

TAP TSI and TAF TSI

Sector Handbook for the Communication between Railway Undertakings and Infrastructure Managers (RU/IM Telematics Sector Handbook)

Temporary Capacity Restriction (TCR)

Project: TCR Tool Development

Date: 5 January 2021

Author: Mario Toma

Version:

Schema	Document	Change	Date
2.4.0	0.1	Initial - version for review of the sector	05.01.2021

Introduction

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

The TCRs represent negative capacity on the network and they are a capacity reduced factors that, if badly coordinated, decrease the stability and therefore the quality of timetables. TCRs should be known in advance (even up to 36 months) and well planned to provide high-quality path offers. It is important to coordinate these TCRs at the international level, include Applicants in the process, and communicate unavailable capacity accordingly. There is a high customer demand to know in advance which capacity restrictions they will be confronted with. All relevant capacity restrictions must be coordinated, taking into account the interests of the RUs and the impacts on available capacity on rail traffic, in order to reduce the impact on customers' traffic and to allow RUs to anticipate and organize as best they can.

Data should be updating more frequently (nearly to daily basis) and because of that technical interfaces for communication between central TCR tool and national TCRs systems are important.

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

Document Summary

This document describes messages and elements used for the TCR data exchange among IMs and the central tool. These messages shall be used by the sector for the TCR import, coordination, and publication, but also for the searching TCRs by Applicants.

Messages described in this document are:

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

TCRCanceledMessage	Message shall be used to cancel the particular TCR. The TCR will not be permanently deleted from the central tool, but will not be editable anymore
TCRResponseMessage	Message shall be sent by the central tool as the response to a TCRMMessage. It contains the status and a report of the import (with the warnings)

Who should read what

Readers charged with the task of implementing...	
... should read Chapters...	TCR (importing and coordinating TCRs) relevant for IMs/ABs
Part A	
5	X
6	X
7	X
8	X
9	X
10	X
11	X
Part B	
12	
Part C	
13	X
14	X
15	X
16	X
17	X
18	X
19	X
20	X
Part D	
21	X
22	X
23	X
24	X
25	X

Temporary Capacity Restriction

1. Introduction

This complete chapter aims to provide the necessary information that is required for the implementation of the TCR messages by the various actors impacted as a result of complying with the TAF/TAP regulations.

The purpose of implementing TAF/TAP TSI is to ensure an efficient and prompt TCR data exchange between IMs to have well-coordinated and up-to-date information about TCRs to be published and visible to RAs and other service providers.

2. Processes

Currently, each IM dealt with TCRs differently, especially regarding the applied timeframe and periods. This was mainly due to different construction and maintenance planning processes which depend on the budget and financial planning. In addition, differing national legal regulations had an influence on TCR management regarding the application of terms and communication with applicants.

The revised Annex VII (recast in 2017) of the Directive 2012/34/EU forces the IMs to involve known and potential applicants, main operators of service facilities and other IMs affected by a TCR at an early stage.

2.1. Import data Process

The planning and coordination of temporary capacity restrictions (TCRs) is a major factor in stabilizing timetable offers. Due to that, IMs have to publish their TCRs as soon as they have information about them.

The import process, using the TSI interface and defined TCR messages, on the high-level overview is quite simple, as presented in the figure below.

