	8	9	10	11	12	13	41		
	8	9	10	11	12	13	14	15		14	15	16	17	18	19	20	42		
	15	16	17	18	19	20	21	16		21	22	23	24	25	26	27	43		
	22	23	24	25	26	27	28	17		28	29	30	31				44		
	29	30						18											
MAY					1	2	3	4	5	18	NOV					1	2	3	44
	6	7	8	9	10	11	12	19		4	5	6	7	8	9	10	45		
	13	14	15	16	17	18	19	20		11	12	13	14	15	16	17	46		
	20	21	22	23	24	25	26	21		18	19	20	21	22	23	24	47		
	27	28	29	30	31			22		25	26	27	28	29	30		48		
JUN						1	2	22	DEC							1	48		
	3	4	5	6	7	8	9	23		2	3	4	5	6	7	8	49		
	10	11	12	13	14	15	16	24		9	10	11	12	13	14	15	50		
	17	18	19	20	21	22	23	25		16	17	18	19	20	21	22	51		
	24	25	26	27	28	29	30	26		23	24	25	26	27	28	29	52		
										30	31						1		

Capacity Model variant
Non-TCR standard day for TT2024

15 December 00:01 Start of the timetable 2025

6.3.2. Variants for particular periods²⁸

The IMs shall have the possibility to define further Capacity Model variants in order to better reflect different traffic situations of various periods. The variants can cover the changing traffic needs of particular days of a week (e.g. additional needs on Fridays), weekends (e.g. increased needs due to tourists), or even school holidays (winter/summer). The definition of additional variants can be restricted to limited geographical scope and can be relevant to the whole network, as well (e.g., Standard non-TCR working day variant for line A - D valid during the whole TT period, dedicated Capacity Model variant for summer holiday period, valid on line between points G - L, from 1 July to 31 August).

However, it will be up to the IMs to create additional Capacity Model variants, the decision-making should consider on one hand the business trends (own forecasts, information received via CNAs) and on other hand also the available resources (HR, IT).

It can be assumed that after the first years of the complete roll-out of TTR, the IMs will create more and more variants to further utilise the added values of Capacity Models and continue the development of their long-term capacity planning activities.

The below calendar displays the case, when the IM defined the following variants for the TT period for a selected section of a railway line:

- Non-TCR standard day (green)
- Variant for weekends (blue)
- Variant for weekdays during school holidays (yellow)

²⁸ Based on the decision of the RNE GA this chapter is only considered as potential IT input.

RNE CAPACITY MODEL - CALENDAR VIEW - TT2024		RAILWAY LINE Dresden Hbf --> Berlin Hbf, SECTION Dresden Hbf --> Elsterwerda																
2024	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK		
JAN	1	2	3	4	5	6	7	52	JUL	1	2	3	4	5	6	7	27	
	8	9	10	11	12	13	14	1		8	9	10	11	12	13	14	28	
	15	16	17	18	19	20	21	2		15	16	17	18	19	20	21	29	
	22	23	24	25	26	27	28	3		22	23	24	25	26	27	28	30	
	29	30	31					4		29	30	31					31	
FEB				1	2	3	4	5	AUG				1	2	3	4	31	
	5	6	7	8	9	10	11	6		5	6	7	8	9	10	11	32	
	12	13	14	15	16	17	18	7		12	13	14	15	16	17	18	33	
	19	20	21	22	23	24	25	8		19	20	21	22	23	24	25	34	
	26	27	28	29				9		26	27	28	29	30	31		35	
MAR					1	2	3	9	SEP							1	35	
	4	5	6	7	8	9	10	10		2	3	4	5	6	7	8	36	
	11	12	13	14	15	16	17	11		9	10	11	12	13	14	15	37	
	18	19	20	21	22	23	24	12		16	17	18	19	20	21	22	38	
	25	26	27	28	29	30	31	13		23	24	25	26	27	28	29	39	
										30							40	
APR	1	2	3	4	5	6	7	14	OCT			1	2	3	4	5	6	40
	8	9	10	11	12	13	14	15		7	8	9	10	11	12	13	41	
	15	16	17	18	19	20	21	16		14	15	16	17	18	19	20	42	
	22	23	24	25	26	27	28	17		21	22	23	24	25	26	27	43	
	29	30						18		28	29	30	31				44	
MAY				1	2	3	4	18	NOV					1	2	3	44	
	6	7	8	9	10	11	12	19		4	5	6	7	8	9	10	45	
	13	14	15	16	17	18	19	20		11	12	13	14	15	16	17	46	
	20	21	22	23	24	25	26	21		18	19	20	21	22	23	24	47	
	27	28	29	30	31			22		25	26	27	28	29	30		48	
JUN						1	2	22	DEC							1	49	
	3	4	5	6	7	8	9	23		2	3	4	5	6	7	8	49	
	10	11	12	13	14	15	16	24		9	10	11	12	13	14	15	50	
	17	18	19	20	21	22	23	25		16	17	18	19	20	21	22	51	
	24	25	26	27	28	29	30	26		23	24	25	26	27	28	29	52	
										30	31						1	

Capacity Model variant
 Non-TCR standard day for TT2024
 Weekend variant for TT2024
 School holiday variant for weekdays for TT2024

15 December 00:01 Start of the timetable 2025

6.3.3. Variants for TCR / TCR window periods

The main aim of the creation of variants for TCR / TCR window periods is to transparently announce and communicate to stakeholders the estimated capacity to be consumed by TCRs (based on the available information on TCRs) and overview of capacity volumes that will IMs need to do the infrastructure maintenance. The Capacity Model variants for TCR/TCR window periods should show in a wider geographical area the applied traffic solution, which contains all volumes (incl. cancelled, replaced and re-routed volumes etc.) on the affected parts of the network during the TCR/TCR window period. It should be noted that a TCR variant can have an effect over an entire route (e.g. Rotterdam - Genoa) or other IM, affected by re-routing. The offered re-routing options can contain different technical features for RUs (e.g. profile, weights).

The IMs shall start Annex VII compliant coordination and consultation on the execution of the Major and High impact TCRs (parameters of the construction/closure) before X-24 with the aim of providing a stable background for the definition of Capacity Model variants (information on the granularity and outputs at different milestones can be found in point 6.5.)

By X-24 the concerned IMs shall agree and transparently indicate the following in connection with:

- Major impact TCRs:
 - Draft Capacity Model variant for TCR period is published at X-21 and Final Capacity Model variant for TCR period is published at X-18 (in case of necessity extended Capacity Model variant can be created) **or**,
 - Only Final Capacity Model variant for TCR period is published at X-18 (in case of necessity extended Capacity Model variant can be created in line with point 5.2.5.).

In this case, the IMs continuously consult the Applicants during the definition of variant for TCR period.

- High impact TCRs:
 - A Draft Capacity Model variant for a TCR period is published at X-21 and a Final Capacity Model variant for a TCR period is published at X-18 (in case of necessity extended Capacity Model variant can be created) **or**,
 - Only a Final Capacity Model variant for a TCR period is published at X-18 (in case of necessity extended Capacity Model variant can be created in line with point 5.2.5.). In this case the IMs continuously consult the Applicants during the definition of variants for a TCR period **or**,
 - Extended Capacity Model variants for TCR periods are published at X-12 in draft and at X-11 in a final form.²⁹

In case of disagreement between the IMs in connection with the possible creation of Capacity Model variants for TCR periods the IMs shall strive to find a commonly acceptable option³⁰.

Taking into account that TCR planning is an iterative process it has to be ensured by the IMs that the changes in the main parameters of TCRs are continuously updated in the TCR tool, which shall "inform" via ECMT the concerned IM, that the Capacity Model variant has to be aligned to the updated information (e.g. if there are changes in the parameters of TCR then the variant can be extended at X-12/11).

The IMs are free to create Capacity Model variants also for lower impact TCRs, the decision-making should consider on one hand business trends (own forecasts, information received via CNAs) and on other hand the available resources (HR, IT).

The below calendar displays a case where the IM defined the following variants for the TT period for a selected section of a railway line:

- Non-TCR standard day (green)
- Variant for weekends (blue)
- Variant for weekdays during school holidays (yellow)
- Variants for a Major and a High impact TCRs (red)

²⁹ After the full implementation of TTR these high impact TCRs will be considered only in the Capacity Supply, as the Capacity Model extensions will be phased out.

³⁰ The details of a possible escalation process will be elaborated.

RNE CAPACITY MODEL - CALENDAR VIEW - TT2024		RAILWAY LINE Dresden Hbf --> Berlin Hbf, SECTION Dresden Hbf --> Elsterwerda															
2024	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	MON	TUE	WED	THU	FRI	SAT	SUN	WEEK	
JAN								52	JUL								
	1	2	3	4	5	6	7	1		1	2	3	4	5	6	7	27
	8	9	10	11	12	13	14	2		8	9	10	11	12	13	14	28
	15	16	17	18	19	20	21	3		15	16	17	18	19	20	21	29
	22	23	24	25	26	27	28	4		22	23	24	25	26	27	28	30
	29	30	31					5		29	30	31					31
FEB									AUG								
				1	2	3	4	5				1	2	3	4	31	
	5	6	7	8	9	10	11	6		5	6	7	8	9	10	11	32
	12	13	14	15	16	17	18	7		12	13	14	15	16	17	18	33
	19	20	21	22	23	24	25	8		19	20	21	22	23	24	25	34
	26	27	28	29				9		26	27	28	29	30	31		35
MAR									SEP								
					1	2	3	9								1	35
	4	5	6	7	8	9	10	10		2	3	4	5	6	7	8	36
	11	12	13	14	15	16	17	11		9	10	11	12	13	14	15	37
	18	19	20	21	22	23	24	12		16	17	18	19	20	21	22	38
	25	26	27	28	29	30	31	13		23	24	25	26	27	28	29	39
										30							40
APR									OCT								
	1	2	3	4	5	6	7	14			1	2	3	4	5	6	40
	8	9	10	11	12	13	14	15		7	8	9	10	11	12	13	41
	15	16	17	18	19	20	21	16		14	15	16	17	18	19	20	42
	22	23	24	25	26	27	28	17		21	22	23	24	25	26	27	43
	29	30						18		28	29	30	31				44
MAY									NOV								
				1	2	3	4	18						1	2	3	44
	6	7	8	9	10	11	12	19		4	5	6	7	8	9	10	45
	13	14	15	16	17	18	19	20		11	12	13	14	15	16	17	46
	20	21	22	23	24	25	26	21		18	19	20	21	22	23	24	47
	27	28	29	30	31			22		25	26	27	28	29	30		48
JUN									DEC								
						1	2	22								1	48
	3	4	5	6	7	8	9	23		2	3	4	5	6	7	8	49
	10	11	12	13	14	15	16	24		9	10	11	12	13	14	15	50
	17	18	19	20	21	22	23	25		16	17	18	19	20	21	22	51
	24	25	26	27	28	29	30	26		23	24	25	26	27	28	29	52
										30	31						1

Capacity Model variant

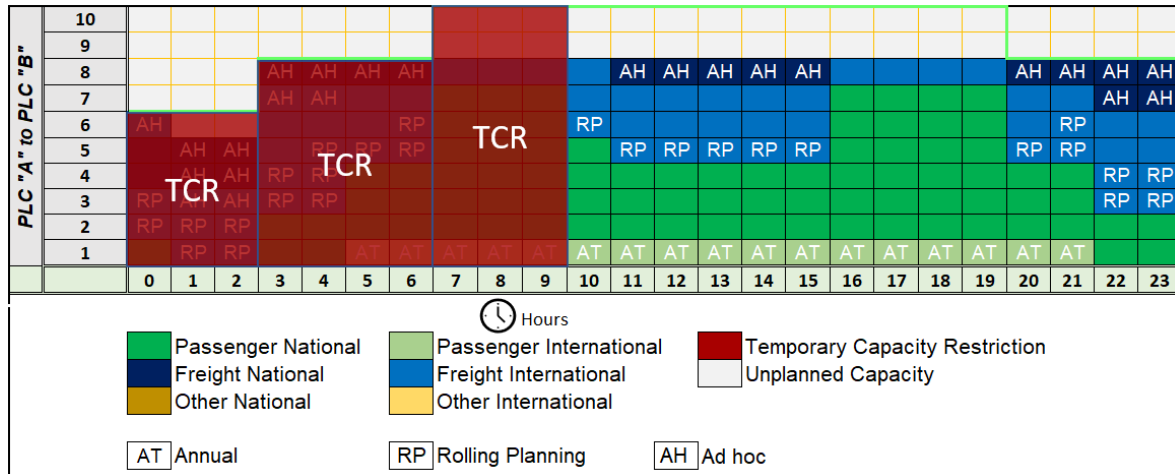
- Non-TCR standard day for TT2024
- Weekend variant for TT2024
- School holiday variant for weekdays for TT2024
- Variant for Major impact TCR for TT2024
- Variant for High impact TCR for TT2024

15 December 00:01 Start of the timetable 2025

The capacity consumed by the TCR will be visualised in the Capacity Model variant based on assumptions, which shall consider the categorisation of the TCR (national/international) and all other relevant information (e.g. in case of total closure 100% of the capacity is consumed etc.)³¹. This information (categorisation of TCRs & other relevant parameters) shall be uploaded into the TCR tool and shall be transferred to ECMT.

