




ERJU SYSTEM PILLAR

T3-TMSRequirements



TMS Functional Requirements

Disclaimer: The formulated requirements are subject to modification according to the clients' and market needs

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Abstract	The document contains the functional requirements in which the Traffic Management System (TMS) is responsible for. The chapters are divided as per the TMS functional capabilities based on our understanding of System Concept document. The capabilities and terminology can be found in System Concept along with the glossary in this document
Config Item	System Requirements Specification
Document ID	30 Deliverables/TMS-TMSFR-ES-017_03#714367  T3-TMSRequirements
Classification	Public
Status	In Progress (educated draft, discussion in domain nearly finished)
Version	1.0
Revision	714367
Last Change Date	24.09.2025
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1 History of Changes

Nr.	Changes	Leaders/Authors
0.1	First Draft for Internal Review - TMS Functional Requirements	Raghda Mohamed
	Comments	Marco Nanni, Matthias Krista, Mirko Gherzi, Ramon Oostveen
0.2	Second Draft for Internal Review - Modified TMS Functional Requirements	Marco Nanni, Mirko Gherzi, Raghda Mohamed, Ramon Oostveen
	Comments	Marco Nanni, Mirko Gherzi, Ramon Oostveen
0.3	Draft for Final Internal Review	Raghda Mohamed
	Revision	Marco Nanni, Marcus Völcker, Mirko Gherzi, Ramon Oostveen
0.4	Contributors Review Version	Matthias Krista, , Raghda Mohamed
	Review	René Schönemann, Patrick Konix, Stefan Wegele, Simone Brezzi
0.5	Contributors' Comments are worked on / Replied to	Matthias Krista, , Raghda Mohamed
0.6	First Delivery Version	Raghda Mohamed confirmed by Marco Nanni and Marcus Völcker
	Precision on Composition and TMS topics	Eric Jourdain
	Review	Marco Nanni, Mirko Gherzi, René Schönemann, Simone Brezzi
0.7	Comments Review & amendments + Draft Release	Marcus Völcker, Matthias Krista, Raghda Mohamed
	1st Approval Round	Eric Jourdan, Marcello Garofalo, Marco Nanni, Marcus Völcker, Matthias Krista, Mirko Gherzi, Veena Shukla, Simone Brezzi
	Addition of Restriction Area and Warning Area requirements.	Matthias Krista, Sebastian Uhlich
0.8	Comments Review & amendments + Draft Release	Matthias Krista, Sebastian Uhlich
0.9	Integrated according to comments received by ADIF and Mirror Group	Marco Nanni

2 Introduction

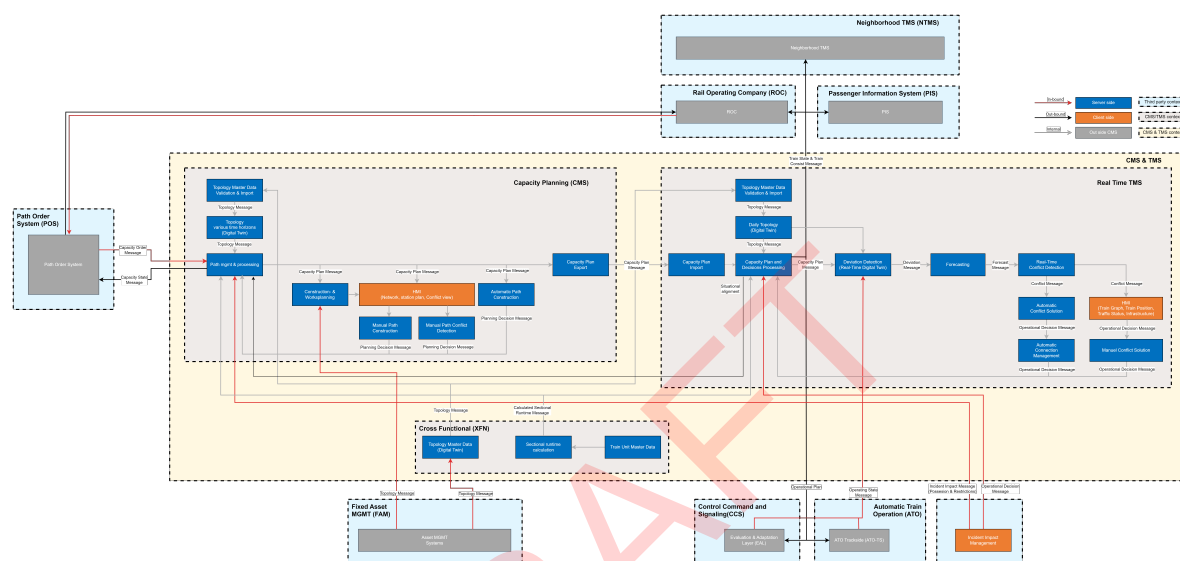
This document is part of the Task 3 deliverables, describing system level 4. The document describes the System Requirements Specification of Traffic Management System, which will be referred to in the document for simplification as "TMS". For more information on the detailed functionalities of TMS, please refer to the System Concept document, which is the basis of this document. Various definitions and concepts are already described in the System Concept. Link to System Concept document can be found here: [System Concept Document](#). the System Requirements are formulated and structured based on the System Engineering Management Plan (SEMP) rules defined in the three documents related to writing requirements. The documents can be reviewed [Here](#)

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3 Document Scope

The document focuses on TMS functional requirements, which are the core functionalities of the system. It specifies the main building blocks of the TMS along with the interface specification between TMS and the other systems in order to fulfil the core functionalities. The figure below describes the building blocks along with the external systems that TMS interacts with as described in the System Architecture Description document.

This document excludes the requirements specification of other systems, and only specifies which data are imported into TMS or exported from TMS to these external systems.



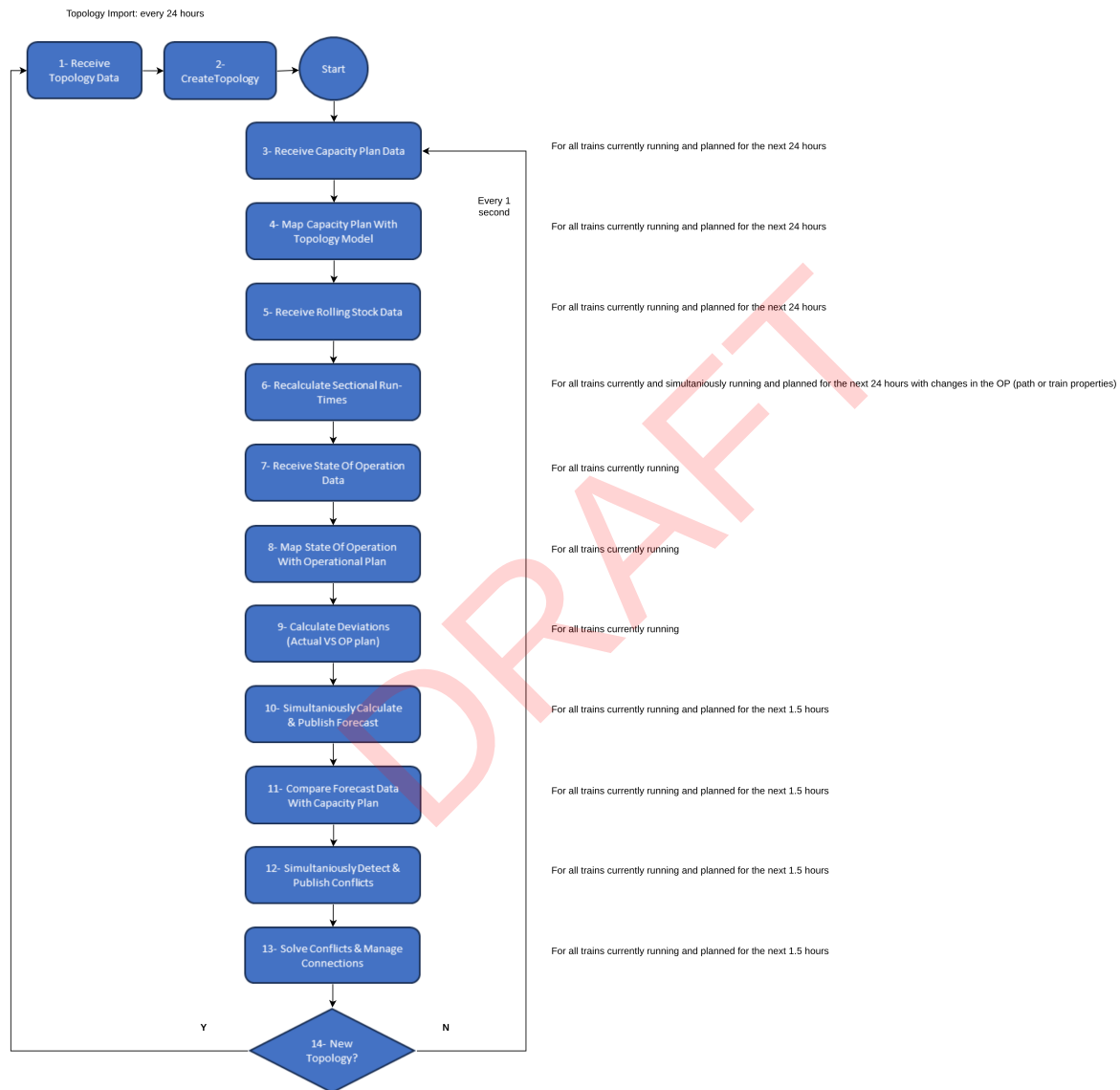
4 How To Read The Document

The document consists of many chapters, each chapter specifies either the data import from the other systems or one of the core TMS functions. The flow has been designed according to the above diagram, however for the data exchange part, it is not necessarily sequential, but it depends on data updates. Regarding the TMS functionalities, there are some defined Dispatching Measures as specified in System Concept, however this list is not exhaustive and could be modified in the future depending on the market business and technological needs. The same applies for the defined TMS optimisation goals / Key Performance Indicators. It is highly advisable to read first System Concept document, Operational Processes and System Architecture Description document before reading the system requirements, since most of the definitions are described in these documents. **Chapter 5** illustrates the flow of this document, and clarify the tasks performed by TMS along with the data imported into the system. **Chapters 6-13** are mainly about the requirements related to data import, mapping and validation. **Chapters 14-18** are about the core TMS functionalities (deviation detection, forecast, conflict detection, conflict solution & connection management). **Chapters 19, 20** are about interfaces with some external systems like Incident Impact Management & Automatic Train Operations. **Chapter 21** is the requirement specification of the Human Machine Interface.