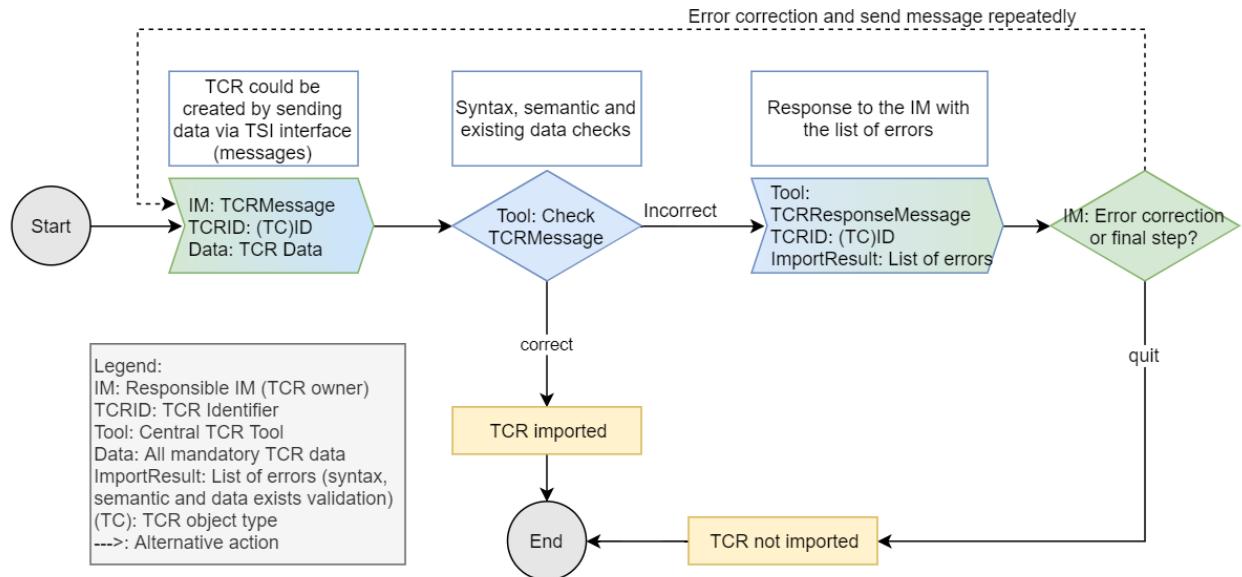


Figure 1: TCR data import process

Mostly, the international TCR data exchange is essentially bilateral and takes place between the IM who created TCR (TCR owner) and involved IM (neighboring IM) who is affected by the TCR.

Of course, there are also cases where more than one neighboring IM is involved. Data import is completely the same, but harmonization is not bilateral anymore and feedbacks from all involved IMs must be considered.

The messages that will be used for data import, response and cancelation are explained in the below:

Message	Message description
TCRMessage	Message shall be used by IMs to import TCRs from their national tool into the TCR tool. The same message shall be used to update already created/imported TCRs.
TCRCanceledMessage	Message shall be used to cancel the particular TCR. The TCR will not be permanently deleted from the central tool, but will not be editable anymore
TCRResponseMessage	Message shall be sent by the central tool as the response to a TCRMessage. It contains the status and a report of the import (with the warnings)

One TCR per message will be sent. TCR must contain all the mandatory elements. Also, IMs are able to provide information about the neighboring IMs that are affected by the TCR. If there is no affected IMs defined, neither they are defined on the sections in the GeoEditor on the line where TCR is created, the TCR is treated as national and will not be coordinated.

2.2. Criteria for defining the capacity restrictions impact

Capacity restrictions may vary widely as regards their duration and impact on rail traffic. Therefore, publication criteria have to be defined for TCRs, depending on their effects on capacity and rail traffic. These guidelines provide a framework of criteria and thresholds to be used as a reference for the publication of TCRs.

To provide guidance on how each TCR should be handled, an impact cluster has been created based on the recast Annex VII (both criteria must be fulfilled):

	Consecutive days	Impact on traffic (estimated traffic cancelled, re-routed or replaced by other modes of transport)
Major impact TCR¹	More than 30 consecutive days	More than 50% of the estimated traffic volume on a railway line per day
High impact TCR¹	More than 7 consecutive days	More than 30% of the estimated traffic volume on a railway line per day
Medium impact TCR¹	7 consecutive days or less	More than 50% of the estimated traffic volume on a railway line per day
Minor impact TCR²	unspecified ³	More than 10% of the estimated traffic volume on a railway line per day

1) Annex VII of Directive 2012/34/EU, article (11);

2) Annex VII of Directive 2012/34/EU, article (12).

3) according to Annex VII of Directive 2012/34/EU, article (12) "7 consecutive days or less", modified here.

If the impact of TCRs is not limited to one network, the IMs concerned, including IMs that might be impacted by the rerouting of trains, shall coordinate among themselves regarding capacity restrictions that could involve a cancellation, re-routing of a train path or replacement by other modes. The IM responsible for the TCR shall share all known information about the planned TCR (period, duration, section of the line affected, possible impact on capacity and plans about cancelling, rerouting train paths or replacement by other modes) with IMs, applicants and the main operators of service facilities that might be impacted by the TCR.