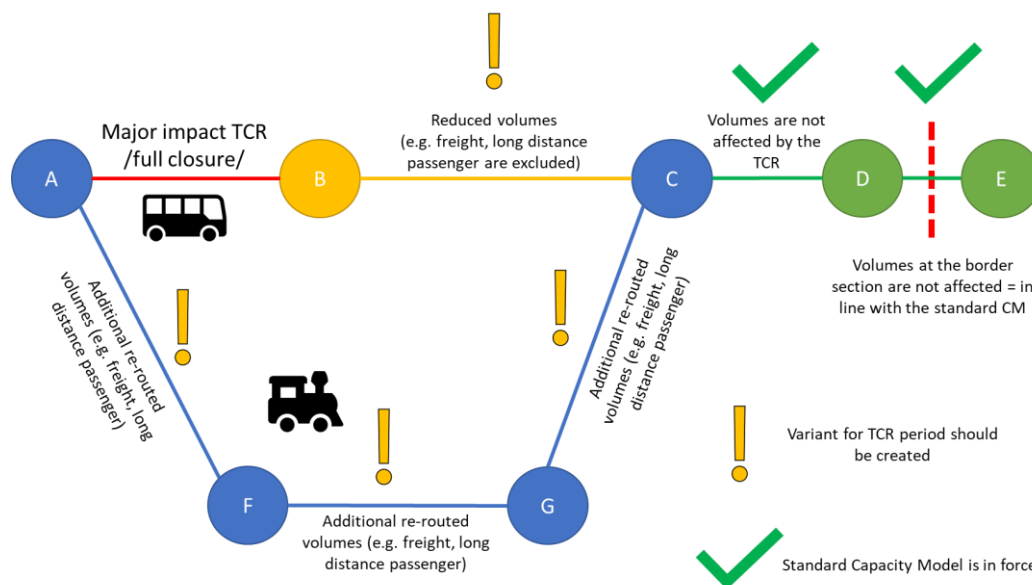
The below example displays the situation when the IM decided to initiate a total closure on a section in the morning for 10 days. According to the information received from the TCR tool this is a total closure, thus, 100% of the capacity shall be marked as negative capacity from 00:00 to 10:00 in ECMT. Furthermore, the IM indicated by X-24, that Capacity Model variants shall be prepared for the period of this TCR:

³¹ The applied categorisation and other pre-defined parameters (e.g. 100% capacity consumption in case of total closures) shall be incorporated into the Capacity Strategy.



Capacity Model variants for TCR / TCR window periods are created for all affected parts of the network (from PLC to PLC):

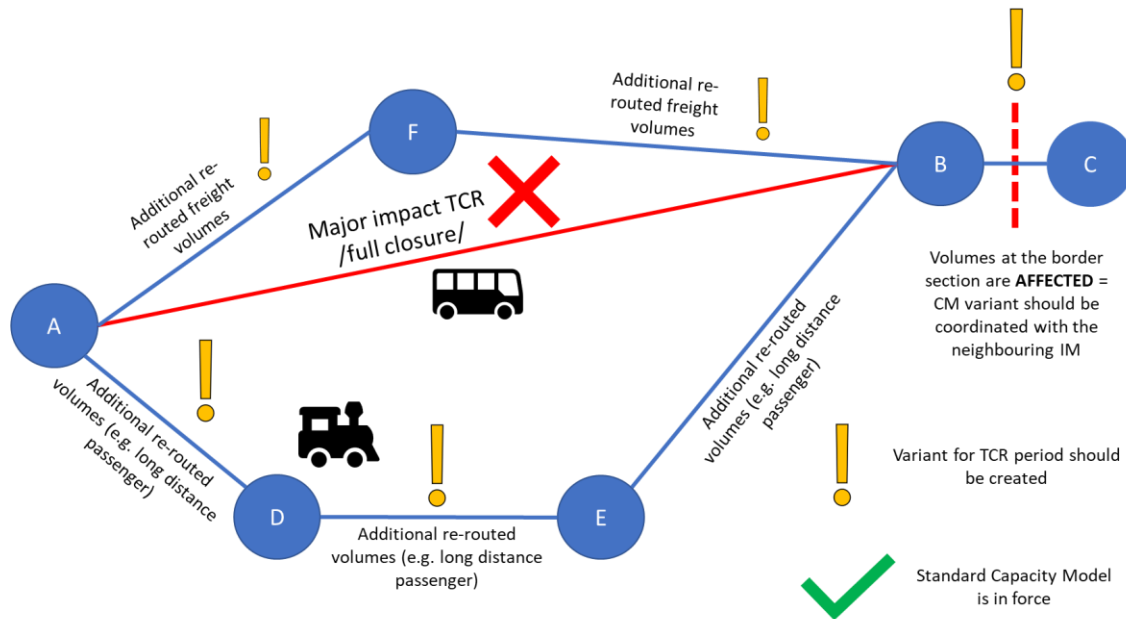
- Part of the network, where the TCR or TCR window occurs: Full/partial closure → volumes must be cancelled/re-routed (section A → B on the below figure)
- Part of the network, which is affected by a TCR or TCR window³²:
 - Due to the TCR, some volumes are cancelled or re-routed (section B → C on the below figure: freight and long-distance passenger volumes are re-routed)
 - Those parts of network where additional volumes are incorporated into the Capacity Model (section A → F → G → C on the below figure: freight and long-distance passenger volumes are re-routed)



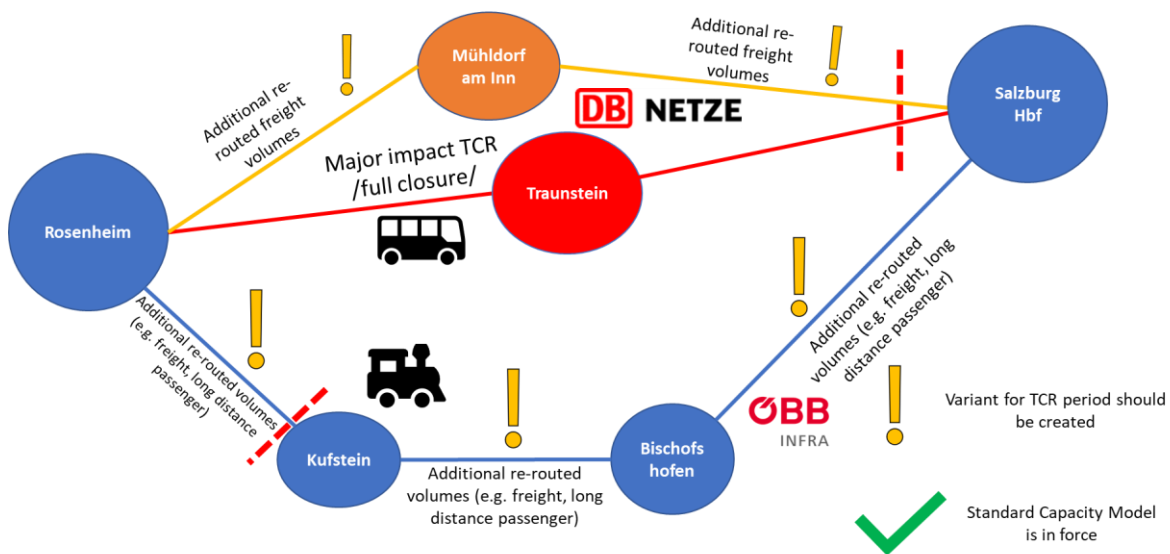
In case the TCR or the TCR window has effects on the volumes at a border section, then the Capacity Model variant(s) shall be coordinated with the neighbouring IM. The coordination on the volumes should be initiated by the IM, on whose network the closure can be found.

³² The diversionary lines to be used during TCR periods are defined as part of the TCR coordination, therefore, the TCR tool contains the relevant information on them.

Capacity Model variant with effects on the border volumes



Capacity Model variant with effects on the border volumes
Coordinated Capacity Model variants have to be created by the IMs



Besides the standard information on traffic volumes the final versions of Capacity Model variants for TCR periods contain the following information based on the data available in the Central IT-tools:

- Approximate duration and period,
- Time of day, and, as soon as it can be set, the hour of the beginning and the end of the capacity restriction,
- Section of line affected by the restriction (from PLC to PLC),
- Capacity of diversionary lines along with an overview of which type of service should be rerouted (if applicable),
- Opening times of the diversionary line(s) and technical constrains for operation (for instance traction, max weight, max lengths, gradients, clearance profile)

Further examples on the visualisation of Capacity Models can be found in Annex C.

6.4. Sources of input

IMs should use different input to construct/extend a Capacity Model. These sources are:

- **Capacity Strategy** of the concerned Timetable period.
- **Concluded Framework agreements** to the extent that the confidential information contained therein is not compromised.
- **Competent authorities:** information provided by them already in the Capacity Strategy phase such as expected public service obligation (PSO) traffic flows (for the traffic part) and available funding for new capacity related projects (for the variants for TCR periods).
- **Concluded Multi-annual Rolling Planning requests:** Rolling Planning requests placed already by applicants in the previous or running timetable period that is supposed to have running days also in the timetable period that is subject to capacity modelling³³.
- **Capacity Needs Announcements:** a process for entities (also potential ones) with interests in capacity usage (Applicants including e.g. PSO authorities, RUs, Shippers/intermodal operators etc.) by which they can announce their new and changing capacity needs. Besides additional capacity needs, the reduction of future needs is also essential information for the IMs, therefore, Applicants are also asked to share their plans in this regard.
- **Historical data:** previous years` Capacity Model & Capacity Supply and data about train services operated in the current or previous years.
- **IM own analyses:** IMs` estimations and own hypotheses of future market developments.

Each of the inputs should also be evaluated by IMs from the point of reliability and stability, in order to construct Capacity Models that do not under/overestimate certain volumes, deviations from market needs should be duly justified and documented.

6.5. Outputs

The IMs should publish the nationally and internationally harmonised Capacity Models covering all types of expected traffic: passenger/freight at X-21 in a draft, at X-18 in final form in ECMT. In ECMT those Capacity Model volumes are considered as published whose harmonisation status have been set as draft (at X-21) or published final (at X-18).

If there is a need for adjusting the published Capacity Models due to changed business needs or finished coordination of High impact TCRs the Capacity Models can be extended. During the creation of extended Capacity Models, the changes must be consulted with the concerned Applicants (drafts of extended Capacity Models are published at X-12, final versions of extended Capacity Models are published at X-11).

During the definition of Capacity Models, it must be checked which sections of infrastructure have been declared congested (as defined by Article 47 of Directive 2012/34/EU). Based on the already prepared capacity enhancement plan (as defined by Article 51 of Directive 2012/34/EU) the IM can identify those sections, where the congestion cannot be released for the TT period covered by the Capacity Model (e.g. during the preparation of Capacity Model for TT2026, in summer 2024 it shall be checked which parts of the network have been considered as congested and foreseen to be still congested in TT2026 based on the capacity enhancement plan). In these special cases volumes should be dedicated also to ad hoc and rolling planning purposes to fully utilise the added value of strengthened long-term planning activities of IMs.

The below table summarises the outputs, which shall be published by the IMs in line with the agreed timeline:

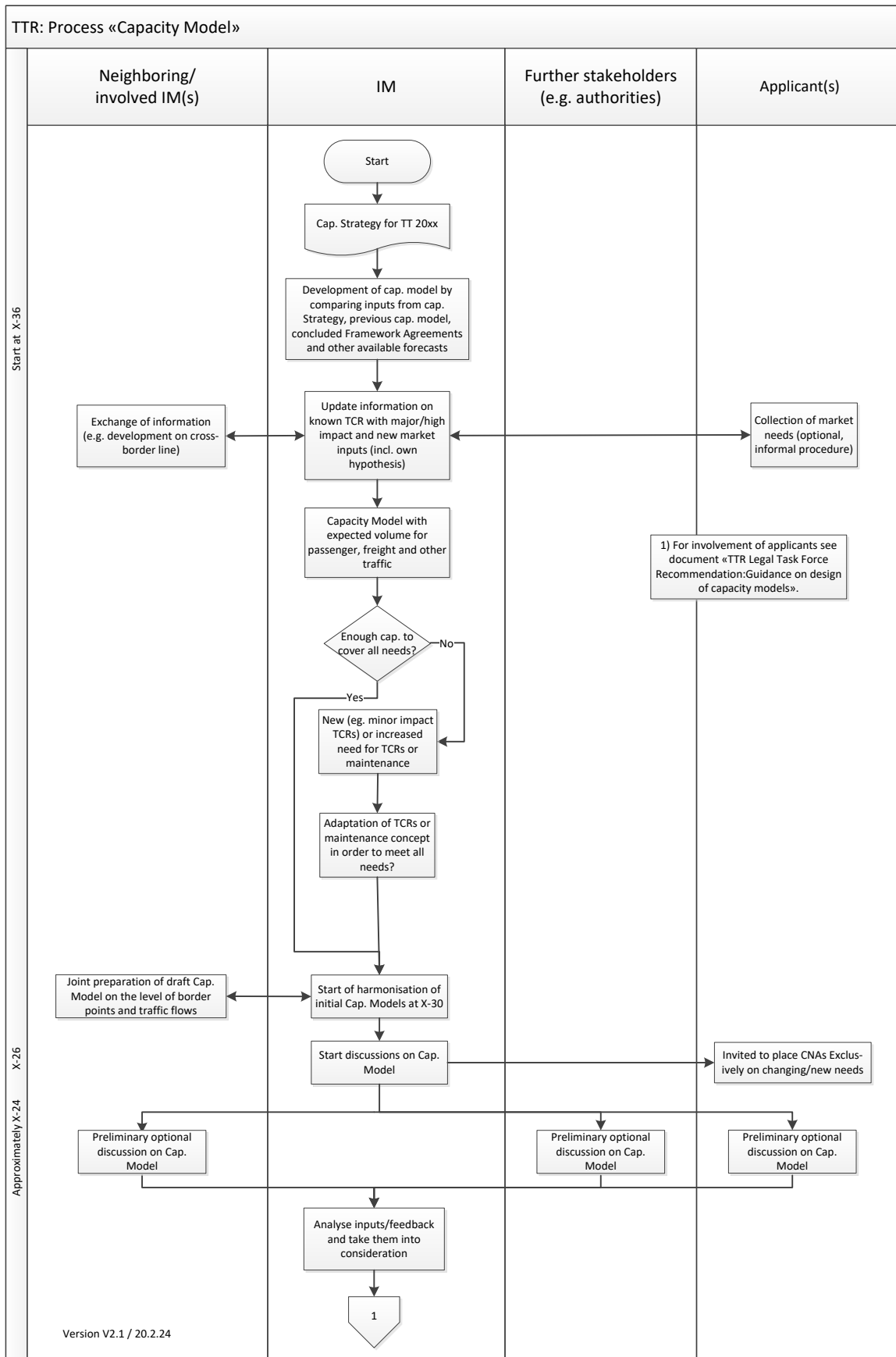
³³ Note: this will not be relevant in TT2027