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5 TMS Work Flow Design

This document contains the System Requirements Specifications for TMS. The figure below illustrates the high-level TMS functions, in order to make the requirements easy to read, understand and improve. The requirements are formulated based on T3 deliverables, especially System Concept, System Definition, Operational Processes and System Architecture Description documents. The workflow below illustrates the functions performed by TMS and not the overall architecture. For a detailed architectural design, please refer to the above building block view figure in System Architecture Description document.



6 Receive Topology Data

SPT3TMS-13264 - Master Data Topology Import

The TMS shall import the Topology_Master_Data from the Topology Master Data system [✓ Done / To be decided]

SPT3TMS-13263 - Track Edge Attributes Import

For each Topology model, the TMS shall import the list of Track_Edge attributes [✓ Done / To be decided]

For more Details on the attributes can be found in the Topology Interface Specification

SPT3TMS-13265 - Track Vacancy Import

For each Topology model, the TMS shall import the list of Track_Vacancy_Proving_Sections attributes [✓ Done / To be decided]

SPT3TMS-13260 - Track Edge Import

For each Topology model, the TMS shall import the list of Track_Edge_Links attributes [✓ Done / To be decided]

SPT3TMS-13259 - Regions Import

For each Topology model, the TMS shall import the list of Regions attributes [✓ Done / To be decided]

SPT3TMS-13262 - Operational Point Import

For each Topology model, the TMS shall import the list of Operational_Point attributes [✓ Done / To be decided]

SPT3TMS-13261 - Track Platforms Import

For each Topology model, the TMS shall import the list of Track_Platforms attributes [✓ Done / To be decided]

SPT3TMS-13268 - ATO Areas Import

For each Topology model, the TMS shall import the list of ATO_Areas attributes [✓ Done / To be decided]

SPT3TMS-13276 - Topology Version Number Import

For each Topology model, the TMS shall import the Topology_Version_Number [✓ Done / To be decided]

SPT3TMS-13274 - Topology Validity Date Import

For each Topology model, the TMS shall import the Topology_Validity_Date [✓ Done / To be decided]

SPT3TMS-13272 - Topology Elements Check

The TMS shall check for each element in the topology model attributes [✓ Done / To be decided]

SPT3TMS-13281 - Topology Rejection

IF the topology data is corrupted, THEN the TMS shall reject the topology version [✓ Done / To be decided]

SPT3TMS-13280 - Topology Import Frequency

WHEN a new topology model, the TMS shall import topology data 24 hours before the train run [✓ Done / To be decided]

To be able to construct a daily topology model, whenever there is an update in the topology

SPT3TMS-13287 - Topology Data Change

WHEN topology data changes in less than 24 hours, the TMS shall import the new topology data [✓ Done / To be decided]

Topology updates happen on the fly, without shutting down or restart the TMS runtime processes

For complete specification of Topology, please review the deliverable: <https://polarion.rail-research.europa.eu/polarion/redirect/project/SPT3CMS/wiki/20%20Workspace/T3-TopologyInterfaceSpecification?selection=SPT3TMS-10740>

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7 Create Topology Model

SPT3TMS-13289 - Topology Data Level Check

The TMS shall check the Topology data level [✓ Done / To be decided]

To check whether the Topology is suitable to execute CMS & TMS functions and ensure consistency across the different systems

SPT3TMS-13300 - Topology Model Inconsistency

WHEN NOT consistent, the TMS shall raise an error to the Topology model [✓ Done / To be decided]

When the data received from topology are inconsistent or missing, the model doesn't work with other systems

SPT3TMS-13298 - Updated Topology Creation

The TMS shall adapt the new Topology model with its own data preparation tools [✓ Done / To be decided]

Generally the topology model inside TMS is adapted whenever a new topology is imported whether it is 24 hours or less to be used in the operational plan, PE, ATO as a single source of truth

SPT3TMS-13786 - Topology Model Activation

the TMS shall activate the last imported Topology model [✓ Done / To be decided]

To make sure the imported topology is active and shared across the different systems (ATO, PE, etc)

SPT3TMS-13294 - Topology Unique Version ID Creation

The TMS shall assign each Topology model a unique Topology_Version_ID [✓ Done / To be decided]

SPT3TMS-13305 - Topology Version ID Validation

The TMS shall validate the Topology_Version_ID for each imported Topology [✓ Done / To be decided]

SPT3TMS-13304 - Topology Validity Date Validation

The TMS shall validate the Topology_Veracity_Date of each imported Topology [✓ Done / To be decided]

SPT3TMS-13303 - New Topology Model Creation

for each change in topology, the TMS shall create a new Topology model [✓ Done / To be decided]

SPT3TMS-13302 - New Topology Version ID Assignment

The TMS shall assign a new Topology_Version_ID to the newly created topology model [✓ Done / To be decided]

SPT3TMS-13307 - New Topology Validity Date Assignment

The TMS shall assign a new Topology_Veracity_Date to the newly created topology model [✓ Done / To be decided]

SPT3TMS-13233 - TCR Infrastructure Marking

The TMS shall mark Temporary Capacity Restriction elements as unavailable [✓ Done / To be decided]

SPT3TMS-13231 - Unavailable Capacity Exclusion

The TMS shall exclude the unavailable elements from the capacity usage until the end of the Temporary Capacity Restriction [✓ Done / To be decided]

SPT3TMS-13243 - Topology Alignment With PE

The TMS shall align the used Topology version with Plan_Execution [✓ Done / To be decided]

To ensure that PE is using the same topology version

SPT3TMS-13237 - Topology Alignment With ATO-E

The TMS shall align the used Topology version with ATO_Execution [✓ Done / To be decided]

To ensure that ATO is using the same topology version

SPT3TMS-13248 - Topology Version Update With PE

IF the Topology version is not identical between the TMS AND the Plan_Execution, the TMS shall send the updated Topology version to the Plan_Execution [✓ Done / To be decided]

SPT3TMS-13247 - Topology Version Update With ATO-E

IF the Topology version is not identical between the TMS AND the ATO_Execution, the TMS shall send the updated Topology version to the ATO_Execution [✓ Done / To be decided]

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8 Receive Capacity Plan Data

SPT3TMS-13246 - Capacity Plan Import

The TMS shall import the Capacity_Plan data from the Capacity Management System [✓ Done / To be decided]

SPT3TMS-13245 - Capacity Plan ID Import

For each Capacity_Plan, the TMS shall import Capacity_Plan_ID [✓ Done / To be decided]

SPT3TMS-13251 - Operational Train Number Import

For each Capacity_Plan, the TMS shall import Train_Number [✚ Open]

Train Number is meant here as the Operational Train Number, which identifies the train in the Timetable

SPT3TMS-13790 - Rolling Stock Data Import

For each Capacity_Plan, the TMS shall import the available Rolling_Stock data [✓ Done / To be decided]

The Rolling Stock data are defined in Chapter 10, since not all data are available in the capacity plan, the full specification is imported from the Rail Operating Company before train run

SPT3TMS-13250 - Payload Weight Import

For each Capacity_Plan, the TMS shall import Payload_Weight [✓ Done / To be decided]

SPT3TMS-13249 - Payload Type Import

For each Capacity_Plan, the TMS shall import Payload_Type [🔗 Content to be approved]

SPT3TMS-13255 - Departure Station Import

For each Capacity_Plan, the TMS shall import Departure_station for each stop [✓ Done / To be decided]

SPT3TMS-13254 - Arrival Station Import

For each Capacity_Plan, the TMS shall import Arrival_Station for each stop [✓ Done / To be decided]

SPT3TMS-13253 - Departure Time Import

For each Capacity_Plan, the TMS shall import Departure_Time for each stop [✓ Done / To be decided]

SPT3TMS-13252 - Arrival Time Import

For each Capacity_Plan, the TMS shall import Arrival_Time for each stop [✓ Done / To be decided]

SPT3TMS-13258 - Assigned Network Import

For each Capacity_Plan, the TMS shall import the assigned infrastructure [✓ Done / To be decided]

SPT3TMS-13257 - TCR Import

For each Capacity_Plan, the TMS shall import the planned Temporary_Capacity_Restrictions [✓ Done / To be decided]

SPT3TMS-13269 - Timing Point Import

For each Capacity_Plan, the TMS shall import each Timing_Points associated with the train path [✓ Done / To be decided]

SPT3TMS-13267 - Circulation Station Import

For each Capacity_Plan, the TMS shall import Circulation_Station [✓ Done / To be decided]

SPT3TMS-13279 - Minimum Circulation Time Import

For each Capacity_Plan, the TMS shall import Minimum_Circulation_Time [✓ Done / To be decided]

SPT3TMS-13277 - Maximum Circulation Time Import

For each Capacity_Plan, the TMS shall import Maximum_Circulation_Time [✓ Done / To be decided]

SPT3TMS-13275 - Minimum Stopping Time Import

For each Capacity_Plan, the TMS shall import Minimum_Stopping_Time at each station [✓ Done / To be decided]

SPT3TMS-13273 - Maximum Stopping Time Import

For each Capacity_Plan, the TMS shall import Maximum_Stopping_Time at each station [✓ Done / To be decided]

SPT3TMS-13285 - Connection Station Import

For each Capacity_Plan, the TMS shall import Connection_Station [✓ Done / To be decided]

SPT3TMS-13283 - Connection Datetime Import

For each Capacity_Plan, the TMS shall import Connection_Datetime [✓ Done / To be decided]

SPT3TMS-13288 - Connection Type Import

For each Capacity_Plan, the TMS shall import Connection_Type [✓ Done / To be decided]

SPT3TMS-13293 - Connection Rating Import

For each Capacity_Plan, the TMS shall import Connection_Rating [✓ Done / To be decided]

SPT3TMS-13292 - Connection Relation Type Import

For each Capacity_Plan, the TMS shall import the Connection_Relation type [✓ Done / To be decided]

SPT3TMS-13291 - Maximum Waiting Time Import

For each Capacity_Plan, the TMS shall import Maximum_Waiting_Time [✓ Done / To be decided]

SPT3TMS-13290 - Start Occupancy Time Import

For each Capacity_Plan, the TMS shall import the sectional Start_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13301 - End Occupancy Time Import

For each Capacity_Plan, the TMS shall import the sectional End_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13299 - Start Occupancy Location Import

For each Capacity_Plan, the TMS shall import the sectional Start_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13297 - End Occupancy Location Import

For each Capacity_Plan, the TMS shall import the sectional End_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13295 - Crew Information Import

For each Capacity_Plan, the TMS shall import Crew_Information (which crew will board and deboard the train) for each stop [🚶 Open]

Crew information is to be defined at detailed design level, and may consist of name and role of the crew personnel, with some relevant attributes as mobile number, etc.