The specific conditions and needs of the various IMs may be different and this should be taken into consideration. IMs should seek to handle TCRs (coordination, publication, and consultation) in a way to best suit the passenger and freight market requirements.

Calculation method for "Impact on traffic"

Since the impact of TCRs is calculated significantly earlier than the complete timetable for a given period becomes available, the baseline for the calculation is:

- The completed timetable available
- All known changes incorporated

- Requested (not allocated) capacity – during the TT construction phase (only after Rolling Planning implementation)

Out of the basic timetable within the TCR duration, a representative day with high traffic volume must be chosen.

It is important to keep the calculation simple. Therefore, in the calculation, only the line section of the respective TCR is taken into consideration - at this stage without secondary effects from TCRs on other line sections.

- On the chosen day, all paths within the geographic range of the TCR together serve as a baseline ('Number of paths on representative day').
- To compare it with the situation of having the TCR in place, a basic timetable must be created and the paths not available for that situation must be counted ('Number of affected paths in TCR calculation'). Note that a simulated timetable requires the assistance of IT systems. IMs may use such sophisticated systems in their calculations.

Finally, the number of paths in the simulated TCR timetable is compared with the number of paths on the representative day. Therefore, the calculation is:

$$[\text{TCR impact on traffic in \%}] = \left(\frac{[\text{Number of affected paths in TCR calculation}]}{[\text{Number of paths on representative day}]} \cdot 100 \right)$$

Definition of "Consecutive days"

To calculate the consecutive days to classify TCRs, various models can be used. The calculation shall be done before the respective deadlines (e.g., before publication).

Model 1: Model with no change of traffic volume affected in terms of cancellation, rerouting, or replacement

- The complete TCR takes place in an uninterrupted manner from start to finish of the TCR
- The traffic volume affected does not vary significantly (in percentage)
- Calculation: Amount of TCR days

Example:

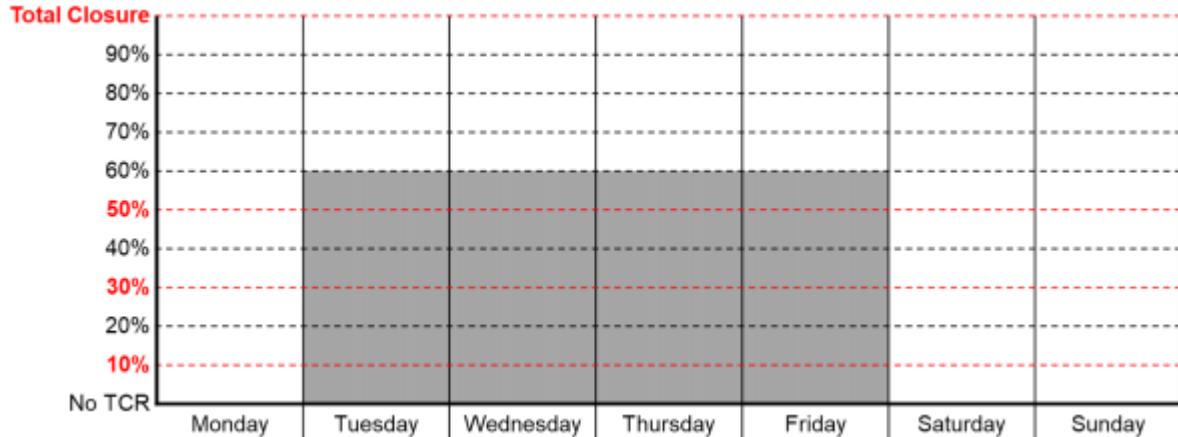
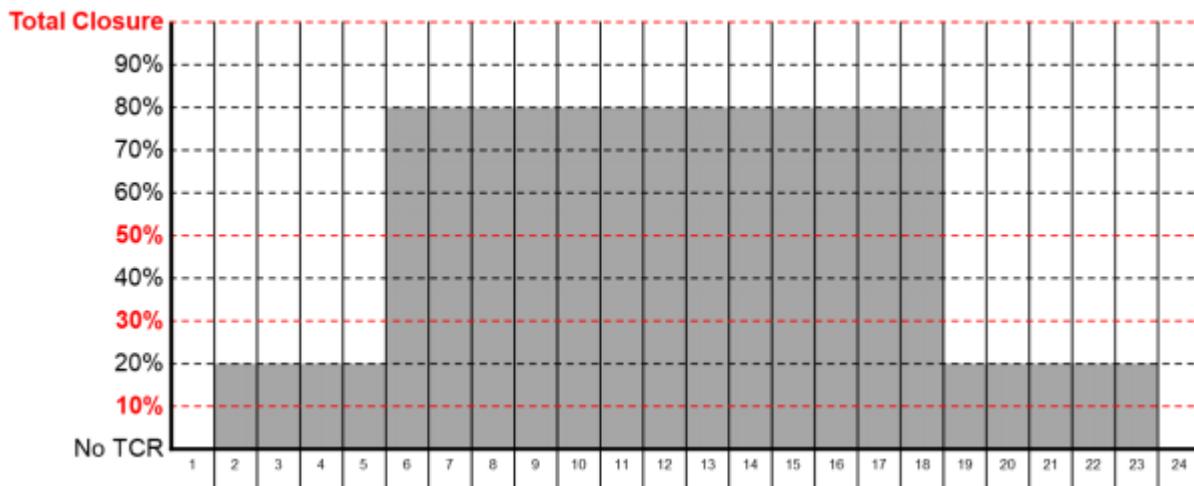