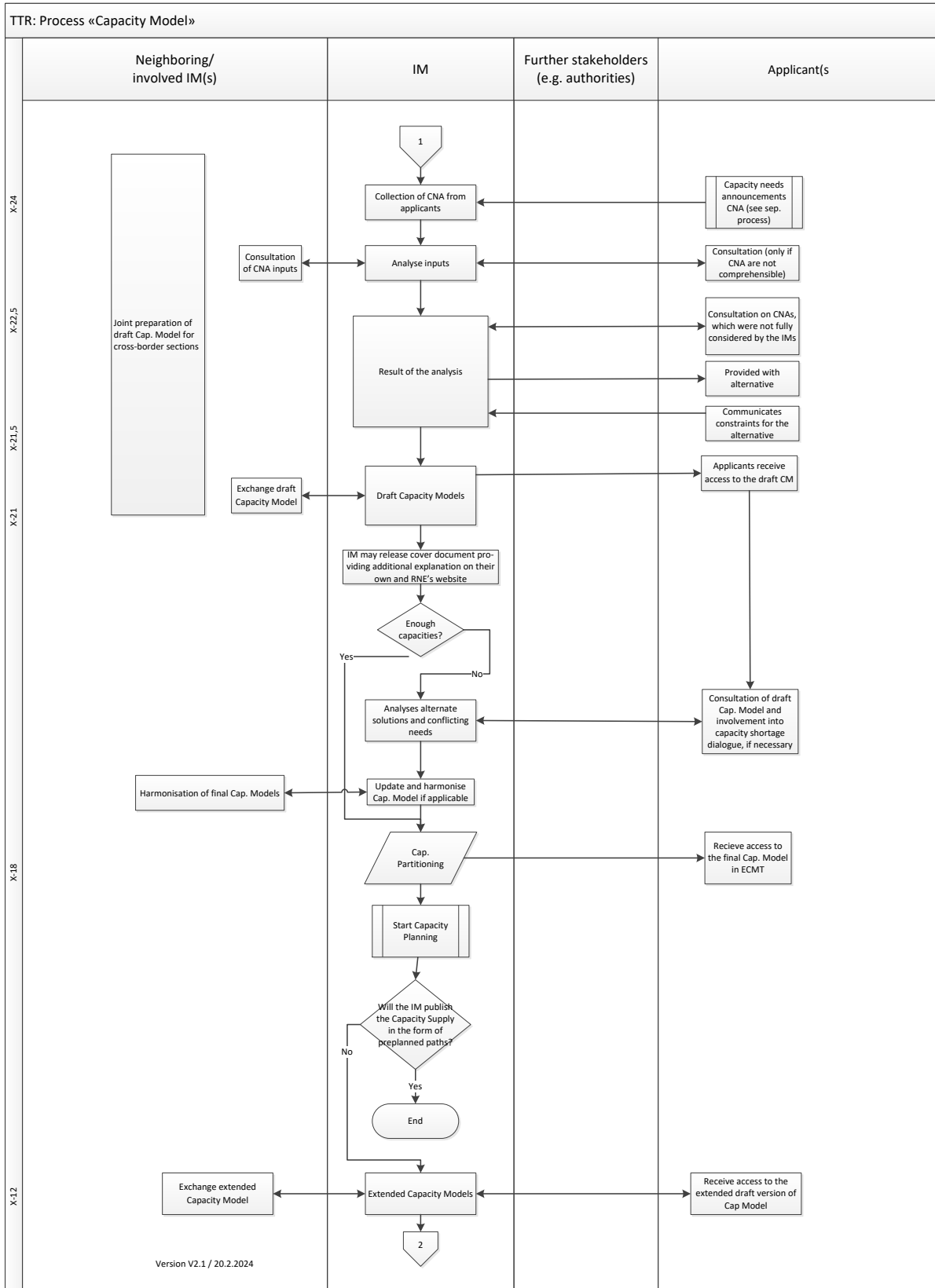
Milestone	Output
X-21	Publication of draft Capacity Models Standard non-TCR working day (mandatory) Variants for particular periods such as different days of the week, school days, weekends, summer/winter holidays etc (optional) Variants for TCR periods (recommended for Major & High impact TCRs) Variants for TCR window periods to the extent they are known (highly recommended)
X-18	Publication of final Capacity Models Standard non-TCR working day (mandatory) Variants for particular periods such as different days of the week, school days, weekends, summer/winter holidays etc (optional) Variants for TCR periods (mandatory for Major & recommended for High impact TCRs) Variants for TCR window periods to the extent they are known (highly recommended)
X-12	Publication of the draft version of extended Capacity Models ³⁴ Standard non-TCR working day (mandatory) Variants for particular periods such as different days of the week, school days, weekends, summer/winter holidays etc (optional) Variants for TCR periods (mandatory in case of changes for Major & mandatory High impact TCRs) Variants for TCR window periods to the extent they are known (highly recommended)
X-11	Publication of the extended Capacity Models ³⁵ Standard non-TCR working day (mandatory) Variants for particular periods such as different days of the week, school days, weekends, summer/winter holidays etc (optional) Variants for TCR periods (mandatory in case of changes for Major & mandatory High impact TCRs) Variants for TCR window periods to the extent they are known (highly recommended)

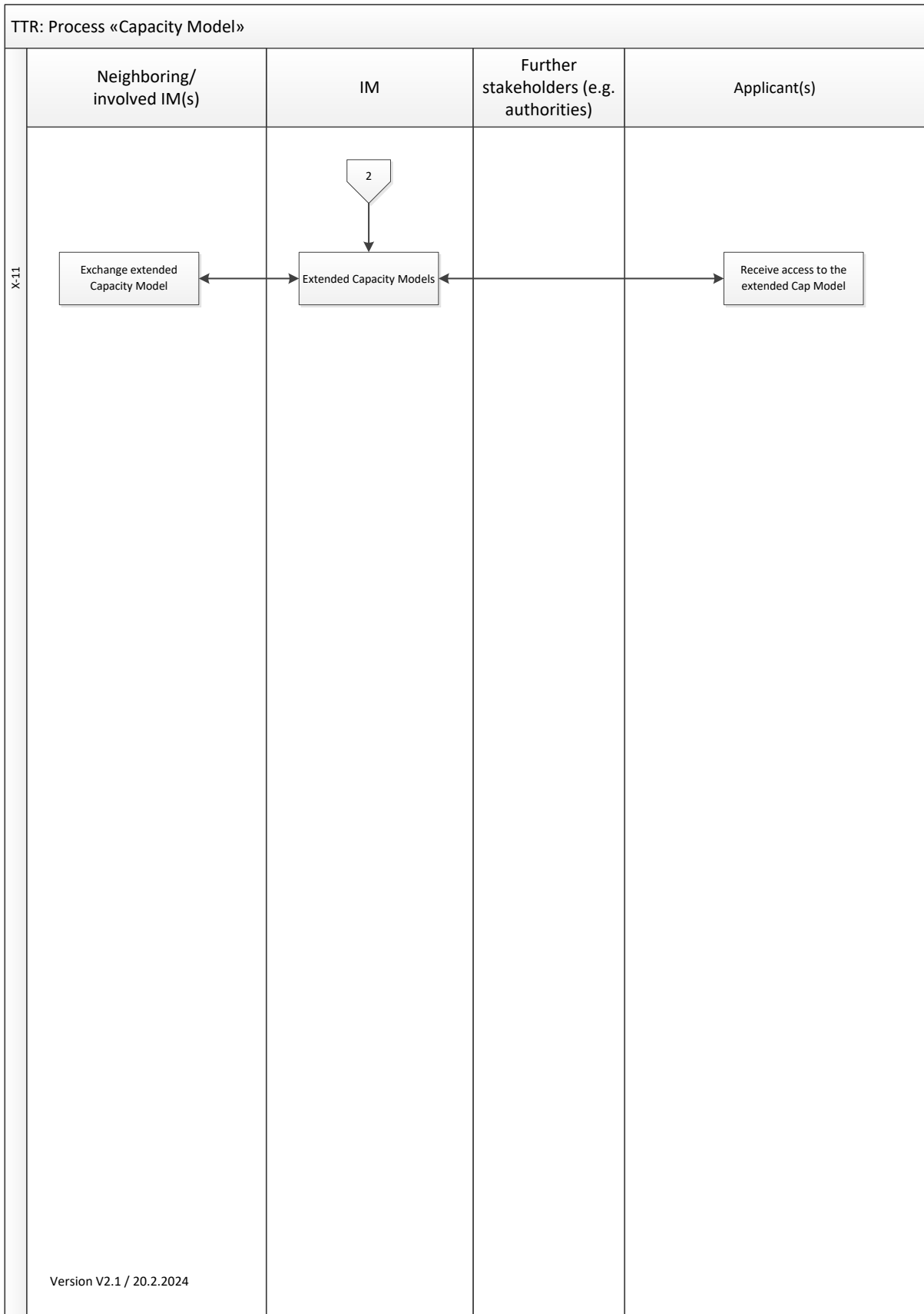
³⁴ In case the final Capacity Model (published at X-18) reflects to the business needs properly, then the creation of extended versions is not mandatory.

³⁵ In case the final Capacity Model (published at X-18) reflects to the business needs properly, then the creation of extended versions is not mandatory.

Annex A: Process diagram for Capacity Model







Annex B: Roadmap to Capacity Model

Stakeholder	X-36 ³⁶	X-36 > X-24	X-26 > X-24	X-24 > X-21	X-21 > X-18	X-18 > X-12 ³⁷	X-12 > X-11
“Leading international entity for capacity planning and management” (Network Coordinator)	Get access to the Capacity Models of the IM in elaboration.* CMO-LE-040	Coordinates the exchange of information and analysis. Ensures international harmonisation of Capacity Models. Administratively organises meetings and communicates information to stakeholders. Monitors that the draft Capacity Model is according to the agreed Capacity Strategy.* CMO-LE-050	Coordinates exchange of information and analysis on Capacity needs Announcements	Coordinates the exchange of information and analysis on capacity needs announcements. Ensures international harmonisation of Capacity Models. Administratively organises meetings and communicates information to stakeholders. Monitors that the draft Capacity Model is according to the agreed Capacity Strategy.* CMO-LE-060	Ensures timely and correct publication of all Capacity Models.* CMO-LE-070	Ensures timely and correct publication of all Capacity Models.* CMO-LE-080	Ensures timely and correct publication of extended Capacity Models.* CMO-LE-090
IM	Copies the previous Capacity Models and starts the model update. CMO-IM-040	Analyses concluded Framework Agreements, previous Capacity Models, studies, own forecasts, and other inputs Meets regularly with other concerned IMs from X-30 to harmonise at the level of border points and traffic flows. CMO-IM-050	Analysis of Capacity Needs Announcements	Capacity Needs Announcements and other inputs are analysed. Applicants are notified at X-22.5 of the conclusion of the Capacity Needs Announcements (considered or not (fully) considered). Alternatives for not considered CNAs are offered to applicants. Fine-tuning of the models. Draft internationally coordinated capacity models are finished including an optional cover document. CMO-IM-060	Organises capacity shortage dialogues with the aim of solving remaining open issues regarding not fully considered CNAs and to answer received questions/remarks to the draft Capacity model. Ensures international and national harmonisation. Performs the final capacity partitioning and publishes all Capacity Models. CMO-IM-070	Draft version of extended Capacity Models by X-12. Consults the applicants of which capacity needs cannot be fully considered in the models. Fine-tunes the models. CMO-IM-080	Final version of extended Capacity Models at X-11. Consults the applicants of which capacity needs cannot be fully considered in the models. Fine-tunes the models. CMO-IM-090
Neighbouring / involved IMs	Get access to the Capacity Models of the IM in elaboration. CMO-OI-040	Provide information on developments at borders. Agree with the IM on the intended volume at border points. CMO-OI-050	Consultation with IM on analysis of internationally relevant Capacity Needs Announcements		Consults with IM on harmonisation of the final Capacity Model		Exchange extended Capacity Model with IM
Applicant(s)		Available for optional discussion to provide market inputs. Consults with other applicants and PSO authorities on responsibility for CNA submission. CMO-RU-050	Submit Capacity Needs Announcements on new and changing needs.	Checks if alternative suggestions for not considered CNAs are appropriate, and if not, communicates the constraints by X-21.5. CMO-RU-060	Available for Capacity shortage dialogues, gets access to the final Capacity Model	Answers to the IM if it is called for a consultation. Gets access to the extended capacity models. CMO-RU-080	Answers to the IM if it is called for a consultation. Gets access to the extended Capacity Models. CMO-RU-090
MoT (Ministry of Transport)		Is actively consulted, especially for capacity models in bottleneck segments. CMO-MT-050			Gets access to the Capacity Models. CMO-MT-070	Gets access to the Capacity Models. CMO-MT-080	Gets access to the Capacity Models. CMO-MT-090
RB (Regulatory Body)					Gets access to the Capacity Models. CMO-RB-070	Gets access to the Capacity Models. CMO-RB-080	Gets access to the Capacity Models. CMO-RB-090
Regions, local governments, transport associations, industries		(PSO authority) Consults with Applicants on who will submit CNAs			Gets access to the extended Capacity Models. CMO-RE-070	Gets access to the extended Capacity Models. CMO-RE-080	Gets access to the extended Capacity Models. CMO-RE-090
Operators of service facilities				Checks if alternative suggestions for not answered CNAs are appropriate, and if not, communicates the constraints. CMO-TS-060		Answers to the IM if it is called for a consultation. CMO-TS-080	Answers to the IM if it is called for a consultation. CMO-TS-090
IT	ECMT allows carry forward of the previous model and desired access rights.	ECMT supports all necessary capacity elements, allows coordination via commenting functions and tracks versioning.	ECMT allows submitting of Capacity Needs Announcements	Draft Capacity Models are visible in ECMT. Optional cover documents (if made) are made available on the IM's	Analysis and mapping of capacity differences at the	Transfers and visualises the TCRs from TCR tool. CMO-IT-080	Transfers and visualises the TCRs from TCR Tool.