SPT3TMS-13306 - Capacity Plan Completeness Check

The TMS shall check the Capacity_Plan data completeness [✓ Done / To be decided]

SPT3TMS-13230 - Incomplete Capacity Plan Data Action

IF the Capacity_Plan data are incomplete, THEN the TMS shall send a message to the Capacity Management System [✓ Done / To be decided]

SPT3TMS-13229 - New Capacity Plan Import

WHEN a new Capacity_Plan is [created] OR [updated] in CMS, the TMS shall import the new Capacity_Plan [✓ Done / To be decided]

So that the TMS contains the up to date capacity plan whether it is ready 48 hours before train run or more or less

SPT3TMS-13756 - Feasible Capacity Plan Import Into TMS

The TMS shall import only feasible Capacity_Plans [✅ Done / To be decided]

The feasible plans are complete plans for a train run. i.e. from the beginning of the train run until the end of it

SPT3TMS-15708 - Import of planned Restriction Areas

The TMS shall import the planned Restriction_Areas from the CMS [🔒 Content to be approved]

SPT3TMS-15707 - Import of planned Warning Areas

The TMS shall import the planned Warning_Areas from the CMS [🔒 Content to be approved]

SPT3TMS-15710 - Synchronization of planned Restriction Areas

WHEN there is a change in the planned Restriction_Areas, the TMS shall import the updated Restriction_Areas [🔒 Content to be approved]

SPT3TMS-15709 - Synchronization of planned Warning Areas

WHEN there is a change in the planned Warning_Areas, the TMS shall import the updated Warning_Areas

[🔒 Content to be approved]

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9 Map Capacity Plan With Topology Model

SPT3TMS-13313 - Capacity Plan Elements' Level Check

The TMS shall check the capacity plan elements' level [✓ Done / To be decided]

Like in the topology case where macro, meso or micro levels are used

SPT3TMS-13312 - Capacity Plan Elements Construction Level

WHILE the capacity plan is NOT on track level, the TMS shall adapt the capacity plan to reach the track level [✓ Done / To be decided]

This requirement is only valid for old-fashioned macroscopic Capacity Management Systems

SPT3TMS-13315 - Location Of Each Element Mapping

The TMS shall map the location of each element in the latest topology version with the Capacity_Plan elements [✓ Done / To be decided]

SPT3TMS-13314 - Speed Limitation For Each Section Mapping

The TMS shall map the speed limitation for each section in the latest topology version with the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13309 - Temporary Capacity Restriction Mapping

The TMS shall map the Temporary_Capacity_Restriction for each section in the Capacity_Plan with the Topology [✓ Done / To be decided]

SPT3TMS-13308 - Direction Of Each Track Mapping

The TMS shall map the direction of each track in the latest topology version with the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13310 - New Capacity Plan Mapping

WHEN a new Capacity_Plan is received, the TMS shall map the elements with the Topology data [✓ Done / To be decided]

SPT3TMS-13316 - New Topology model Mapping

WHEN a new Topology model is constructed, the TMS shall map each element in Topology with the Capacity_Plan data [✓ Done / To be decided]

SPT3TMS-13320 - Topology Version Validation With The assigned Capacity Plan

The TMS shall validate the Topology_Version with the assigned Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13311 - Successful Mapping Capacity Plan With Topology

WHEN each mapping element in the Capacity_Plan matches with the Topology, the TMS shall set this mapping as successful [✓ Done / To be decided]

SPT3TMS-13317 - Mapping Setting To Unsuccessful

IF the mapping is not matching, THEN the TMS shall set the mapping as unsuccessful [✓ Done / To be decided]

SPT3TMS-13322 - Single Capacity Plan Rejection

IF the mapping is not matching, THEN The TMS [shall reject the Capacity_Plan for a single train] OR [import only the valid parts of the plan] [✓ Done / To be decided]

SPT3TMS-13319 - Message Construction For Unsuccessful Mapping

IF the mapping is unsuccessful, the TMS shall construct a mapping message [✓ Done / To be decided]

SPT3TMS-13759 - Capacity Management System Notification Of Failed Import

IF the mapping is not matching THEN the TMS shall notify the Capacity Management System [✓ Done / To be decided]

Note: In today's systems, the import is rejected for missing parts, while for the future, the quality of the plan should be improved

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10 Receive Rolling Stock Data

The attributes are based on the Train Composition message. For the full Train Composition specification, please check the Telematic TSI Train Composition message. [Telematics Applications for Freight Service TSI](#) & [Telematics Applications for Passenger Service TSI](#)

SPT3TMS-13819 - Consignment Note Data Message Import

The TMS shall receive Consignment_Note_data message from the Rail Operating Company before the train run [🔍 Content to be approved]

SPT3TMS-13698 - Train Composition Message Import

For each train, the TMS shall receive Train_Composition message from the Rail Operating Company before the train run [🔍 Content to be approved]

The Time frame shall be based on the contract between the Rail Infrastructure Manager & Rail Operating Company

SPT3TMS-13700 - Train Composition Data Confirmation

WHEN possible, the TMS shall receive Train_Composition data confirmation from the Automatic Train Operation Execution [🔍 Content to be approved]

SPT3TMS-13699 - Train Composition Message Attributes

The TMS shall receive the Train_Composition message [🔍 Content to be approved]

SPT3TMS-13899 - Train Number Import

The TMS shall receive the Train_Number [🔍 Content to be approved]

The following attributes are part of the Train Running Data in the Train Composition message

SPT3TMS-13696 - Train Type Import

The TMS shall receive the Train_Type [🔍 Content to be approved]

SPT3TMS-13695 - Train Weight Import

The TMS shall receive the Train_Weight [🔍 Content to be approved]

SPT3TMS-13702 - Train Length Import

The TMS shall receive the Train_Length [🔍 Content to be approved]

SPT3TMS-13710 - Train Max Speed Import

The TMS shall receive the Train_Max_Speed [🔍 Content to be approved]

SPT3TMS-13708 - Max Axle Weight Import

The TMS shall receive the Max_Axle_Weight [🔍 Content to be approved]

SPT3TMS-13706 - Brake Type Import

The TMS shall receive the Brake_Type [🔍 Content to be approved]

SPT3TMS-13704 - Brake Weight Import

The TMS shall receive the Brake_Weight [🔍 Content to be approved]

SPT3TMS-13718 - Number Of Vehicles Import

The TMS shall receive the Number_Of_Vehicles [🔍 Content to be approved]

SPT3TMS-13716 - Number Of Axles Import

The TMS shall receive the Number_Of_Axles [🔍 Content to be approved]

The following attributes are part of the Locomotive Identification Data in the Train Composition message

SPT3TMS-13721 - Type Code1 Import

The TMS shall receive the Type_Code1 [🔍📄 Content to be approved]

SPT3TMS-13720 - Type Code2 Import

The TMS shall receive the Type_Code2 [🔍📄 Content to be approved]

SPT3TMS-13722 - Country Code Import

The TMS shall receive the Country_Code [🔍📄 Content to be approved]

SPT3TMS-13728 - Series Number Import

The TMS shall receive the Series_Number [🔍📄 Content to be approved]

SPT3TMS-13727 - Serial Number Import

The TMS shall receive the Serial_Number [🔍📄 Content to be approved]

SPT3TMS-13726 - Control Digit Import

The TMS shall receive the Control_Digit [🔍📄 Content to be approved]

SPT3TMS-13915 - NID Engine Import

The TMS shall import the NID_Engine from the Rail_Operating_Company [🔍📄 Content to be approved]
The On-board ETCS equipment identity

The following attributes are part of the Wagon Data in the Train Composition message

SPT3TMS-13732 - Wagon Train Position Import

The TMS shall receive the Wagon_Train_Position [🔍📄 Content to be approved]

SPT3TMS-13731 - Wagon Operational Data Import

The TMS shall receive the Wagon_Operational_Data [🔍📄 Content to be approved]

SPT3TMS-13730 - Brake Type Import

The TMS shall receive the Brake_Type [🔍📄 Content to be approved]

SPT3TMS-13729 - Brake Weight Import

The TMS shall receive the Brake_Weight [🔍📄 Content to be approved]

SPT3TMS-13733 - Wagon Max Speed Import

The TMS shall receive the Wagon_Max_Speed [🔍📄 Content to be approved]

SPT3TMS-13703 - Total Load Weight Import

The TMS shall receive the Total_Load_Weight [🔍📄 Content to be approved]

SPT3TMS-13701 - Wagon Tech Data Import

The TMS shall receive the Wagon_Tech_Data [🔍📄 Content to be approved]

SPT3TMS-13711 - Length Over Buffers Import

The TMS shall receive the Length_Over_Buffers [🔍📄 Content to be approved]

SPT3TMS-13709 - Wagon Number Of Axles Import

The TMS shall receive the Wagon_Number_Of_Axles [🔍📄 Content to be approved]

SPT3TMS-13707 - Wagon Weight Empty Import

The TMS shall receive the Wagon_Weight_Empty [🔍📄 Content to be approved]