Figure 2: 4 consecutive days (Tuesday to Friday, ca. 60% impact on traffic)

Model 2: Model with variance in volume affected:

- The complete TCR takes place in an uninterrupted manner from start to finish of the TCR
- The traffic volume affected changes significantly (e.g., preparation of main works)
- Calculation: Periods with similar traffic volume affected have to be calculated individually (split)

Example:



Calculation: There are three TCR periods:

- Period "P1": 4 consecutive days (day 2 to 5, ca. 20 % impact on traffic)
- Period "P2": 13 consecutive days (day 6 to 18, ca. 80 % impact on traffic)
- Period "P3": 5 consecutive days (day 19 to 23, ca. 20 % impact on traffic)

Result: The treatment of each TCR period is different. However, the publication of the TCR will show all 3 periods (22 days) as one combined TCR:

- P2 is published/treated as a high impact TCR with 13 consecutive days
- P1 and P3 are published/treated as minor impact TCRs with 4 and 5 consecutive days.

Special case: Several TCRs of 7 days or less in a row:

If TCRs with a duration of 7 or less consecutive days and significant impact to traffic follow each other in a row (e.g., TCR Monday to Friday for several weeks), it should be taken into consideration to treat them as one single TCR with a duration of more than 7 days for coordination and consultation purposes. Especially if the TCRs are part of the same project, this possibility should be considered

2.3. TCR coordination and publication

Annex VII considers the possibility to carry out two rounds of coordination and consultation before every publication. The second round of consultation is mandatory if changes were made after the first round (e.g., due to results of coordination).

TCR coordination

Simply gathering and publishing information about capacity restrictions without any coordination has little value for IMs and applicants. The coordination of TCRs shall ensure that planned capacity restrictions will consider the needs of both the IMs and the market by rationalizing and minimizing the gravity of impact and duration of the capacity restrictions.

The aim of the coordination phase is to guarantee the possibility to all IMs to carry out their respective TCRs, optimizing their mutual interferences and minimizing the impact on applicants.

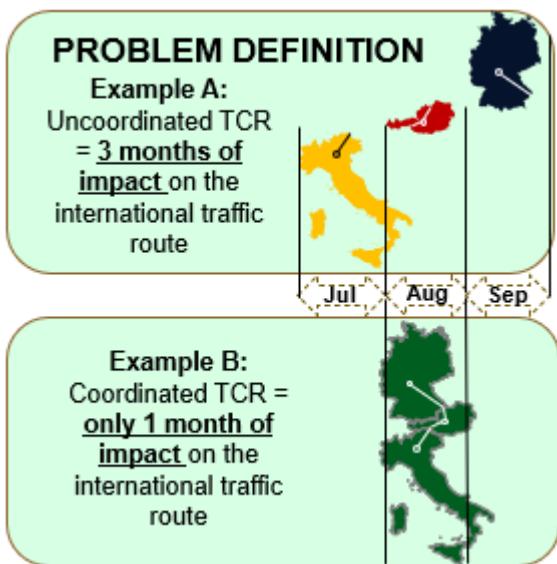


Figure 3: TCR Coordination logic

Coordination shall be facilitated through bilateral (or multilateral) meetings of IMs taking into account passenger and freight flows. All IMs shall coordinate TCRs in such a way that their impact on capacity and

applicants is as low as possible and the use of infrastructure as efficient as possible (no non-parallel works on the same line, etc.).