³⁶ Note that while the fully implemented TTR assumes this milestone at X-36, for TT2025 it is set as X-30 (June 2022).

³⁷ After the full implementation of TTR the Capacity Model timeline will end at X-18, therefore, the Capacity Model extensions will be phased out and the preparation of Capacity Supply will begin at the same time.

* Due to ongoing activities in TTR projects in this regards, further description and involvement of this entity are currently out of the scope of this document.

	Geography from CRD is impartible to the hub. CMO-IT-040	CMO-IT-050		website and the RNE website. Transfers and visualises the TCRs from TCR Tool. CMO-IT-060	border (as input for the IM for harmonisation) Publication of Capacity Models and possibility to display models for different levels of granularity supported in ECMT CMO-IT-070	CMO-IT-090
Legal framework					Law empowers IMs to make a binding capacity partitioning. CMO-LF-070 / CMO-LF-080 / CMO-LF-090	

Annex C: Visualisation of Capacity Model

The Capacity Models can be visualised in three different formats:

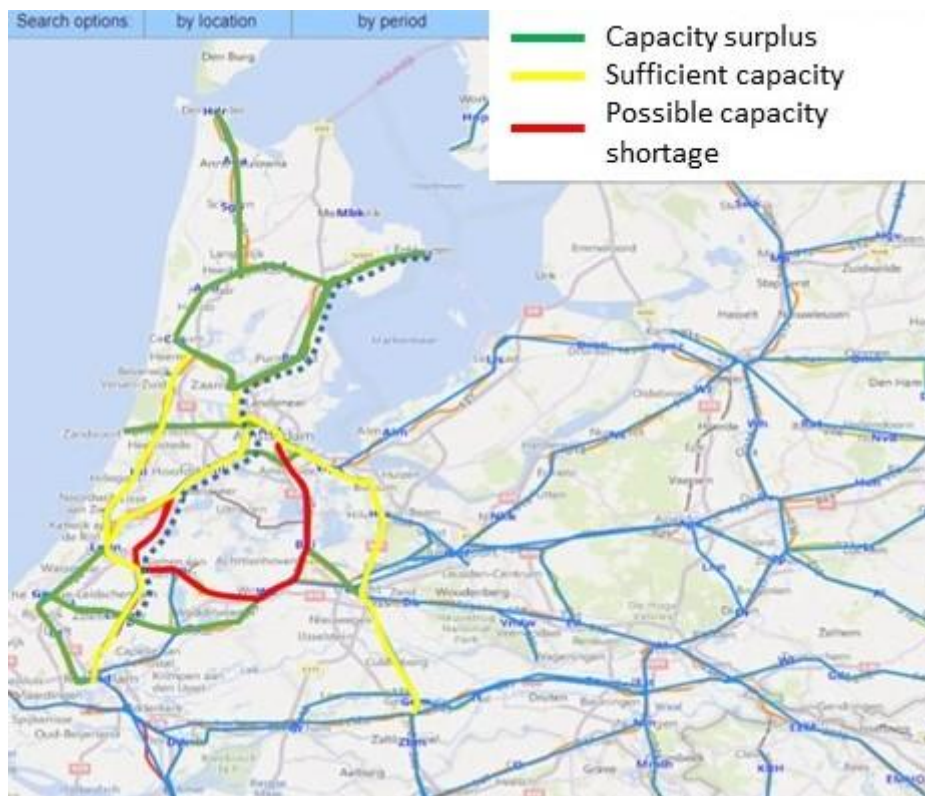
1. Network overview

ECMT will be able to generate an overview on the capacity situation on network level on a daily or hourly basis using on one hand the uploaded information on volumes and TCRs, and on the other hand the intended capacity usage line. The tool shall differentiate between the below categories within the overview:

- Possible capacity shortage: Volume(s) can be found in the analysed period already above the intended capacity usage line.
- Sufficient capacity: The number of planned volumes is under the intended capacity usage line and consumes in case of
 - hourly overview more than 80%
 - daily overview more than 50%of the available capacities under the intended capacity usage line.
- Capacity surplus: The number of planned volumes is under the intended capacity usage line and there is room for unplanned capacities to accommodate additional needs (volumes consume in case of hourly overview less than 80% / daily overview less than 50% of the available capacities under the intended capacity usage line).

The Network overview is important for the identification of possible capacity bottlenecks on a broader scale. The IMs and stakeholders will have a complete picture on the situation allowing them to initiate the necessary measures to release the capacity situation, if needed.

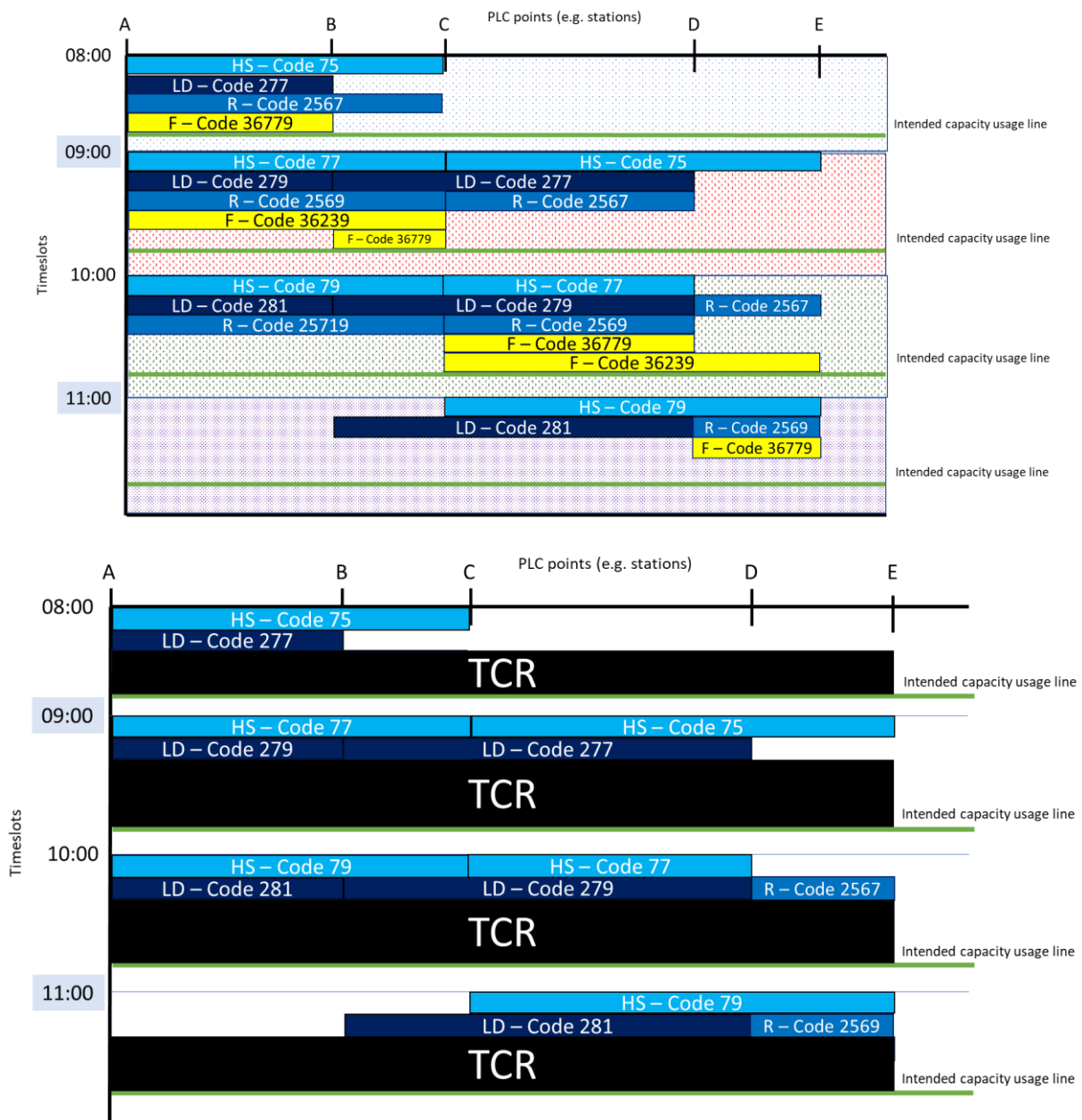
A possible visualisation can be found below:

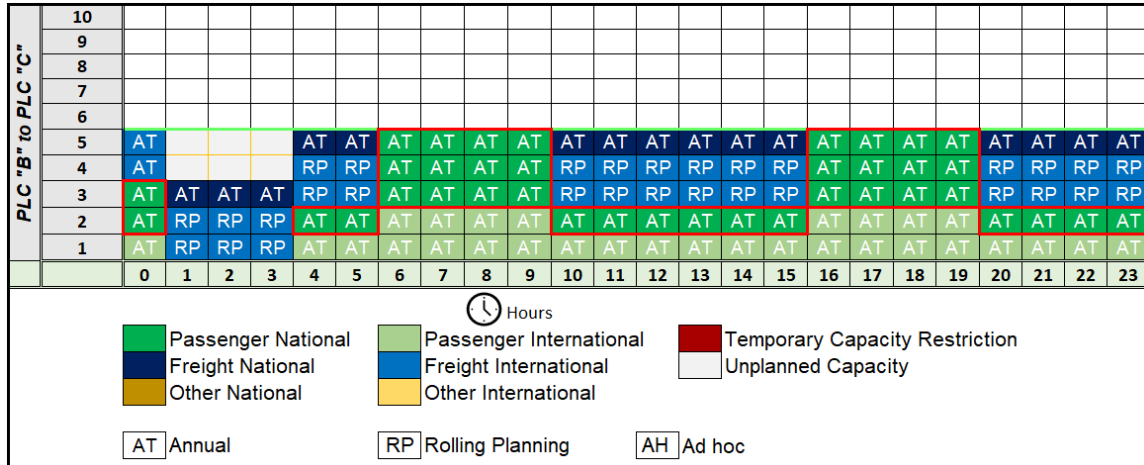


2. Line overview

A railway line level overview should be generated by ECMT based on the information provided by IMs. The identification of the volumes is done with the usage of dedicated IDs. These visualised summaries of planned volumes can be used for the verification of the IMs` inputs, and also for cross-border harmonisation and TCR-consultation purposes.

As a first step for the generation of a line level overview the concerned PLCs shall be set by the user (min: origin & destination and at least one PLC / railway line). The generated Capacity Model analyses the situation at the defined measuring points (PLCs), time information of volumes refers to hourly departures from PLCs, the duration of the occupation of the volumes will not be considered in the Capacity Model.