SPT3TMS-13705 - Missing Train Composition Attributes

IF the Train_Composition attributes are missing, THEN the TMS shall search for these attributes in the Train_Unit_Master_Data [🔍📄 Content to be approved]

SPT3TMS-13719 - Compatibility Check On Train Composition Data

The TMS shall run a compatibility check on the Train_Composition data [🔍 Content to be approved]

SPT3TMS-13717 - Train Accepted Message Sending

WHEN the check is successful, the TMS shall send the Railway_Operating_Company a Train_Accepted message [🔍 Content to be approved]

SPT3TMS-13715 - Train Not Suitable Message Sending

IF the check is failed, the TMS shall send the Railway_Operating_Company a Train_Not_Suitable message [🔍 Content to be approved]

SPT3TMS-13723 - TMS Communication With The Rail Operating Company

The TMS shall communicate with the Rail Operating Company via Telematic TSI standards [🔍 Content to be approved]

SPT3TMS-15939 - Dangerous freights

IF the Train_carries Dangerous goods, THEN the TMS shall receive the characteristics of the Dangerous freights (from CMS) [🔍 Open]

Optional feature (Train Ready message):**SPT3TMS-13713 - Train Ready Message Receipt**

The TMS shall receive the Train_Ready message from the Railway_Operating_Company [🔍 Content to be approved]

SPT3TMS-13724 - Train Ready Message Compliance Check

The TMS shall check if the Train_Ready message components are compliant with [the Train_Composition] AND [Infrastructure data] [🔍 Content to be approved]

11 Recalculate Sectional Run-Time

SPT3TMS-13321 - Sectional Run Time Calculation

The TMS shall contain a Sectional_Run_Time_Calculator [✓ Done / To be decided]

SPT3TMS-13367 - Train Running Time Calculations

For each train, the TMS shall provide calculations for the train running time [✓ Done / To be decided]

SPT3TMS-13369 - Topology Data Incorporation In The Sectional Run Time Calculation

The TMS shall incorporate Topology data in the Sectional_Run_Time calculation [✓ Done / To be decided]

SPT3TMS-13363 - Minimum Run Time Calculation According To The TSR

The TMS shall calculate the minimum run time according to the Temporary_Speed_Restriction data in the calculation [✓ Done / To be decided]

SPT3TMS-13365 - Train Composition Data Consideration In The Sectional Run Time Calculation

The TMS shall consider Train_Composition data in the Sectional_Run_Time calculation [✓ Done / To be decided]

The train data provided in chapter 10 shall be considered

SPT3TMS-13364 - Weather Data Consideration In The Sectional Run Time Calculation

The TMS shall consider Weather_Conditions in the Sectional_Run_Time calculation [✓ Done / To be decided]

SPT3TMS-13747 - TMS Interface With A Weather Information System

The TMS shall interface with a Weather Information System [✓ Done / To be decided]

SPT3TMS-13374 - Train Speeds Optimisation For Given Signal Positions

The TMS shall optimise train speeds for given signal positions [🔍 Content to be approved]

SPT3TMS-15913 - Braking acceleration

The TMS shall consider braking acceleration [🔍 Content to be approved]

SPT3TMS-15914 - Capabilities of Locomotive dimensions

The TMS shall consider capabilities of Locomotive dimensions (weight, length) [🔍 Content to be approved]

SPT3TMS-13383 - Minimum And Maximum Speed Consideration

The TMS shall consider the [Minimum] AND [Maximum] speed for a given infrastructure properties [✓ Done / To be decided]

SPT3TMS-13378 - Historical Running Times Calculation

IF the input data is not complete, the TMS shall use historical data from similar previous calculations [✓ Done / To be decided]

SPT3TMS-13388 - Sectional Run Time Recalculation Frequency

For each train, the TMS shall recalculate the sectional runtime every 1 second [✓ Done / To be decided]

SPT3TMS-13386 - Sectional Run Time Message Construction

The TMS shall construct a Sectional_Run_Time message [✓ Done / To be decided]

The RIM should define whether to group all sections and send them in one message or send separate messages for each sections

SPT3TMS-13385 - Run Time ID Attribute Creation

The Sectional_Run_Time message shall contain Run_Time_ID [✓ Done / To be decided]

SPT3TMS-13384 - Starting Point Attribute Creation

The Sectional_Run_Time message shall contain Starting_Point [✓ Done / To be decided]

SPT3TMS-13391 - Ending Point Attribute Creation

The Sectional_Run_Time message shall contain Ending_Point [✓ Done / To be decided]

SPT3TMS-13390 - Path Attribute Creation

The Sectional_Run_Time message shall contain sectional Path [✓ Done / To be decided]

SPT3TMS-13404 - Total Run Time Attribute Creation

The Sectional_Run_Time message shall contain Total_Run_Time [✓ Done / To be decided]

SPT3TMS-13402 - Train Number Attribute Creation

The TMS shall assign each Sectional_Run_Time message to a
Train_Number [✓ Done / To be decided]

SPT3TMS-16000 - Acceleration curve

The TMS shall consider sampled acceleration curves for the type of trains running in the controlled area in calculating the train running time [✚ Open]

SPT3TMS-16001 - Train characteristics

The TMS shall consider the train characteristics, as maximum speed for recovery delays, acceleration, deceleration in calculating the train running time

[✚ Open]

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12 Receive State Of Operation Data

SPT3TMS-15712 - Receive actual Restriction Areas from PE

The TMS shall receive the imported actual Restriction_Areas from PE [🔍 Content to be approved]

SPT3TMS-15711 - Receive actual Restriction Areas from ATO

The TMS shall receive the imported actual Restriction_Areas from ATO [🔍 Content to be approved]

SPT3TMS-15714 - Receive actual Warning Areas from PE

The TMS shall receive the imported actual Warning_Areas from PE [🔍 Content to be approved]

SPT3TMS-15713 - Receive actual Warning Areas to the ATO

The TMS shall receive the imported actual Warning_Areas from ATO [🔍 Content to be approved]

SPT3TMS-13830 - Operational Plan Execution Request To PE & ATO E

The TMS shall send Operational_Plan_Execution_Request to the [Plan_Execution system] AND [Automatic Train Operations Execution] [✅ Done / To be decided]

To notify PE & ATO E that the train's operational plan is ready for execution

SPT3TMS-13829 - Operational Plan Execution Response from PE & ATO E

The TMS shall receive the Operational_Plan_Execution_Response from the [Plan_Execution system] AND [Automatic Train Operations Execution] [✅ Done / To be decided]

SPT3TMS-13832 - Operational Plan Execution Acceptance Message Receipt

WHEN Accepted, the TMS shall receive an acceptance message [✅ Done / To be decided]

SPT3TMS-13831 - Operational Plan Execution Rejection Message Receipt

WHEN Rejected, the TMS shall receive a rejection message [✅ Done / To be decided]

SPT3TMS-13827 - Operational Plan Execution Report from PE & ATO E

WHEN Accepted, the TMS shall receive Operational_Plan_Execution_Report from the [Plan_Execution system] AND [Automatic Train Operations Execution] [✅ Done / To be decided]

SPT3TMS-13409 - State Of Operation Message Receipt

The TMS shall receive the State_Of_Operation messages from the from the [Plan_Execution system] AND [Automatic Train Operations Execution] [✅ Done / To be decided]

To report the real-time data of related to the operational plan attributes

SPT3TMS-13408 - Train Unit Report Message Attributes

The State_Of_Operation message shall contain Train_Unit_Report [✅ Done / To be decided]

SPT3TMS-13407 - Train Unit Data Report Attribute

The Train_Unit_Report shall contain Train_Unit_Data_Report message [✅ Done / To be decided]

SPT3TMS-13406 - Train Unit State Report Attribute

The Train_Unit_Report shall contain Train_Unit_State_Report message [✅ Done / To be decided]

SPT3TMS-13411 - Train Unit Position Report Attribute

The Train_Unit_Report shall contain Train_Unit_Position_Report message [✅ Done / To be decided]

SPT3TMS-13327 - Track Allocation Message Attributes

The State_Of_Operation message shall contain Track_Allocation [✅ Done / To be decided]

SPT3TMS-13325 - Track Allocation Report Attribute

The Track_Allocation shall contain Track_Allocation_Report message [✅ Done / To be decided]

SPT3TMS-13336 - Track Allocation Removal Attribute

The Track_Allocation shall contain Track_Allocation_Removal message [✅ Done / To be decided]

SPT3TMS-13334 - Field Element State Message Attributes

The State_Of_Operation message shall contain Field_Element_State [✅ Done / To be decided]

SPT3TMS-13333 - Field Element State Report Attribute

The Field_Element_state shall contain Field_Element_State_Report message [✓ Done / To be decided]

SPT3TMS-13331 - Operational Restriction Area Message Attributes

The State_Of_Operation message shall contain Operational_Restriction_Area [✓ Done / To be decided]

SPT3TMS-13341 - Operational Restriction Area Creation Attribute

The Operational_Restriction_Area shall contain Operational_Restriction_Area_Creation message [✓ Done / To be decided]

SPT3TMS-13340 - Operational Restriction Area Removal Attribute

The Operational_Restriction_Area shall contain Operational_Restriction_Area_Removal message [✓ Done / To be decided]

SPT3TMS-13339 - Operational Warning Area Message Attributes

The State_Of_Operation message shall contain Operational_Warning_Area [✓ Done / To be decided]

SPT3TMS-13338 - Operational Warning Area Creation Attribute

The Operational_Warning_Area shall contain Operational_Warning_Area_Creation message [✓ Done / To be decided]

SPT3TMS-13349 - Operational Warning Area Removal Attribute

The Operational_Warning_Area shall contain Operational_Warning_Area_Removal message [✓ Done / To be decided]

SPT3TMS-13347 - TMS Receipt Of State Of Operation Message Every 1 Second

The TMS shall receive the State_Of_Operation message every 1 second for each Operational_Plan [✓ Done / To be decided]

To calculate the deviations, perform the forecast, conflict detection in a near real time manner, and report accurate and up to date information and solve the conflicts in a timely manner. The 1 second could be configurable by the Rail Infrastructure Manager according to the capacity needs