For the time being, the coordination function is not considered neither defined in the TSI messages. The TCR coordination will be made directly in the central tool.

Depending on the coordination process definition and agreement by the members, the messages could be extended with the coordination parameter.

TCR Publication

Major and High impact TCRs

The infrastructure managers concerned shall publish all capacity restrictions and the preliminary results of a consultation with the applicants for a first time at least 24 months in advance, to the extent they are known. IMs should maintain a network of contacts to ensure that information regarding TCRs can be shared as soon it is available.

If the impact of TCRs is not limited to one network, the IMs concerned, including IMs that might be impacted by the rerouting of trains, shall coordinate among themselves regarding capacity restrictions that could involve a cancellation, re-routing of a train path or replacement by other modes. The IM responsible for the TCR shall share all known information about the planned TCR (period, duration, section of the line affected, possible impact on capacity and plans about cancelling, rerouting train paths or replacement by other modes) with IMs, applicants and the main operators of service facilities that might be impacted by the TCR.

Medium impact TCRs

Whenever a project is approved and the related TCRs are scheduled, but before X-13.5, IMs shall inform applicants and affected IMs about known medium impact TCRs with international impact. Based on this information, IMs trigger the consultation of applicants, who may place their comments and concerns.

Coordination and publication timeframes for the impact of different TCRs have been defined as presented in the figure below.

	Major Impact TCRs	High Impact TCRs	Medium Impact TCRs	Minor Impact TCRs
Before X-24	Preliminary consultation of applicants Coordination with neighboring IMs Requests from applicants			
X-24		First publication of TCRs		
X-23	Finalization of provision of alternatives; consultation and coordination			
X-19				
X-18	Coordination finalization			
X-17				
X-15				
X-14				
X-13				
X-12		Second publication of TCRs	Publication	
X-7				Final information
X-6				Consultation and coordination
X-5				
X-4				Publication

Figure 4: TCRs' Coordination Timeframe

The first round of coordination and consultation for the Major impact TCRs is from X-24 to X-18, and for the High impact TCRs from X-24 to X-13,5.

The second round for the Major impact TCRs starts from X-18 to X-12, and for the High and Medium impact TCRs from X-13,5 to X-12.

Regarding the minor TCRs, IMs shall start consultations and coordination (if needed) with affected IMs and applicants as soon as possible after they start planning TCRs. For that purpose, all information about minor impact TCRs shall be provided to applicants and affected IMs as soon as it is available. The information shall be made available to applicants and affected IMs at X-6.5 at the latest.

The decisions resulting from the different rounds of consultation with the applicants should reflect the aim of reducing IMs' costs and minimizing the impact on applicants.

All TCRs (after X-4)

IMs shall provide details on the offered train paths for passenger trains to affected applicants no later than four months and for freight trains no later than one month prior to the start of the capacity restriction, unless IMs and affected applicants agree on shorter lead time.

2.4. TCRs in the Timetable and late TCRs

All the stable TCRs must be considered in the timetable. By X-11 at the latest, IMs provide 365-days overview of the capacity in capacity diagrams, including pre-constructed products, and fixed and published TCRs (major, high and medium impact).

Upon the TTR implementation, applicants place their requests for the annual TT by X-8/X-8.5. Applicants should already take into account the fixed TCRs and the IMs should indicate whether applicants may request tailor-made paths through particular TCRs/buffer-blocks ¹or not.

All TCRs that are published and fixed (an exact time known) by the draft offer and final offer deadline, have to be already reflected in the draft and final offers.

All TCRs that are modified or defined after the last publication deadlines, such as for instance an unforeseen breakdown of infrastructure outside the maintenance cycles or before the termination of the infrastructure component lifecycle, are considered as late TCR's.