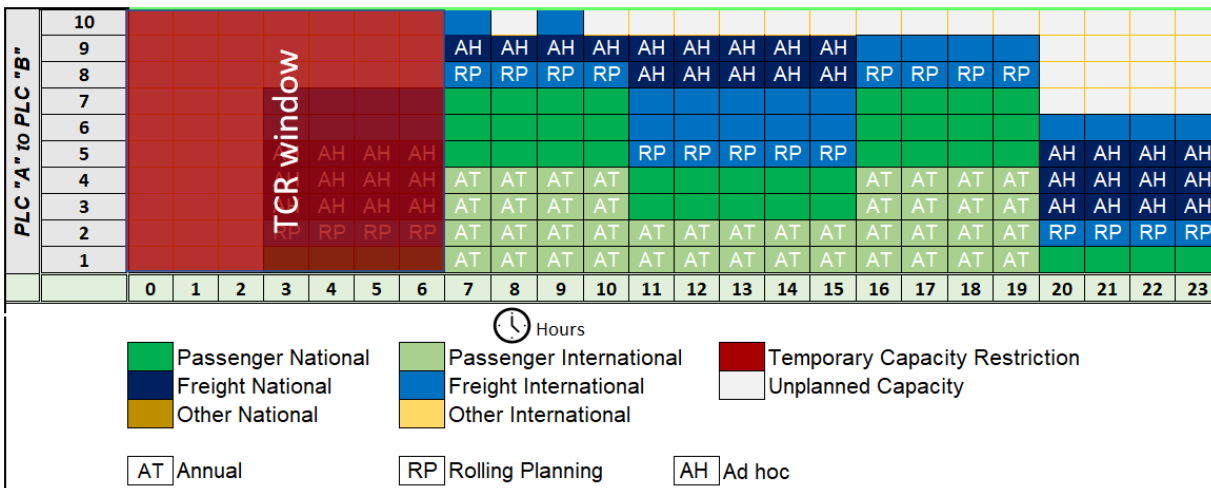




- | | |
|---|---------------------------------|
| <input type="radio"/> high-speed | <input type="radio"/> wagonload |
| <input type="radio"/> long-distance | <input type="radio"/> block |
| <input type="radio"/> express-regional | <input type="radio"/> combined |
| <input checked="" type="radio"/> regional | |

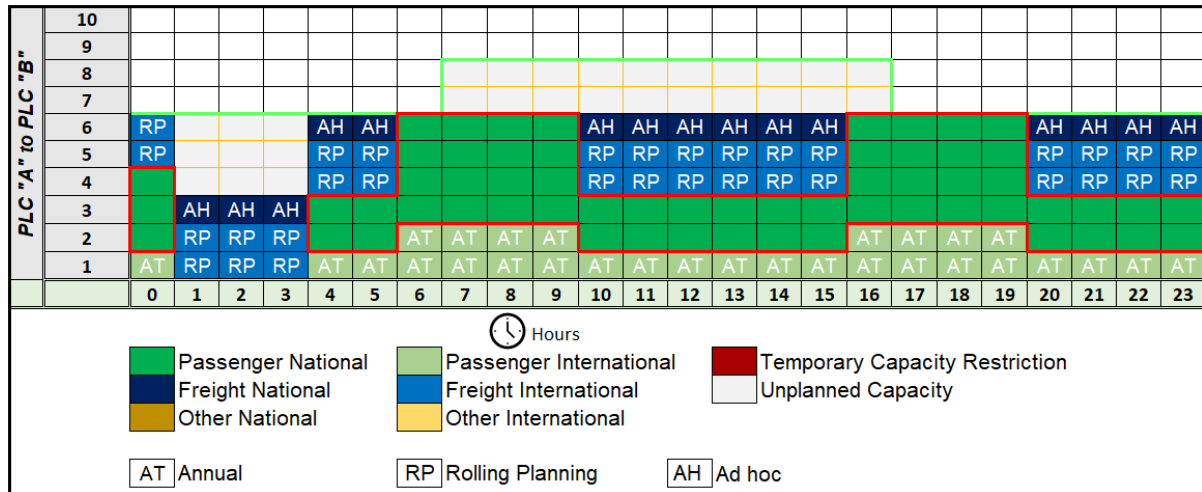
Capacity Model (B → C)

Example B: an IM displays ATT, RP, ad hoc, and unplanned volumes. The trains are planned in detail (volume per particular hour). A TCR window is planned from midnight to 07.00 am, meaning a total closure over this period. The intended capacity usage line was calculated based on historical information derived from the IT-tools (TIS & national).



Example of the traffic part of the Capacity Model B

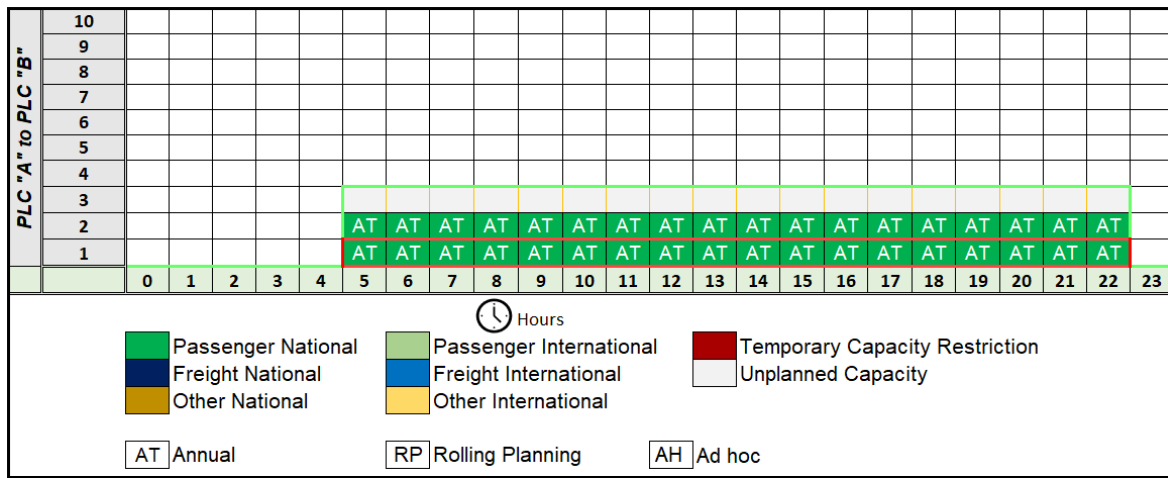
Example C: an IM displays ATT, RP, ad hoc, and unplanned volumes. The trains are planned in detail (volume per particular hour). The intended capacity usage line was calculated based on historical information derived from the IT-tools (TIS & national).



- high-speed
- long-distance
- express-regional
- regional
- wagonload
- block
- combined

Example of the traffic part of the Capacity Model C

Example D: is a regional single-track line with low importance; the trains are planned in detail (volume per particular hour), the rest of the capacity is left as unplanned. The intended capacity usage line was calculated for each direction based on the IM's own estimations, the traffic is suspended on each day from 23:00 till 05:00.

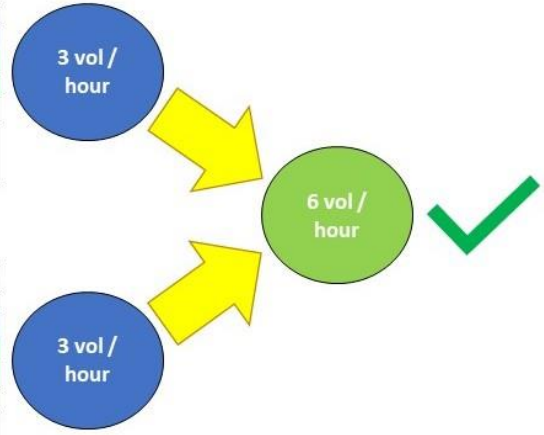


- high-speed
- long-distance
- express-regional
- regional
- wagonload
- block
- combined

Figure 1: Example of the traffic part of the Capacity Model D

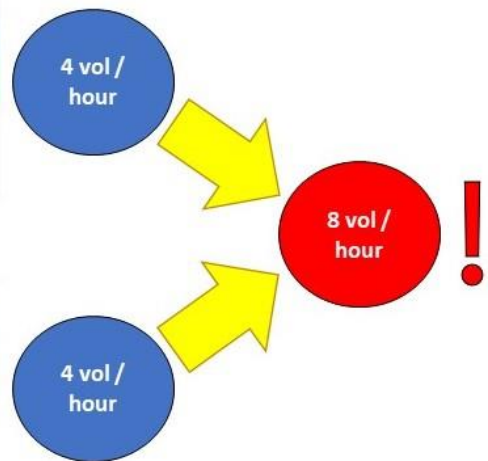
Example E: is a single-track line. The intended capacity usage line was calculated based on the IM's own estimations. According to the results the line can accommodate approximately 6 volumes per hour in total. ECMT will indicate in case of capacity overbookings in both directions to raise the attention of the IM's need for adjustments.

	5																		
	4																		
PLC "A" to PLC "B"	3	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	2	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	1	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
🕒 Hours																			



	5																		
	4																		
PLC "B" to PLC "A"	3	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	2	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	1	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
🕒 Hours																			

	5																		
	4	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
PLC "A" to PLC "B"	3	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
	2	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	1	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
🕒 Hours																			

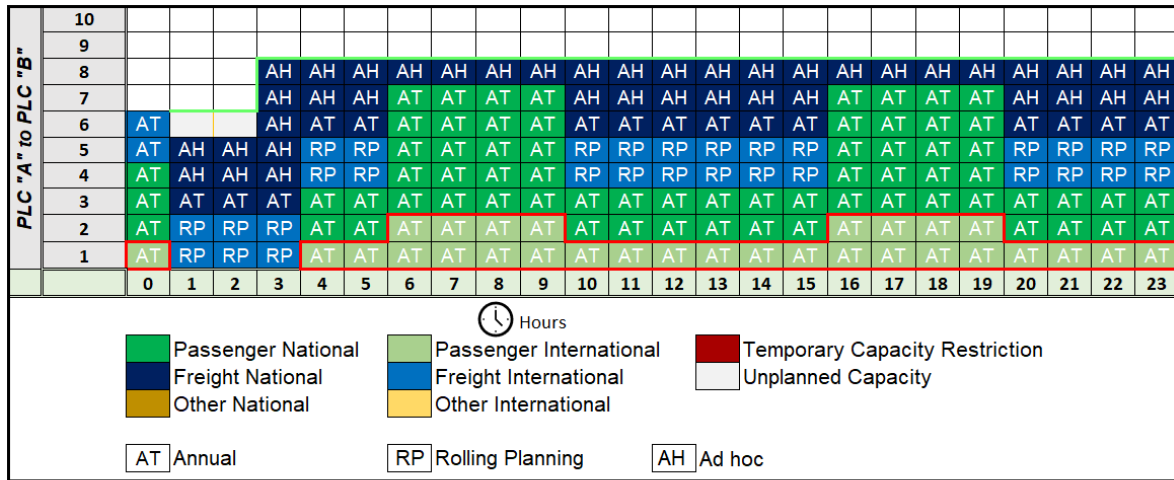


	5																		
	4	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
PLC "B" to PLC "A"	3	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
	2	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
	1	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT	AT
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
🕒 Hours																			

Example of the traffic part of the Capacity Model E

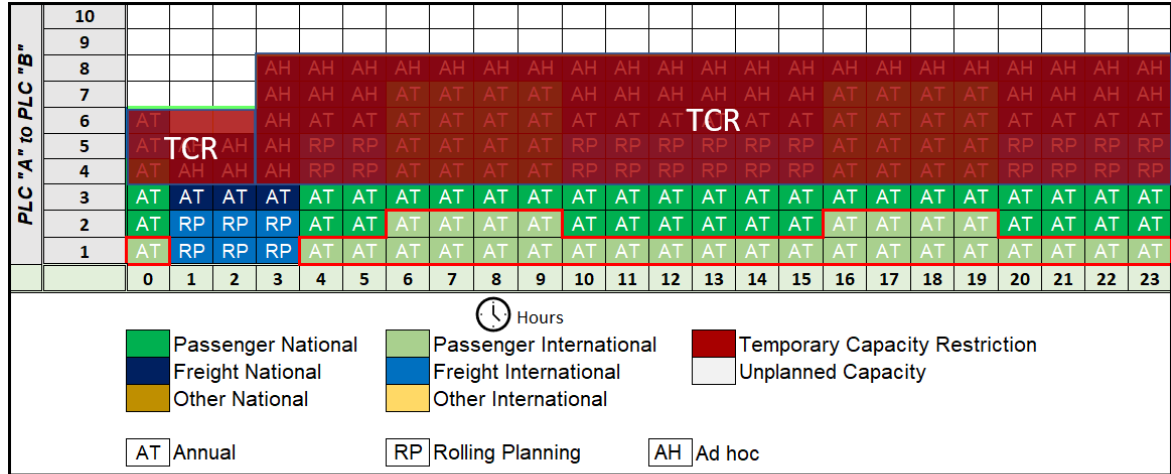
Visualisation of TCRs in the model:

In the below example a section can be seen with 184 planned and 2 unplanned volumes:



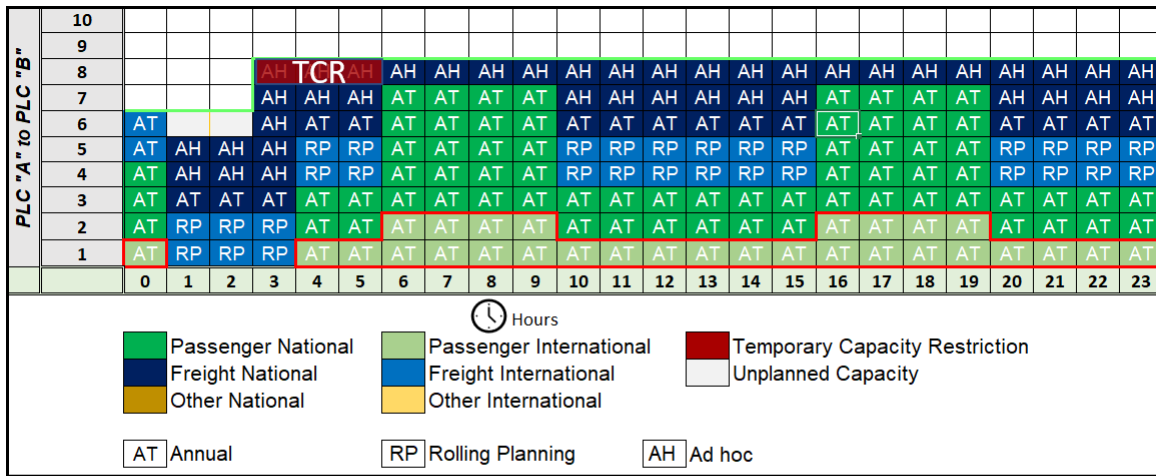
- high-speed
- long-distance
- express-regional
- regional
- wagonload
- block
- combined