SPT3TMS-13345 - State Of Operation Message Receipt in Near Real Time

The State_Of_Operation message shall be in Near_Real_Time [✓ Done / To be decided]

SPT3TMS-13746 - Near Real Time Configuraiton

The TMS shall contain a configurable Near_Real_Time field [✓ Done / To be decided]

To give each RIM the flexibility to define their Near Real Time in seconds

SPT3TMS-13357 - Train Number Inclusion In State Of Operation

For each State_Of_Operation message, the message shall contain a corresponding Train_Number [✓ Done / To be decided]

SPT3TMS-13355 - Completeness Check Of The State Of Operation Message

The TMS shall check the completeness of the State_Of_Operation message [✓ Done / To be decided]

SPT3TMS-13353 - Missing State Of Operation Attribute Communication

IF an attribute is missing from the message, THEN the TMS shall send a message to the [Plan_Execution system] AND [Automatic Train Operations Execution] AND [Dispatcher] [✓ Done / To be decided]

SPT3TMS-13352 - TMS Communication With Control Command and Signaling Interface

The TMS shall communicate with [Plan_Execution system] AND [Automatic Train Operations Execution] via Standard Communication Interface Operational Plan interface (SCI-OP) [✓ Done / To be decided]

SPT3TMS-13361 - Attributes Alignment With Control Command and Signaling Document

For each message received, the attributes shall be aligned with the attributes in the deliverable https://polarion.rail-research.europa.eu/polarion/redirect/project/SPT3CMS/wiki/20%20Workspace/Concept_Interface_TMS_CCS_V1_2?selection=SPT3TMS-6448 [✓ Done / To be decided]

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13 Map State Of Operation With Capacity Plan

SPT3TMS-13360 - State Of Operation Mapping With Capacity Plan

For each attribute in the State_Of_Operation message, the TMS shall map it with the corresponding Capacity_Plan attribute [✓ Done / To be decided]

SPT3TMS-13359 - Failure To Find A Corresponding Capacity Plan Reference

When the TMS fails to find a corresponding Capacity_Plan_Reference, the TMS shall search for a matching Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13377 - Train Unit Data Report Mapping With Rolling Stock Data

The TMS shall compare each Train_Unit_Data report with the corresponding [Rolling_Stock] AND [Infrastructure] data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13376 - Train Unit State Report Mapping With Rolling Stock Data

The TMS shall compare each Train_Unit_State report with the corresponding [Rolling_Stock] AND [Infrastructure] data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13375 - Train Unit Position Report Mapping With Rolling Stock Data

The TMS shall compare each Train_Unit_Position report with the corresponding [Rolling_Stock] AND [Infrastructure] data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13373 - Track Allocation Report Mapping With Infrastructure Data

The TMS shall compare each Track_Allocation_Report with the corresponding Infrastructure data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13381 - Track Allocation Removal Mapping With Infrastructure Data

The TMS shall compare each Track_Allocation_Removal with the corresponding Infrastructure data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13379 - Field Element State Report Mapping With Infrastructure Data

The TMS shall compare each Field_Element_State_Report with the corresponding Infrastructure data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13389 - Operational Restriction Area Creation Mapping With TCRs

The TMS shall compare each Operational_Restriction_Area_Creation with the corresponding Temporary_Capacity_Restriction data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13387 - Operational Restriction Area Removal Mapping With TCRs

The TMS shall compare each Operational_Restriction_Area_Removal with the corresponding Temporary_Capacity_Restriction data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13392 - Operational Warning Area Creation Mapping With TCRs & TSRs

The TMS shall compare each Operational_Warning_Area_Creation with the corresponding [Temporary_Capacity_Restriction] AND [Temporary_Speed_Restriction] data in the Capacity_Plan [✓ Done / To be decided]

SPT3TMS-13397 - Operational Warning Area Removal Mapping With TCRs & TSRs

The TMS shall compare each Operational_Warning_Area_Removal with the corresponding [Temporary_Capacity_Restriction] AND [Temporary_Speed_Restriction] data in the Capacity_Plan [✓ Done / To be decided]

14 Calculate Deviations

SPT3TMS-8927 - Deviation Threshold Configurations

The TMS shall contain configurable deviation threshold parameters [🔒 Content to be approved]

To define the minimum conditions to recognise a deviation. e.g., more than 3 mins delay, arrival at wrong platform, etc..

SPT3TMS-8929 - Capacity Plan Data Comparison With State Of Operation

The TMS shall compare each attribute in the State_Of_Operation with the Corresponding attribute in the Capacity_Plan [✅ Done / To be decided]

SPT3TMS-13396 - Actual Arrival Time Difference From Planned Arrival Time

IF the Actual_Arrival_Time at a station is different from the Planned_Arrival_Time, THEN the TMS shall [record] AND [propagate] the difference above the threshold as a deviation [✅ Done / To be decided]

SPT3TMS-13395 - Actual Departure Time Difference From Planned Departure Time

IF the Actual_Departure_Time at a station is different from the Planned_Departure_Time, THEN the TMS shall [record] AND [propagate] the difference above the threshold as a deviation [✅ Done / To be decided]

SPT3TMS-13394 - Actual Arrival Platform Difference From Planned Arrival Platform

IF the Actual_Arrival_Platform is different from the Planned_Arrival_Platform, THEN the TMS shall [record] AND [propagate] the difference as a deviation [✅ Done / To be decided]

SPT3TMS-13405 - Actual Departure Platform Difference From Planned Departure Platform

IF the Actual_Departure_Platform is different from the Planned_Departure_Platform, THEN the TMS shall [record] AND [propagate] the difference as a deviation [✅ Done / To be decided]

SPT3TMS-13403 - Actual Arrival Station Difference From Planned Arrival Station

IF the Actual_Arrival_Station is different from the Planned_Arrival_Station, THEN the TMS shall [record] AND [propagate] the difference as a deviation [✅ Done / To be decided]

SPT3TMS-13401 - Actual Departure Station Difference From Planned Departure Station

IF the Actual_Departure_Station is different from the Planned_Departure_Station, THEN the TMS shall [record] AND [propagate] the difference as a deviation [✅ Done / To be decided]

SPT3TMS-13399 - Actual Entry Time Of A Section Difference From Planned Entry Time

IF the Actual_Entry_Time of a section is different from the Planned_Entry_Time, THEN the TMS shall [record] AND [propagate] the difference above the threshold as a deviation [✅ Done / To be decided]

SPT3TMS-13410 - Actual Exit Time Of A Section Difference From Planned Exit Time

IF the Actual_Exit_Time of a section is different from the Planned_Exit_Time, THEN the TMS shall [record] AND [propagate] the difference above the threshold as a deviation [✅ Done / To be decided]

SPT3TMS-13324 - Actual Section Difference From Planned Section

IF the Actual_Section is different from the Planned_Section, THEN the TMS shall [record] AND [propagate] the difference as a deviation [✅ Done / To be decided]

In case of a planned TCR that was finished earlier than planned

SPT3TMS-13330 - Delayed Train Cancellation & Deviation Detection

IF a delayed train was cancelled, THEN the TMS shall [record the delay] AND [broadcast the cancellation] [✅ Done / To be decided]

SPT3TMS-13329 - Cancelled Train Removal From Deviation Calculation

The TMS shall remove cancelled trains from the deviation calculations [✓ Done / To be decided]

SPT3TMS-8932 - Root Cause Assignment

WHEN available, the TMS shall assign a deviation a root cause automatically [✓ Done / To be decided]

SPT3TMS-8933 - Classification Code Assignment

WHEN possible, the TMS shall assign a classification code to the root cause [✓ Done / To be decided]

SPT3TMS-8934 - Failure to Assign a Root Cause

WHEN the TMS fails to assign a Root_Cause, the TMS shall display a message to the Dispatcher [✓ Done / To be decided]

SPT3TMS-8935 - Manual Root Cause Assignment

The Root_Cause shall be manually selected from a predefined list of root causes [✓ Done / To be decided]

To be primarily used if no automatic root cause detection is given

SPT3TMS-8936 - Consequence Cause Assignment

The TMS shall assign the second deviation due to a root cause status a consequence cause [✓ Done / To be decided]

SPT3TMS-8937 - The Consequence Cause Is A Subset From The Root Cause

The consequence cause shall be a subset from the root cause [✓ Done / To be decided]

A consequence cause is a result of a root cause and shall be assigned since there is a preceeding root cause

SPT3TMS-8940 - Infrastructure Marking As Unavailable

When the TMS detects a deviation due to infrastructure unavailability, the TMS shall mark the infrastructure as unavailable [✓ Done / To be decided]

SPT3TMS-13837 - Estimate Resource Unavailability Duration

WHEN the TMS detects a deviation due to infrastructure unavailability, WHEN possible, the TMS shall estimate the duration of resource unavailability [✓ Done / To be decided]

SPT3TMS-13344 - Delay Justificaiton Message Formation

For each delay, the TMS shall form a Delay_Justificaiton message [✓ Done / To be decided]

SPT3TMS-13343 - Detected Delay Attribute in Delay Justification

The Delay_Justification message shall contain the detected delay [✓ Done / To be decided]

SPT3TMS-13342 - Delay Location Attribute in Delay Justification

The Delay_Justification message shall contain the detected Delay_Location [✓ Done / To be decided]

SPT3TMS-13351 - Delay Cause Attribute in Delay Justification

The Delay_Justification message shall contain the detected Delay_Cause [✓ Done / To be decided]

SPT3TMS-13350 - Train Number Attribute in Delay Justification

The Delay_Justification message shall contain the delayed Train_Number [✓ Done / To be decided]

SPT3TMS-13348 - Sending Delay Justification Cause To Railway Operating Company

The TMS shall send the Delay_Justification cause to the Railway_Operating_Company [✓ Done / To be decided]

SPT3TMS-13346 - Deviation Message Formation

The TMS shall form a Deviation_Message [✓ Done / To be decided]

SPT3TMS-13358 - Deviation ID Attribute in Deviation Message

The Deviation_Message shall contain Deviation_ID [✓ Done / To be decided]