In those cases, the infrastructure manager shall consult neighboring IMs, applicants and the main operators of service facilities concerned forthwith.

If already allocated paths are affected, the IM has to trigger a path alteration process.

For TCRs becoming known after the dedicated coordination/publication deadline but still prior to path allocation the IM's start a dedicated consultation phase (case by case). These dedicated consultation phases are announced through the agreed communication channels and are open to affected and interested applicants. If possible, the IM presents alternative offers for allocated capacity and an approach for an alternative offer for no requested capacity. If no agreement with the applicants can be reached, IMs are required to take the final decision.

Exception: TCRs caused by force majeure (i.e., natural disasters or accidents) are not considered late TCRs.

Path alteration process in case of late TCRs

Based on the path agreement, the applicant can expect that a booked path is available up to its operation. However, if an event occurs that TCR's need to be changed, between the capacity allocation and prior to the start of the operation, and the booked path from either the long term or short-term planning is no longer available, the IM shall inform the applicant as soon as it has the knowledge about this fact.

The IM is obliged to consult the applicant with an alternative proposal together with the indication the path is not available. If no agreement with the applicants can be reached, IMs are required to take the final decision, where the applicant may refuse to use the allocated path and declare it as economically not usable.

However, an alternative is not always possible. In that case, the IM shall inform the applicant immediately.

This path alteration may refer to one single day, several days or all remaining days.

¹ The buffer-block defines the capacity blocked in the capacity diagram (a 24 hour and 365 day overview of capacity), to be used as a cushion against fluctuations in available capacity for train runs and TCRs.

3. Structure of the message

The main elements of the TCRMessage structure are provided in this section. Detailed description of all the message elements is provided in the Annex 1 – TCR Message specification.

Message header

The message header is common for all RA/IM messages and therefore has no business relevance related to TCR process. It is purely a technical part of the message. See chapter 11.

Administrative Contact Information

Used to define the contact information of the responsible person responsible for creation and coordination of TCR in the company.

Identifier

This element holds the composite identifier for the TCR ID. The recommendation is to use the ID from the national tool for the Core element of the identifier. In this case it will be easier to track the TCR in the central tool, but also do the necessary updates to TCRs.

In the case, that the 12 characters of the Core element are not sufficient for the ID (e.g., nationally TCR is defined with the 13 characters), the Variant element could be used for the extension.

Coordinating IM

This element is used to define which IM is responsible for the TCR and coordinates the process between IMs. It is important specially in the countries with more than one IM, where IMs can create TCRs for each other (e.g., in Switzerland). The value that should be entered is the company code of the responsible company. This element is optional.

TCR

The TCR element is the most important element of this message. This element contains all the necessary information that describes the TCR object itself. Description of each element is provided in the Annex 1. The element that should be singled out and further clarified is the Temporal expansion.

Regarding the expansion type, there are two types (attributes) that can be chosen:

- **Periodical** - The characteristic of this event is described with a repeating pattern (e.g., work activities happen each Saturday and Sunday from 11:00 to 04:15). For periodical works, specific working days should be set, where each value represents the beginning day of each work. In the

case of the given example with works on Saturday and Sunday from 02:00 to 04:15, the values Sat and Sun needs to be set (not Sat, Sun and Mon).

- **Continuous** - These events are characterized in a way that they occur non-stop during the TCR (e.g., a complete closure of a track from 01.07.2017 10:00 to 01.09.2017 12:00).

Related to the TCR timing, it is possible to define the validity period in the case that the exact dates and times are known or unknown.