The IM decided to initiate a partial closure on the section for 60 days. Out of the 186 volumes 114 are affected with this TCR, which means that this is a Major TCR:



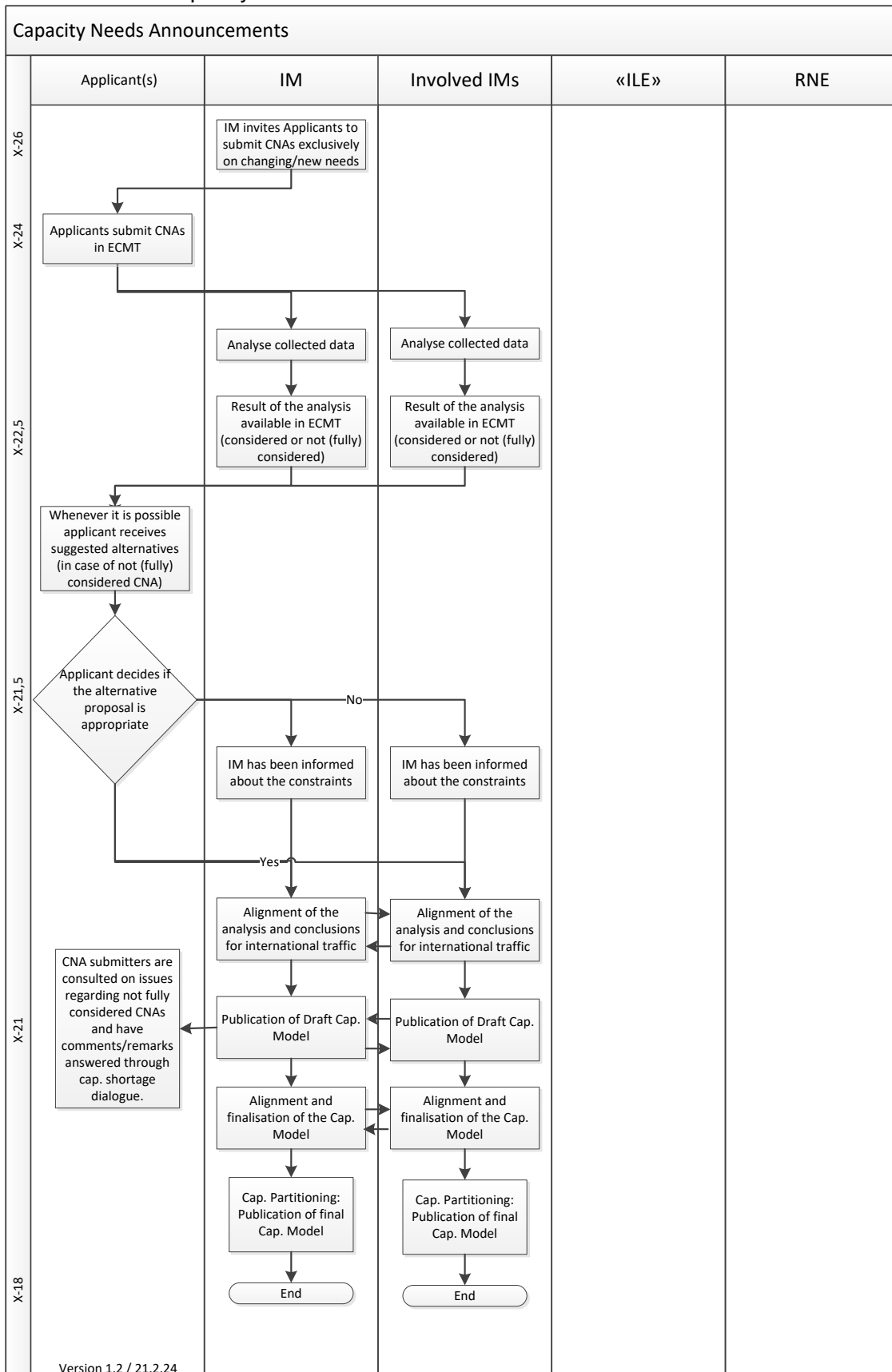
- high-speed
- long-distance
- express-regional
- regional
- wagonload
- block
- combined

The IM does maintenance works regarding two switches in the morning, therefore 3 volumes should be cancelled. Out of the 186 volumes, 3 are affected with this TCR, which means that this is a Less than minor impact TCR:



Annex D: Process chart of Capacity Needs Announcements

The process chart of Capacity Needs Announcements can be found below:



Annex E: Standardised template for Capacity Needs Announcements

It can be assumed that Applicants in the passenger market will make use of the possibility to deliver very detailed information, therefore, passenger needs should contain the following information on a mandatory basis:

- Time information on hourly basis
- Origin & destination PLCs
- Border points
- Commercial stops to identify the needed route
- Pattern traffic (Y/N)
- Frequency (if applicable)
- Maximum travel time (to identify best routing)
- Information on the contractual status of the traffic
- Type of contract

Considering the different level of available information on freight traffic these needs should contain the below information on mandatory basis:

- First known point PLC (e.g. junction, factory etc.)
- Last known point PLC (e.g. junction, factory etc.)
- Information on the contractual status of the traffic
- Type of contract

The table³⁸ below contains the basic set of information, which should (in case of mandatory fields) or can (in case of optional fields) be uploaded into ECMT for the preparation of the Capacity Models and submission of Capacity Needs Announcements.

Field	Description	CNA		CM
		Passenger traffic	Freight traffic	
Changing/new need	It shall be used only for the CNA to indicate if it a changing or new need. Values to be used: changing, new	mandatory	mandatory	N/A
ObjectType	Alphanumerical field (2 characters). The relevant types: CN = CNA and for IMs it is for instance CP = Catalogue Path, PA = Path.	mandatory	mandatory	mandatory
Company	Alphanumerical field (4 characters) for the company code of the entity which created the object, the codes can be search//teleref.era.europa.eu/	mandatory	mandatory	mandatory
Core	Alphanumerical field (12 characters) for the core element of the planned transport identifier.	mandatory	mandatory	mandatory
Variant	Alphanumerical field (2 characters). For CNA/trains only 00 shall be used.	mandatory	mandatory	mandatory
TimeTableYear	The timetable period where the business will be carried out. Example: for timetable period from December 2024 to December 2025: Enter 2025.	mandatory	mandatory	mandatory

³⁸ The initial version of the standardised template might be modified based on the findings of CNA pilots.

OTN	The "train number" or any national identifier that either the Applicant or the IM would like to assign to the CNA or CM object. It is only a desired number, no number allocation is part of the CNA process.	optional	optional	optional
Title	An optional field to provide a user-friendly naming of the object, so you can recognise it easier. It does not need to be unique.	mandatory	mandatory	mandatory
Harmonisation status	A mandatory IM field to provide information on the status of the CM objects. It defines whether the CMO is in "Preparation/Draft/Under finalisation/Published final/Closed" status when it is being created/updated in ECMT.	N/A	N/A	mandatory
CMVariant	An optional IM field. It shall be used only for the CM objects to connect them to a variant. One object can belong To more variants.	N/A	N/A	optional
LeadRU	It shall be used only for the CNA to state who is the leading applicant for the CNA. Enter the company code of the applicant, ied here: https://teleref.era.europa.eu/	optional	optional	N/A
CoordinatingIM	Alphanumerical field (2 characters) IM field. It shall be used only for the CM, in case there is a coordinating IM.	N/A	N/A	optional
TrainType	Enter the train type (Passenger, Freight). Please note that TAF code list has more values (see the sheet Code list).	mandatory	mandatory	mandatory
TrafficType	Related to the train type. Only valid traffic types can be selected: Passenger (high speed/long distance/express regional/regional), Freight (wagonload/blocktrain/combined transport).	optional	optional	optional
CapacityProductType	This field is related to the capacity partitioning. For CNA, you indicate what capacity product would be suitable for the CnA (see the sheet Code list).	optional	optional	optional
Category	Write if the traffic is either national or international.	mandatory	mandatory	mandatory
TrafficContracted	For passenger: write "1" in case the traffic is already contracted (e.g. PSO) or the traffic is planned as market (commercial) driven operation (e.g. open access). Write "0" if you are not fully sure that your company will be selected to execute the carriage (e.g. ongoing PSO tender).	mandatory	mandatory	N/A

	For freight: write "1" in case the traffic is already contracted or supply-driven. Write "0" if you are not fully sure that your company will be Selected to execute the carriage.			
TypeOfContract	In case you wrote "1" in the field TrafficContracted, provide information on the type of contract (e.g. PSO/commercial-driven-operation/supply-driven-operation/demand-driven operation). In case you wrote "0" in the field TrafficContracted, write down description for IMs for which customer and or what kind of transport will you apply for. This is to allow IMs identify Double CNAs for the same transport.	mandatory	mandatory	N/A
MaxJourneyTime	It shall be used only for the CNA to indicate the limit of the journey time from origin to the destination (hh:mm), wished by the applicant.	mandatory	optional	N/A
CountryCodeISO	2-character ISO code of the country of the location on the pow. They can be found here: https://www.iso.org/obp/ui/#search	mandatory	mandatory	mandatory
LocationPrimaryCode	Max. 5 digit field for the Primary location code (PLC) of the location on the particular row. (available at: https://teleref.era.europa.eu/ , enter them without the country ISO code)	mandatory	mandatory	N/A
Name	The location name (https://teleref.era.europa.eu/)	optional	optional	N/A
TrainActivity	This field is used to indicate the train activity at the particular location. The overview of activities is in the sheet Code list. The values shall be provided with their 4-digit codes and comma-separated if more activities are executed in the same location, for instance; 0001,0013 (=commercial stop, attach wagon).	optional	optional	optional
ELA	Earliest arrival time (hh:mm), adding minutes-based information is optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional	optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional
ELD	Earliest departure time (hh:mm), adding minutes-based information is optional	At first PLC: Adding one of the departure times is mandatory, rest is optional	optional	At first PLC: Adding one of the departure times is mandatory,

				rest is optional
ALA	Actual arrival time (hh:mm), adding minutes-based information is optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional	optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional
ALD	Actual departure time (hh:mm), adding minutes-based information is optional	At first PLC: Adding one of the departure times is mandatory, rest is optional	optional	At first PLC: Adding one of the departure times is mandatory, rest is optional
LLA	Latest arrival time (hh:mm), adding minutes-based information is optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional	optional	At last PLC: Adding one of the arrival times is mandatory, rest is optional
LLD	Latest departure time (hh:mm), adding minutes-based information is optional	At first PLC: Adding one of the departure times is mandatory, rest is optional	optional	At first PLC: Adding one of the departure times is mandatory, rest is optional
DwellTime	For the min. dwell time on the location in minutes (mm)	optional	optional	optional
MaxJourneyTimeSection	It shall be used only for the CNAs to indicate the limit of the journey time from a location to the next location, wished by the applicant (hh:mm)	optional	optional	N/A
ResponsibleApplicant	Alphanumerical field (4 characters): company code of the applicant responsible for/from the location on this can be searched here: https://teleref.era.europa.eu/	optional	optional	N/A
TrainWeight	The weight of the train including loco in tons	optional	optional	optional
TrainLength	The length of the train including loco in metres	optional	optional	optional
TrainMaxSpeed	The maximum possible speed of the train in km/h, provided by the Applicant	optional	optional	optional
PlannedSpeed	The speed in km/h that was or will be taken into account in the path construction, provided by the IM	N/A	N/A	optional

Acceleration	The acceleration information in m/s ² . Note that comma is used, not dot, to separate the decimal part (correct: 1,2 incorrect: 1.2)	optional	optional	optional
BrakeType	Only valid brake types can be selected, see the sheet Code list.	optional	optional	N/A
BrakingRatio	The braking ratio for the selected brake type.	optional	optional	N/A
NumberOfLocos	A number that indicates the number of traction units to be used for the future train indicated in the CNA.	optional	optional	N/A
PushPullTrain	Write either 1 or 0. A boolean field that indicates if the train can change direction without shunting the loco around the train.	optional	optional	N/A
RollingStockType	Indicate the Rolling stock type (see sheet Code list).	optional	optional	N/A
ETCSOnBoard	Write either 1 or 0. A boolean field that indicates whether the train is equipped with any kind of ETCS option.	optional	optional	N/A
P1	Belongs to the combined transport profile. It shall be fulfilled only for combined transport trains.	optional	optional	optional
C1	Belongs to the combined transport profile. It shall be fulfilled only for combined transport trains.	optional	optional	optional
P2	Belongs to the combined transport profile. It shall be fulfilled only for combined transport trains.	optional	optional	optional
C2	Belongs to the combined transport profile. It shall be fulfilled only for combined transport trains.	optional	optional	optional
DangerousGoodsIncluded	Write either 1 or 0. It's a boolean field that indicates whether the train includes any kind of dangerous goods.	optional	optional	N/A
ExceptionalTransport	Write either 1 or 0. It's a boolean field that indicates whether the train is an exceptional transport.	optional	optional	N/A
TiltingFunction	Write either 1 or 0. It's a boolean field, only for passenger trains, that indicates whether train is capable of tilting.	optional	optional	N/A
ValidFrom	The start of the validity period of the object. YYYY-MM-DD	mandatory	mandatory	mandatory
ValidTo	The end of the validity period of the object. YYYY-MM-DD	mandatory	mandatory	mandatory
Monday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
Tuesday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional

Wednesday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
Thursday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
Friday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
Saturday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
Sunday	Part of the circulation days pattern, if the user does not want to provide daily bitmap for the calendar. Write either 1 or 0.	conditionally optional	conditionally optional	optional
TimeUnit	Only valid values can be selected (see sheet Code list). Then the applicant can provide a frequency for the selected Time unit in the defined validity period.	conditionally optional	conditionally optional	N/A
Frequency	This field is connected with the TimeUnit filed for the defined TimeTableYear. If you select TimeUnit=weekly and write Frequency=1, it would mean 1 train run per week.	conditionally optional	conditionally optional	N/A
BitmapDays	The length shall be in line with the selected validity period and it indicates a daily calendar of the object.	conditionally optional	conditionally optional	optional
Comment	Free text field	-		optional

Annex F: Capacity Model evaluation

After X+12, when the appropriate timetable period ended, IMs should evaluate whether they were able to keep their previous commitment from the capacity partitioning. This knowledge is essential to gather data and improve the capacity partitioning and planning in the upcoming TT periods.