SPT3TMS-13356 - Train Number Attribute in Deviation Message

The Deviation_Message shall contain Train_Number [✓ Done / To be decided]

SPT3TMS-13354 - Deviation Location Attribute in Deviation Message

The Deviation_Message shall contain Deviation_Location [✓ Done / To be decided]

SPT3TMS-13372 - Deviation Time Attribute in Deviation Message

The Deviation_Message shall contain Deviation_Time [✓ Done / To be decided]

SPT3TMS-13371 - Sending Deviation Message To Forecast

The TMS shall send the Deviation_Message to the Forecast [✓ Done / To be decided]

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15 Calculate & Publish Forecast

SPT3TMS-13370 - Train Run Forecast Duration

For each train, the TMS shall calculate the future train run [for the next 90 minutes] OR [until the end of the train run] [✓ Done / To be decided]

The degree of forecast calculation depends highly on the advancement of the implemented TMS per country

SPT3TMS-8946 - Forecast Provision As A Calculation Service

The TMS Forecast shall be available as a calculation service [✓ Done / To be decided]

To predict train runs all the time

SPT3TMS-13764 - Simultaneous Forecast Calculation

The TMS shall perform simultaneous calculations for each Active train on the network [✓ Done / To be decided]

SPT3TMS-8960 - Forecast Horizon Setting

The TMS shall contain a configurable forecast location points [✓ Done / To be decided]

To set the location points of the forecast agreed between the Rail Infrastructure Manager and the Rail Operating Company

SPT3TMS-13444 - Sectional Run Time Calculations Incorporation In Forecast Calculations

The TMS shall forecast the train run on the currently planned route based on the Sectional Run_Time calculations [✓ Done / To be decided]

SPT3TMS-13443 - Driving Strategy Incorporation In Forecast Calculations

The TMS shall forecast the train run on the currently planned route based on the Driving_Strategy [✓ Done / To be decided]

SPT3TMS-13440 - Train Time Reserve Incorporation In Forecast Calculations

The TMS shall forecast the train run on the currently planned route based on the Train_Time_Reserve [✓ Done / To be decided]

SPT3TMS-13439 - State Of Operation Incorporation In Forecast Calculations

The TMS shall forecast the train run on the currently planned route based on the State_Of_Operation [✓ Done / To be decided]

SPT3TMS-13442 - Waiting For The Next State Of Operation When Missing Data

IF the State_Of_Operation data is missing, the TMS shall wait until the next complete State_Of_Operation message [✓ Done / To be decided]

To base the calculations on the actual time and location of the train (train position and track possession)

SPT3TMS-13446 - Dangerous Goods Consideration In Forecast Calculations

IF the train contains Dangerous_Goods, THEN the TMS shall consider the restrictions in the Forecast [✓ Done / To be decided]

SPT3TMS-13456 - Dispatching Measures Consideration In Forecast Calculations

The TMS shall forecast the train run based on the last executed active Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13454 - Flank Protection Parameters Consideration In Forecast Calculations

The TMS shall forecast the train run based on the Flank_Protection parameters [✓ Done / To be decided]

SPT3TMS-13452 - Train Position Forecast On The Network During The Train Run

The TMS shall forecast the Train_Position on the network during the train run [✓ Done / To be decided]

To forecast the location of the train at a given point in time

SPT3TMS-13450 - Track Possession On The Network During The Train Run

The TMS shall forecast the Track_Possession of the train on the network during the train run [✓ Done / To be decided]

To forecast the time of the train on a given point on the network

SPT3TMS-13462 - Start Occupancy Time Forecast

For each section, the TMS shall forecast the Start_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13460 - End Occupancy Time Forecast

For each section, the TMS shall forecast the End_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13459 - Start Occupancy Location Forecast

For each section, the TMS shall forecast the Start_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13458 - End Occupancy Location Forecast

For each section, the TMS shall forecast the End_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13465 - Direct Track Possession Forecast

The TMS shall forecast the direct Track_Possession [✓ Done / To be decided]

SPT3TMS-13464 - Indirect Track Possession Forecast

The TMS shall forecast the indirect Track_Possession [✓ Done / To be decided]

SPT3TMS-13467 - Signal Status Forecast Based On Train Speed

WHEN indirect occupancy, the TMS shall forecast the signal status based on the speed of the train at the station [✓ Done / To be decided]

SPT3TMS-13476 - Departure Time Forecast Calculation For An On-Time Train

The TMS shall forecast the Departure_Time as the Arrival_Time plus the Maximum_Stopping_Time [✓ Done / To be decided]

SPT3TMS-13474 - Departure Time Forecast Calculation For A Delayed Train

IF the train is delayed, THEN the TMS shall forecast the Departure_Time as the Arrival_Time plus the Minimum_Stopping_Time [✓ Done / To be decided]

SPT3TMS-13472 - Minimum Stopping Time Forecast For A Changed Departure Platform

WHEN a platform is changed, the TMS shall calculate the Min_Stopping_Time as the [Platform_Change_Time] AND [Passenger_Information_Time] [✓ Done / To be decided]

SPT3TMS-13483 - Dynamic Business Rules Inclusion In Forecast For A Connecting Train

WHEN the train is a connection train, the TMS shall include the Dynamic Business_Rules in the forecasted Departure_Time [✓ Done / To be decided]

SPT3TMS-13482 - Forecast Of Trains With Circulation Dependency

WHEN two trains have a circulation dependency, the Forecast shall consider the calculated Arrival_Time of the arriving train as the Departure_Time of the departing train plus the Minimum_Circulation_Time [✓ Done / To be decided]

SPT3TMS-13481 - Arrival Time Forecast Based On Current Time & Location Of The Train

The TMS shall forecast the Arrival_Time based on the current [Timestamp] and [Location] of the train [✓ Done / To be decided]

SPT3TMS-13480 - Circulation Time Calculation Of A Train

The TMS shall forecast the Circulation_Time of a train run [✓ Done / To be decided]

SPT3TMS-13485 - Arrival Time Calculation Of The Arriving Circulating Train

The TMS shall forecast the Arrival_Time of the circulating train [✓ Done / To be decided]

SPT3TMS-13416 - Departure Time Calculation Of The New Departing Train

The TMS shall forecast the Departure_Time of the new train run [✓ Done / To be decided]

SPT3TMS-13414 - Departing Train Forecast Calculations Based On The Arriving Train

The TMS shall forecast the train run of the departing train based on the data from the arriving train [✓ Done / To be decided]

SPT3TMS-13423 - Circulation Time & Circulation Location Forecast Calculations

The TMS shall calculate the Circulation_Time AND Circulation_Location in the Forecast [✓ Done / To be decided]

SPT3TMS-13422 - Train Sequence Forecast Calculations

The TMS shall forecast the sequence of trains on the network [✓ Done / To be decided]

SPT3TMS-13421 - Headway Distance Calculation According To The Speed Of The Train

The TMS shall forecast the Headway_Distance according to the Speed of the trains running in sequence [✓ Done / To be decided]

SPT3TMS-13420 - Headway Distance Calculation According To The Train Sequence

The TMS shall forecast the Headway_Distance according to the sequence of the trains running in sequence [✓ Done / To be decided]

SPT3TMS-13428 - Infrastructure Passing Forecast

For each movement in the train run, the TMS shall forecast the point in time that the train will pass the infrastructure point referred by the movement [✓ Done / To be decided]

To calculate the forecast for the train movement in the Operational Plan

SPT3TMS-13427 - Active Trains Inclusion In The Forecast Calculations

The TMS shall include Active trains in the Forecast calculations [✓ Done / To be decided]

SPT3TMS-13426 - Standby Trains Inclusion In The Forecast Calculations

The TMS shall include Standby trains in the Forecast calculations [✓ Done / To be decided]

SPT3TMS-8951 - Inactive Trains Forecast Removal

The TMS shall exclude Inactive trains from the Forecast calculations until their Activation_Status is set to [Active] OR [Standby] [✓ Done / To be decided]

Inactive trains are temporarily disabled by dispatchers as long as departure time is unknown due to disturbances on train. Taking these trains into account will lead to useless results in forecast. Common approach to handle these trains across various dispo systems. Trains are manually inactivated by dispatcher. Other dispatchers are notified

SPT3TMS-13425 - Forecast Message Formation

The TMS shall form a Forecast message [✓ Done / To be decided]

SPT3TMS-13431 - Forecast ID Inclusion In The Forecast Message

The TMS shall include Forecast_ID in the Forecast message [✓ Done / To be decided]

SPT3TMS-13430 - Train Number Inclusion In The Forecast Message

The TMS shall include Train_Number in the Forecast message [✓ Done / To be decided]

SPT3TMS-13429 - Expected Location Point Inclusion In The Forecast Message

The TMS shall include the expected Location_Point in the Forecast message [✓ Done / To be decided]

SPT3TMS-13435 - Expected Forecast Time Inclusion In The Forecast Message

The TMS shall include the expected Forecast_Time of the train run in the Forecast message [✓ Done / To be decided]

SPT3TMS-13434 - Sending The Forecast Message To The Conflict Detection

The TMS shall send the Forecast message to the Conflict_Detection [✓ Done / To be decided]

SPT3TMS-13433 - Forming & Sending Train Running Forecast Message To Railway Operating Company

The TMS shall [form] AND [send] a Train_Running_Forecast message to the Railway_Operating_Company [✓ Done / To be decided]

SPT3TMS-13432 - Sending Train Running Forecast Message Via Telematic TSI Protocol

The Train_Running_Forecast message shall follow the Telematic TSI protocol [✓ Done / To be decided]

SPT3TMS-8958 - Early Running Trains Settings

The TMS shall contain the setting of the forecast rules for early trains until they are no longer early [✓ Done / To be decided]

SPT3TMS-8959 - Forecast Processing Time Calculations

The TMS shall calculate the forecast processing time for all forecast executions [✓ Done / To be decided]

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16 Compare Forecast With Capacity/Operational Plan

SPT3TMS-13244 - Comparison Between Forecast & Capacity Plans

The TMS shall compare the forecast of each train with the Capacity_Plan of the remaining running trains
[✓ Done / To be decided]