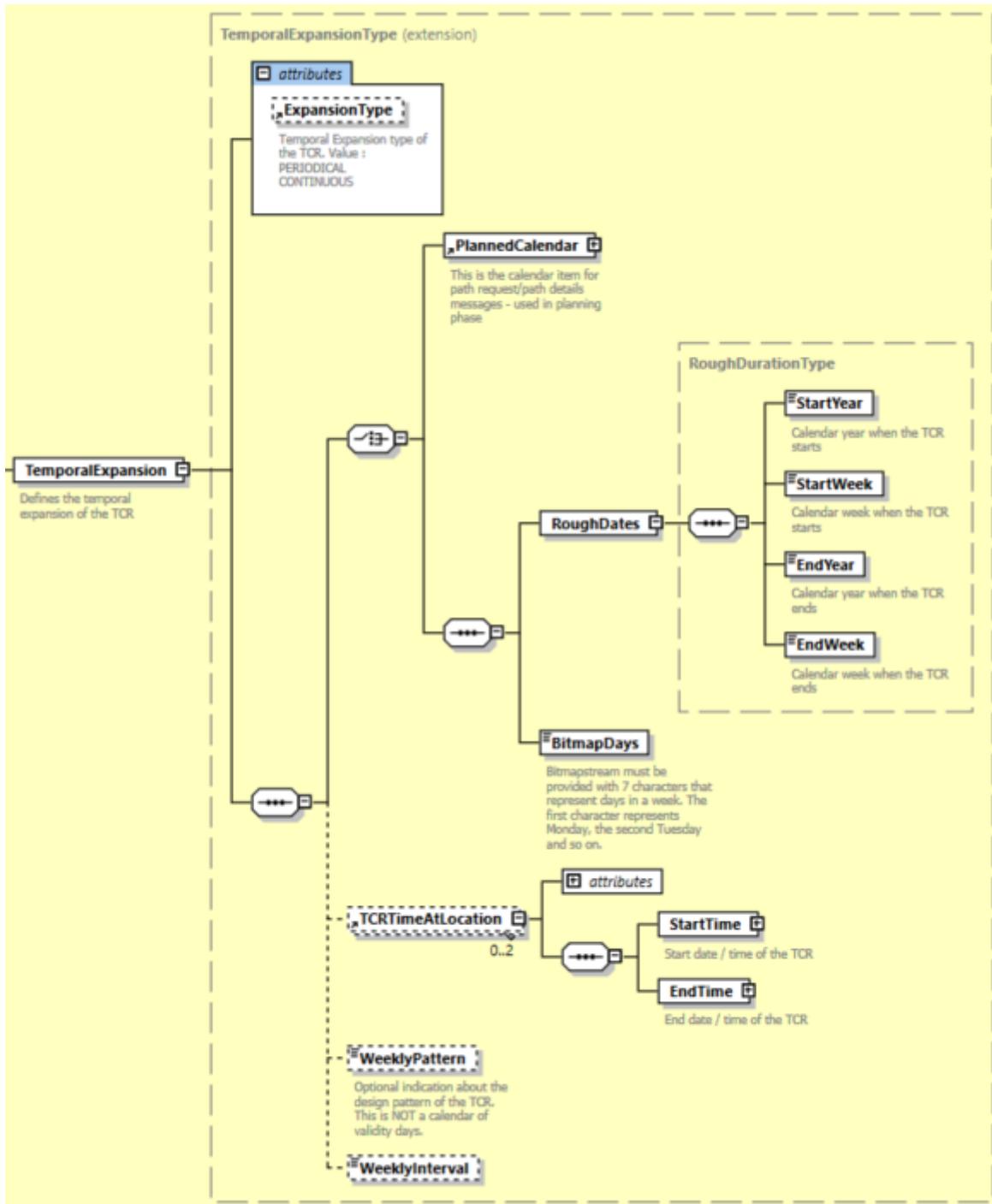
If the exact date and time of TCR is known, the validity period element of the “Planned calendar” shall be defined. These dates and times define the very first date when the TCR starts and the end date until the TCR last. According the defined period, each day occurrence could be defined using the “BitmapDays” element.

In the case that exact dates are not known, it is possible to define the year/week range that approximately defines the TCR validity period. When the exact dates will be known, this data should be updated, using the “Planned calendar” element.

The weekly pattern element is used to define the day pattern when TCRs happens. This is especially important for the periodical TCRs, where this pattern defines the days for the TCR, starting with Monday as a first bit.

It is possible to define the weekly occurrence of the TCR. For this purpose, the “Weekly Interval” element will be used. The numbers defined there means that TCRs will occur e.g., every second week (2), every third week (3) and so on.

There is the “TCR Time At Location” element which is defined for a future use to define a possible offset time at the start or end location. This will not be implemented in the tool before 2022.



Annex 1: TCR Messages specification