It is important to track:

- Whether the estimated share for TCRs was kept, and if not, for which reason. The IMs should also evaluate whether the share of TCR was sufficient for maintenance in the long-term view. The evaluation of IMs should not be limited to simple two per cent figure comparisons, it must be transparent and go deeper into the particular shares of TCR impact types and, where needed, even to particular TCRs. The stakeholders have to understand that special attention must be given to the TCRs caused by force majeure, of which most are unpredictable. The evaluation should be done according to the Procedures for Temporary Capacity Restriction Management.
- The reliability of submitted CNAs by Applicants, if they requested the products designed for them by IMs and whether they were used for the train run.
- If the ratio of TCRs was in line with the planned amounts included into the traffic part of the Capacity Model.

The IMs should develop a joint methodology for evaluating Capacity Models, consult this methodology with Applicants, and update this document.

Annex G: Calculation of intended capacity usage lines and unplanned capacities

The intended capacity usage lines, and the amount of the unplanned capacity can be calculated through different methods.

1. Based on historical data derived from TIS/national traffic management system:

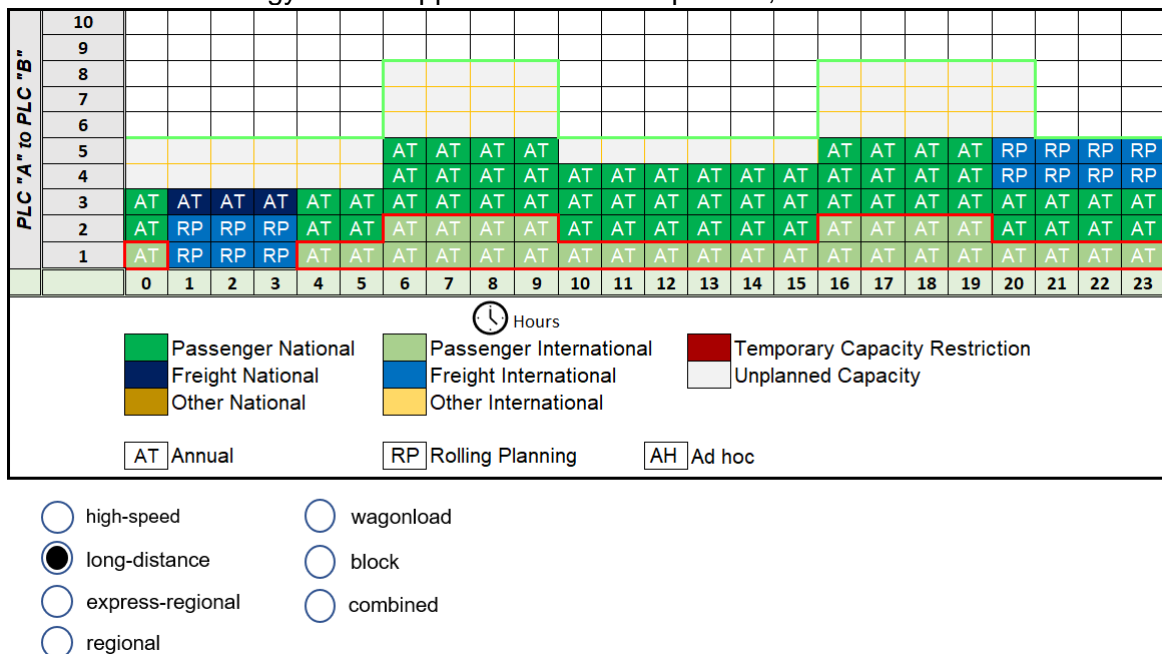
In the first step, the average number of trains within a period should be checked for each railway line.

Example:

The period of morning rush hour (6-9 am):

- Between 6-7: 9 trains,
- Between 7-8: 8 trains,
- Between 8-9: 7 trains,
- The volume, which can be accommodated without paying special attention to capacity planning / extraordinary traffic management measures in the Capacity Model is 8 in the period between 6-9 am.

The same methodology can be applied for the other periods, as well.



Example of the calculation of intended capacity usage line - 1

Based on the information gathered from RNE Train Information System (TIS)/national systems, the volumes, which can be accommodated without extraordinary traffic management measures are changing period by period on the analysed railway line.

The calculated values per hour shall be included into the model, as an intended capacity usage line, which means that the planned/unplanned capacities below this line can be used without any extraordinary efforts on IM side.

The intended capacity usage line can be calculated based on the following inputs:

- Railway line (mandatory) → the intended capacity usage should be calculated for every railway line.
- Primary Location Code level information (optional) → IMs have to opportunity to also share PLC level information and calculate the intended capacity usage line on PLC level.
- Period (mandatory) → It is possible to set one figure for the whole day or to set it for periods/hours.

During the preparation of the Capacity Model not all capacities have been filled with volumes, therefore, unplanned capacities remained for later utilisation. Taking into account, that one period is usually homogeneous (passenger majority in the morning, freight majority at night) it can be stated, that these volumes define the majority in the period. According to our analysis the traffic mix does not change significantly over the TT periods.

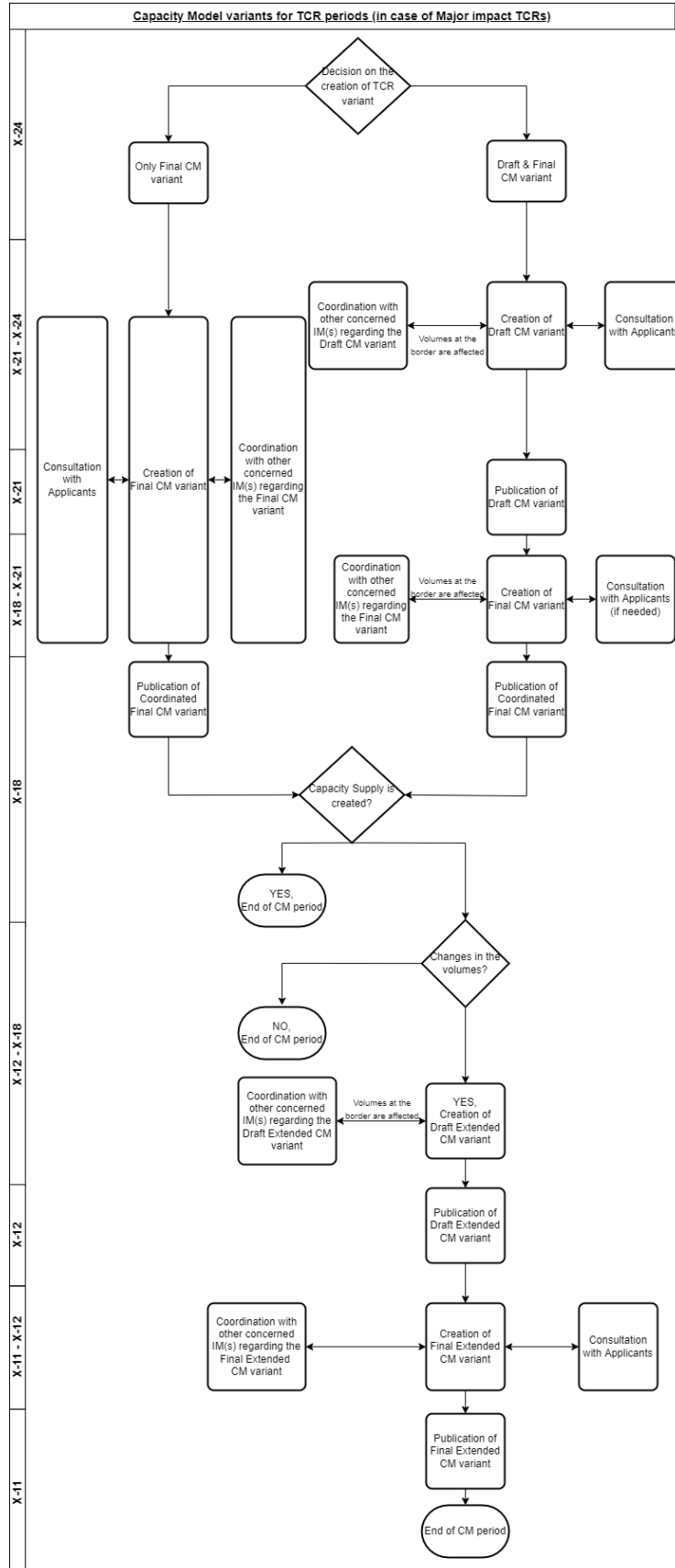
The automatic calculation of the intended capacity usage is based on the bell curve theory. The bell curve represents the normal distribution of a dataset. The previous analysis has shown that the distribution of trains follows the normal distribution (or very close to that), which means the bell curve can be utilised.

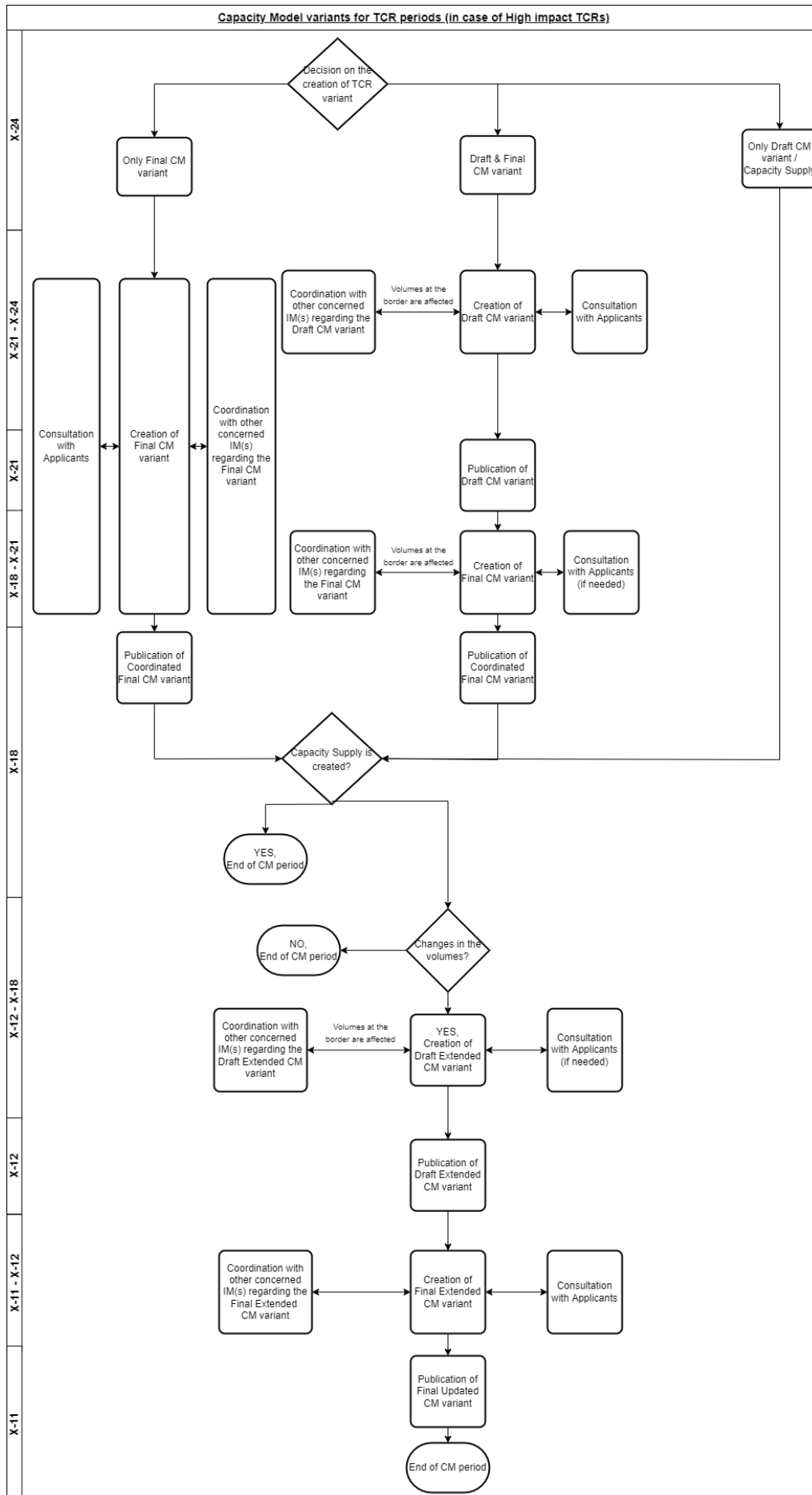
On the horizontal axis, the value (e.g., number of trains) is presented, while on the vertical axis the number of days is shown. For instance, there were 2 days when 10 freight trains were operated on the line and only one day when 25 freight trains. It can be noted that these are extreme values (e.g., due to TCR less freight train operated) and can be neglected for the future analysis.