SPT3TMS-13437 - Forecast Comparison With Operational Plan

WHEN the Operational_Plan for a train run is updated, the TMS shall compare the forecast of each train with the Operational_Plan of the remaining trains [✓ Done / To be decided]

In case a dispatching measure has been applied and the operational plan is updated

SPT3TMS-13436 - Forecast Arrival Time Comparison With Planned Arrival Time

For each train run, the TMS shall compare the Forecast_Arrival_Time with the Planned_Arrival_Time at each station [✓ Done / To be decided]

SPT3TMS-13449 - Forecast Departure Time Comparison With Planned Departure Time

For each train run, the TMS shall compare the Forecast_Departure_Time with the Planned_Departure_Time at each station [✓ Done / To be decided]

SPT3TMS-13448 - Forecast Minimum Stopping Time Comparison With Planned Minimum Stopping Time

For each train run, the TMS shall compare the Forecast_Minimum_Stopping_Time with the Planned_Minimum_Stopping_Time at each station [✓ Done / To be decided]

SPT3TMS-13447 - Forecast Maximum Stopping Time Comparison With Planned Maximum Stopping Time

For each train run, the TMS shall compare the Forecast_Maximum_Stopping_Time with the Planned_Maximum_Stopping_Time at each station [✓ Done / To be decided]

SPT3TMS-13445 - Forecast Arrival Station Comparison With Planned Arrival Station

For each train run, the TMS shall compare the Forecast_Arrival_Station with the Planned_Arrival_Station
[✓ Done / To be decided]

SPT3TMS-13457 - Forecast Departure Station Comparison With Planned Departure Station

For each train run, the TMS shall compare the Forecast_Departure_Station with the Planned_Departure_Station [✓ Done / To be decided]

SPT3TMS-13455 - Forecast Minimum Circulation Time Comparison With Planned Minimum Circulation Time

For each train run, the TMS shall compare the Forecast_Minimum_Circulation_Time with the Planned_Minimum_Circulation_Time at each station [✓ Done / To be decided]

SPT3TMS-13453 - Forecast Maximum Circulation Time Comparison With Planned Maximum Circulation Time

For each train run, the TMS shall compare the Forecast_Maximum_Circulation_Time with the Planned_Maximum_Circulation_Time at each station [✓ Done / To be decided]

SPT3TMS-13451 - Forecast Circulation Location Comparison With Planned Circulation Location

For each train run, the TMS shall compare the Forecast_Circulation_Location with the Planned_Circulation_Location [✓ Done / To be decided]

SPT3TMS-13463 - Forecast Crossing Time Comparison With Planned Crossing Time

For each train run, the TMS shall compare the Forecast_Crossing_Time with the Planned_Crossing_Time at each junction [✓ Done / To be decided]

SPT3TMS-13461 - Forecast Headway Distance Comparison With Planned Headway Distance

For each train run, the TMS shall compare the Forecast_Headway_Distance with the Planned_Headway_distance [✓ Done / To be decided]

SPT3TMS-13466 - Forecast Start Occupancy Time Comparison With Planned Start Occupancy Time

For each train run, the TMS shall compare the Forecast_Start_Occupancy_Time with the Planned_Start_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13471 - Forecast End Occupancy Time Comparison With Planned End Occupancy Time Comparison

For each train run, the TMS shall compare the Forecast_End_Occupancy_Time with the Planned_End_Occupancy_Time [✓ Done / To be decided]

SPT3TMS-13470 - Forecast Start Occupancy Location Comparison With Planned Start Occupancy Location

For each train run, the TMS shall compare the Forecast_Start_Occupancy_Location with the Planned_Start_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13469 - Forecast End Occupancy Location Comparison With Planned End Occupancy Location

For each train run, the TMS shall compare the Forecast_End_Occupancy_Location with the Planned_End_Occupancy_Location [✓ Done / To be decided]

SPT3TMS-13468 - Train Weight Comparison With Track Maximum Allowed Weight

For each section, the TMS shall compare the Train_Weight with the Track_Maximum_Allowed_Weight [✓ Done / To be decided]

SPT3TMS-13479 - Train Length Comparison With The Platform Length

For each section, the TMS shall compare the Train_Length with the Platform_Length [✓ Done / To be decided]

SPT3TMS-13477 - Locomotive Identifier Comparison With Capacity Restrictions

For each section, the TMS shall compare the Loco_Ident with the Capacity_Restrictions [✓ Done / To be decided]

SPT3TMS-13475 - Dangerous Goods Reference File Comparison With Capacity Restrictions

For each section, the TMS shall compare the Dangerous_Goods_Reference_File with the Capacity_Restrictions [✓ Done / To be decided]

17 Detect & Publish Conflicts

SPT3TMS-13783 - Same Infrastructure Occupancy Conflict

WHEN at least one train is delayed, WHEN the Forecast calculations show two or more trains occupying the same infrastructure at the same time, the TMS shall detect a conflict [✓ Done / To be decided]

SPT3TMS-13473 - Compatibility Check Of The Rolling Stock On The Infrastructure

The TMS shall check the compatibility of the Rolling_Stock data on the Infrastructure data [✓ Done / To be decided]

SPT3TMS-13484 - Rolling Stock Data Matches With The Infrastructure Properties

WHEN the Rolling_Stock data matches with the Infrastructure_Properties, the TMS shall set the Compatibility_Check as successful [✓ Done / To be decided]

SPT3TMS-13413 - Rolling Stock Data Doesn't Match The Infrastructure Properties

IF the Rolling_Stock data doesn't match the Infrastructure_Properties, THEN the Conflict_Detection shall detect a Technical_Conflict [✓ Done / To be decided]

SPT3TMS-13412 - Traction Conflict Detection

IF the Loco_Type_Number is not compatible with the Track_Type, THEN the Conflict_Detection shall detect a Traction_Conflict [✓ Done / To be decided]

SPT3TMS-13419 - Platform Length Conflict Detection

IF the Actual_Train_Length is greater than the Platform_Length, THEN the Conflict_Detection shall detect a Platform_Length_Conflict [✓ Done / To be decided]

SPT3TMS-13418 - Train Weight Conflict Detection

IF the Actual_Train_Weight is greater than the Network_Maximum_Allowed_Weight, THEN the TMS shall detect a Weight_Conflict [✓ Done / To be decided]

SPT3TMS-13417 - Permission Conflict Detection

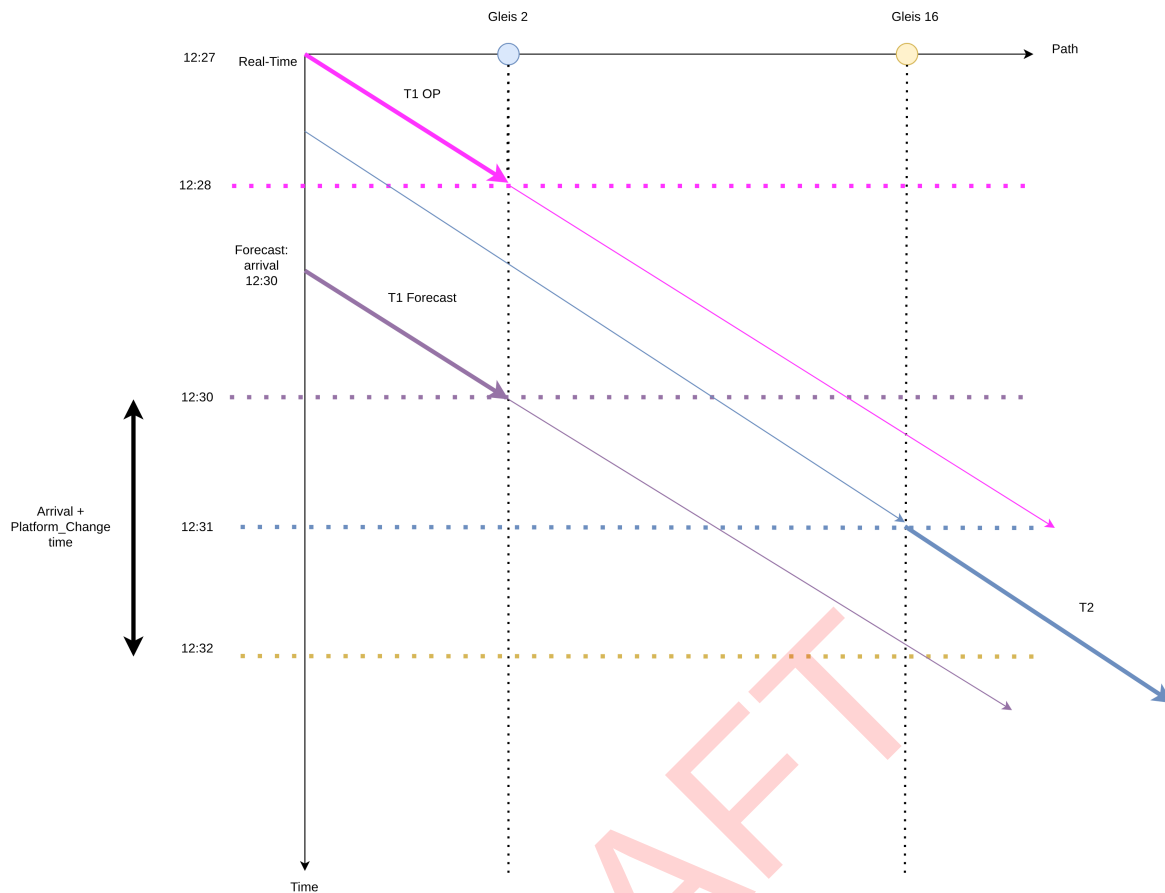
IF the train with Dangerous_Goods is not allowed on the infrastructure, THEN the Conflict_Detection shall detect a Permission_Conflict [✓ Done / To be decided]

SPT3TMS-13415 - Non Stopping Zone Conflict Detection

IF a delayed train is forecasted to stop in a non stopping zone, THEN the TMS shall detect a Conflict [✓ Done / To be decided]