On average, 15.7 freight trains utilised the line daily, so if the intended capacity line is defined a little bit above the average, then the system would already contain buffer and count with a possible future increase in the traffic. For example, as it is shown on the figure, in 80% of the cases there were 19 freight trains maximum on the line. This information can be utilised as the intended capacity usage line might be set at 19, meaning if the capacity would reach this value, it is highly probable that the IMs should interreact or the system can easily become unstable.

With the help of the mentioned methodology, the intended capacity usage line can be calculated and set for any section. The methodology of the model enables the IMs to avoid the extremes and to define the intended capacity usage line based on real data which can be later iteratively adjusted.

Annex H: Process chart for creation of Capacity Model variants for TCR / TCR window periods from the perspective of the IM-role

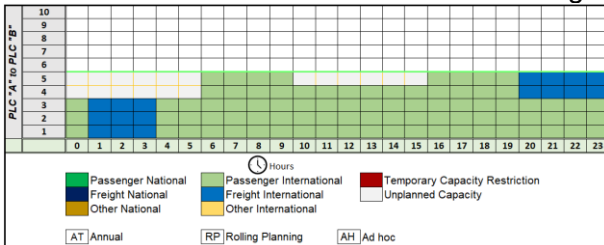




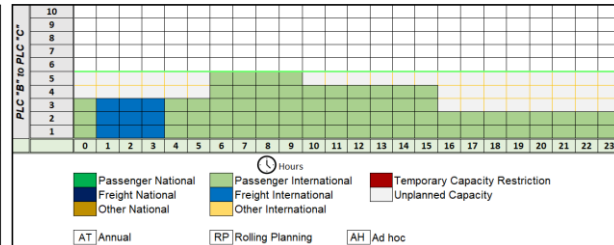
Annex I: Harmonisation of Capacity Model volumes – use cases

Use case No 1: Bilateral harmonisation, both IMs define only mandatory layers.

- ✓ Both IM1 (MÁV) & IM2 (HŽ Infrastruktura) plan until the nearest PLC to the border point Botovo/Gyékényes (PLC „B”)
- ✓ Defined layers: 1 & 2
- ✓ Dwell time was not considered during the harmonisation

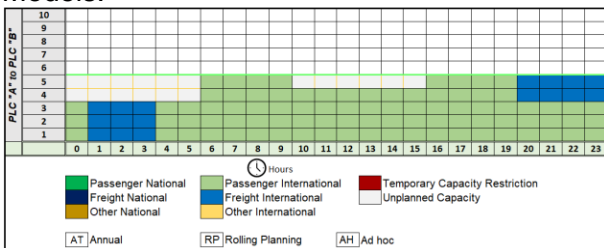


Initial Capacity Model – MÁV

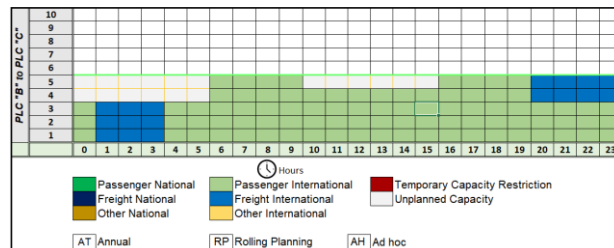


Initial Capacity Model – HŽ Infrastruktura

The initial Capacity Model of IM2 contained less pre-planned volumes after 16:00 compared to the initial Capacity Model of IM1. After the harmonisation round at X-26 the IM2 decides to add further volumes to their Capacity Model to receive a harmonised status → result: Fully harmonised Capacity Models.



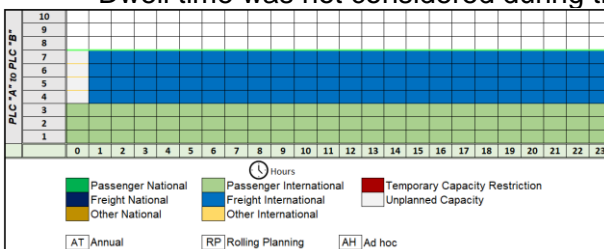
Harmonised Capacity Model – MÁV



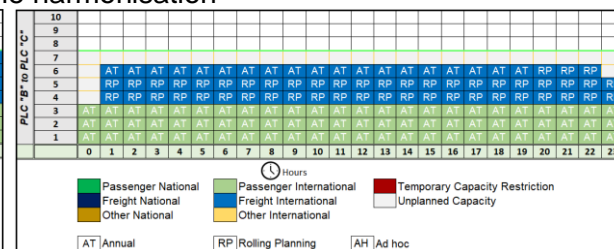
Harmonised Capacity Model – HŽ Infrastruktura

Use case No 2: Bilateral harmonisation, IM1 defines Layers 1,2, IM2 defines Layers 1,2,5.

- ✓ IM1 (ÖBB-I) & IM2 (SŽ-I) plan until the nearest PLC to the border point Spielfeld-Straß/Šentilj (PLC „B”)
- ✓ IM1 defines layers: 1, 2. IM2 defines layers 1, 2, 5.
- ✓ Dwell time was not considered during the harmonisation

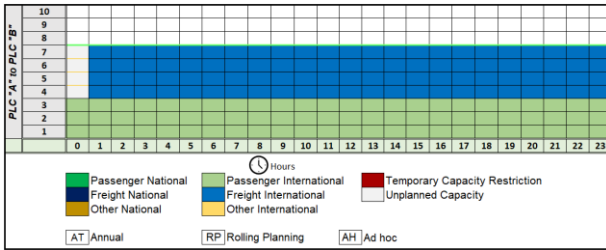


Initial Capacity Model – ÖBB-I

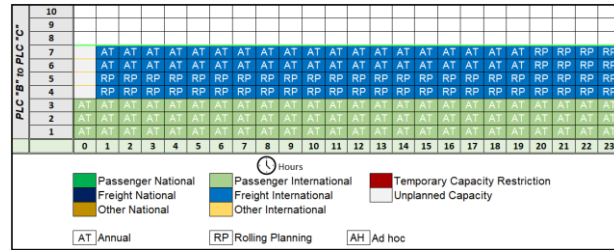


Initial Capacity Model – SŽ-I

IM1 plans with a higher amount of freight volumes after 01:00 and in the meantime IM2 plans with a lower amount of freight volumes and defines also Layer 5. After the harmonisation round at X-26 IM2 decides to add further volumes to their Capacity Model to have the same number of pre-planned volumes on both sides of the border → result: Harmonised number of Capacity Models volumes.



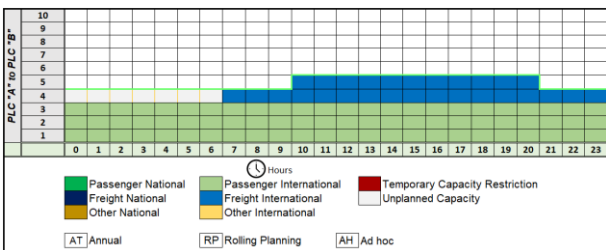
Harmonised Capacity Model – ÖBB-I



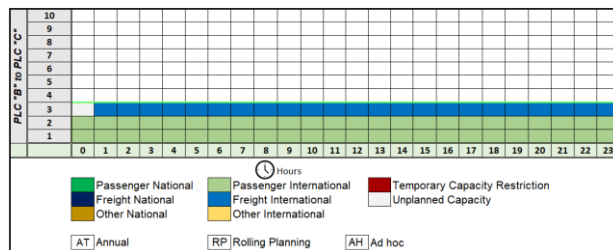
Harmonised Capacity Model – SŽ-I

Use case No 3: Trilateral harmonisation for traffic flows, Layers 1 and 2 defined.

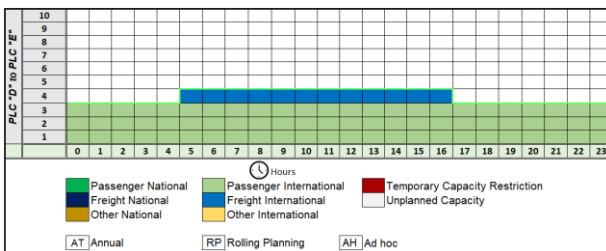
- ✓ IM1 (DB InfraGO) plans till the nearest PLC to the border point Kufstein (PLC „B”)
- ✓ IM2 (ÖBB-I) plans from the nearest PLC to the border point Kufstein (PLC „B”) to nearest PLC to the border point Brennero/Brenner (PLC „E”)
- ✓ IM3 (RFI) plans from the nearest PLC to the border point Brennero/Brenner (PLC „E”)
- ✓ All IMs define Layer 1 & 2
- ✓ Dwell time was not considered during the harmonisation



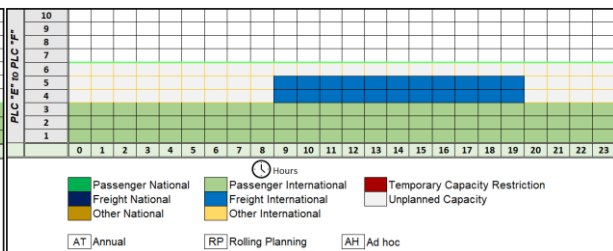
Initial Capacity Model – DB InfraGO



Initial Capacity Model – ÖBB-I



Initial Capacity Model – ÖBB-I



Initial Capacity Model – RFI

IM1 plans with 1 international freight volume / hour between the hourly slots of 07 – 09 & 21 – 23, and with 2 international freight volumes / hour between the hourly slots of 10 – 20 and 3 international passenger volumes in each hour at PLC „B”.

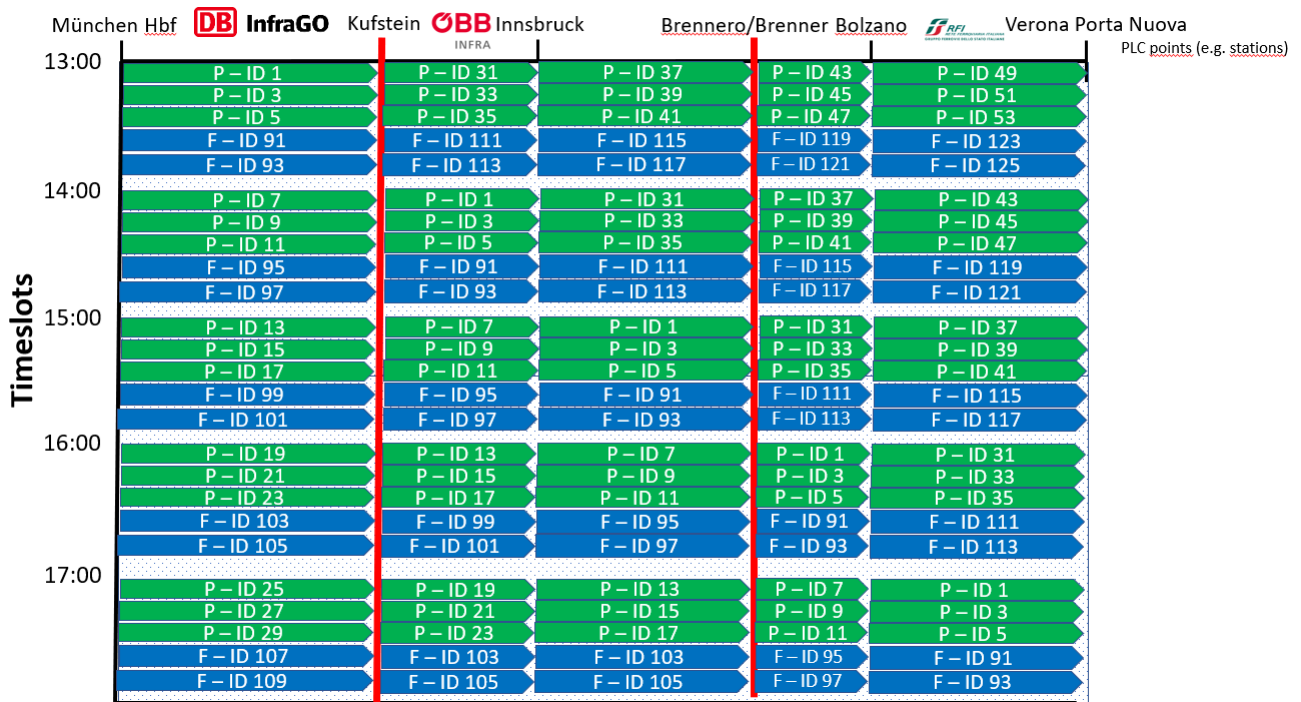
IM2 plans with 1 international freight volume / hour after 01:00, and 2 international passenger volumes in each hour at PLC „B”.

IM2 plans with 1 international freight volume / hour between the hourly slots of 05 – 16, and 3 international passenger volumes in each hour at PLC „E”.

IM3 plans with 2 international freight volume / hour between the hourly slots of 09 – 19, and 3 international passenger volumes in each hour at PLC „E”.

After the harmonisation round at X-26 IM2 decides to add further volumes to their Capacity Model to have the same number of pre-planned volumes at PLC „B” and in addition IM2 decides to add further volumes to their Capacity Model to have the same number of pre-planned volumes at PLC „E”.

The efforts of the IMs result in the harmonised Capacity Models at traffic flow level.



Harmonised Capacity Model – DB InfraGO – ÖBB-I - RFI