SPT3TMS-13424 - Connection Conflict Detection

WHEN [two trains have dependencies] AND [the preceding train is delayed], IF the sum of the [Planned_Arrival_Datetime] AND the [Platform_Change_Time] of the preceding train is more than the Planned_Departure_Datetime of the succeeding train, THEN the TMS shall detect a Connection_Conflict [✓ Done / To be decided]



SPT3TMS-13532 - Train Activation Status Check

For each train, the TMS shall check the Activation_Status [✓ Done / To be decided]

SPT3TMS-13530 - Cancelled Train Conflict Detection

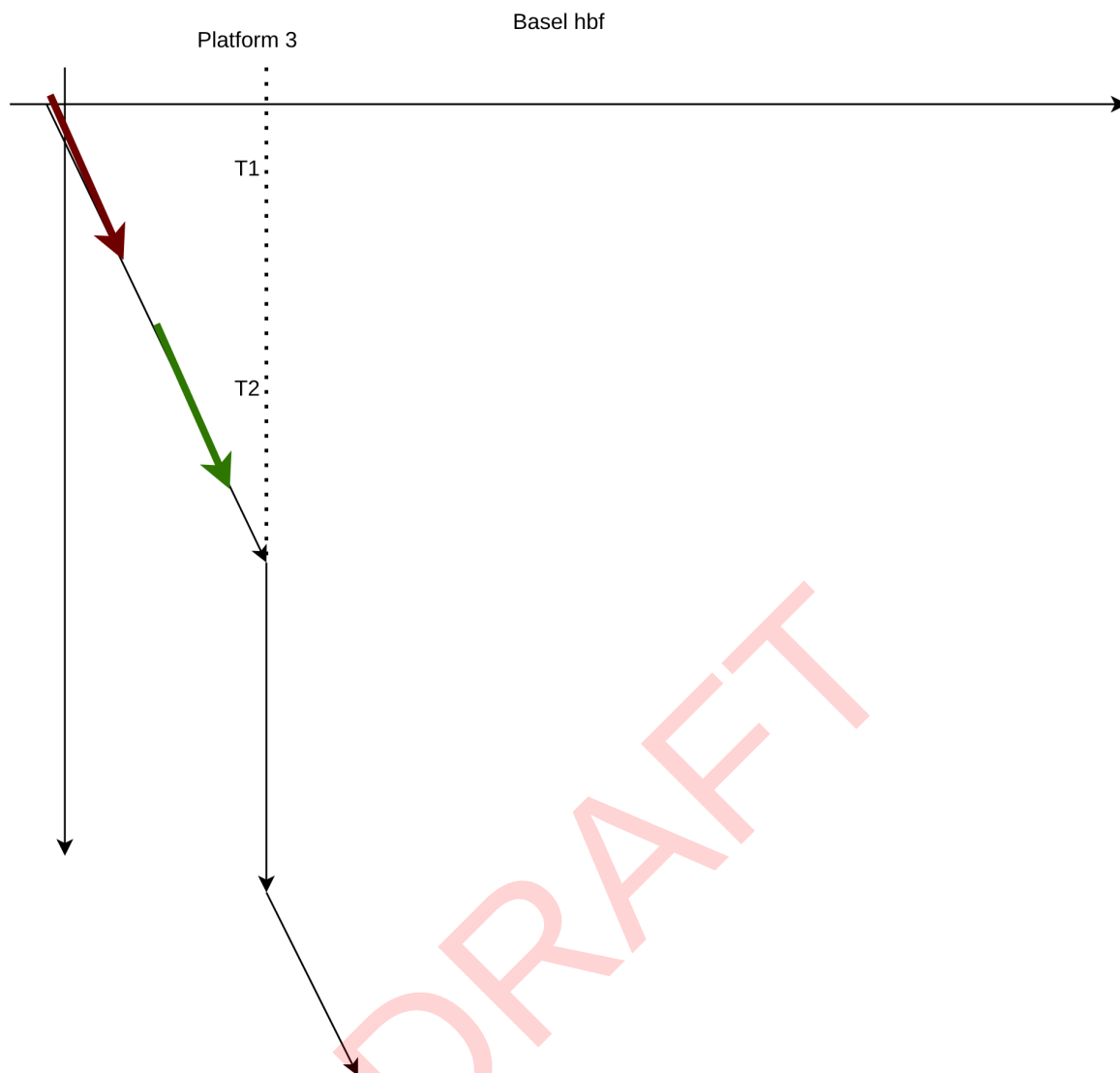
If the Train_Status is Cancelled, THEN the TMS shall detect a Cancelled_Train_Conflict [✓ Done / To be decided]

SPT3TMS-13528 - Inactive Train Conflict Detection

If the Train_Status is Inactive, THEN the TMS shall detect an Inactive_Train_Conflict [✓ Done / To be decided]

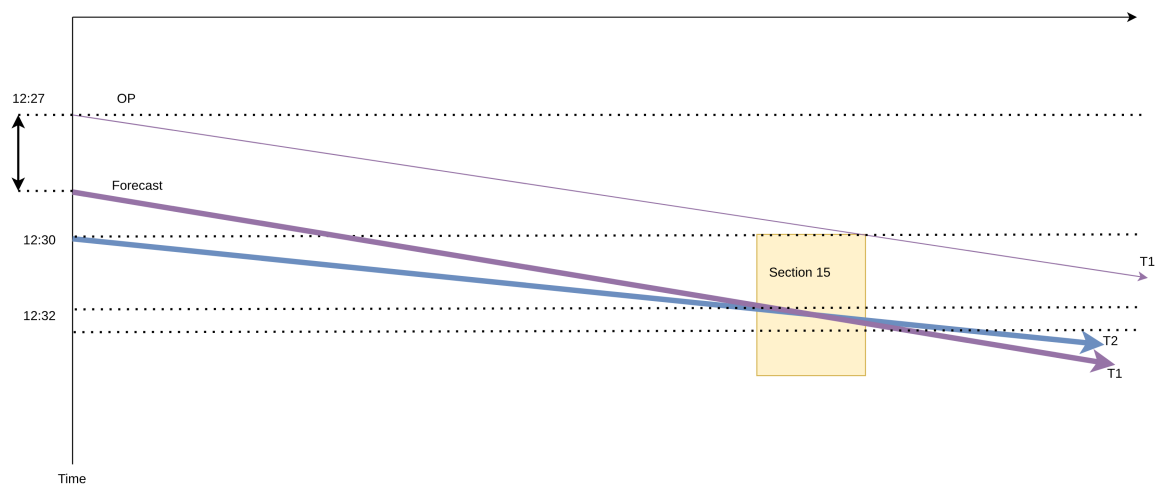
SPT3TMS-13526 - Track Occupancy Conflict Detection

WHEN a delayed train occupies the entry OR exit of a station, IF a following train is [entering] OR [exiting] the station, THEN the TMS shall detect a Track_Occupancy_Conflict [✓ Done / To be decided]



SPT3TMS-13540 - Track Occupancy Conflict Detection

IF one train is delayed, IF more than one train travel in the same direction occupy the same infrastructure element simultaneously within a section, THEN the TMS shall detect a Track_Occupancy_Conflict [✓
Done / To be decided]



SPT3TMS-13538 - Platform Occupancy Conflict Detection

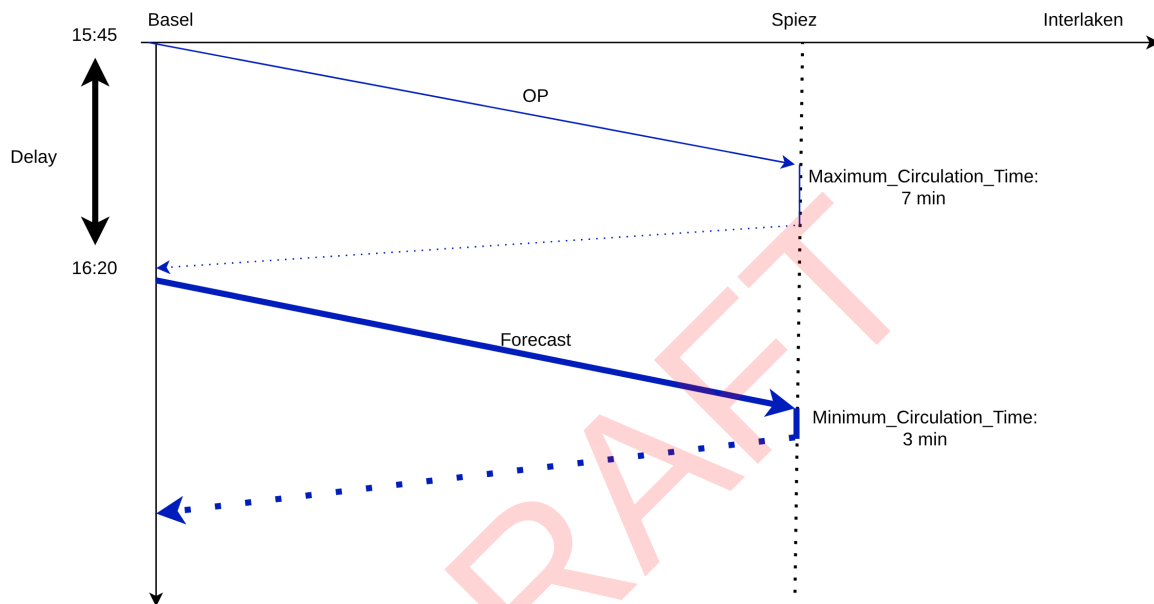
WHEN one train is delayed, IF more than one train occupy the same platform at the same time, THEN the TMS shall detect a Platform_Occupancy_Conflict [✓ Done / To be decided]

SPT3TMS-13536 - Circulation Conflict Detection

IF a train journey for a circulation train is cancelled before the end of the circulation, THEN the TMS shall recalculate the related conflicts to that train [✓ Done / To be decided]

SPT3TMS-13534 - Circulation Conflict Detection

WHEN a delayed train is scheduled for a circulation, IF [the train is delayed beyond a Maximum_Delay_Threshold] OR [circulation is done from a different station], THEN the TMS shall detect a Circulation_Conflict [✓ Done / To be decided]

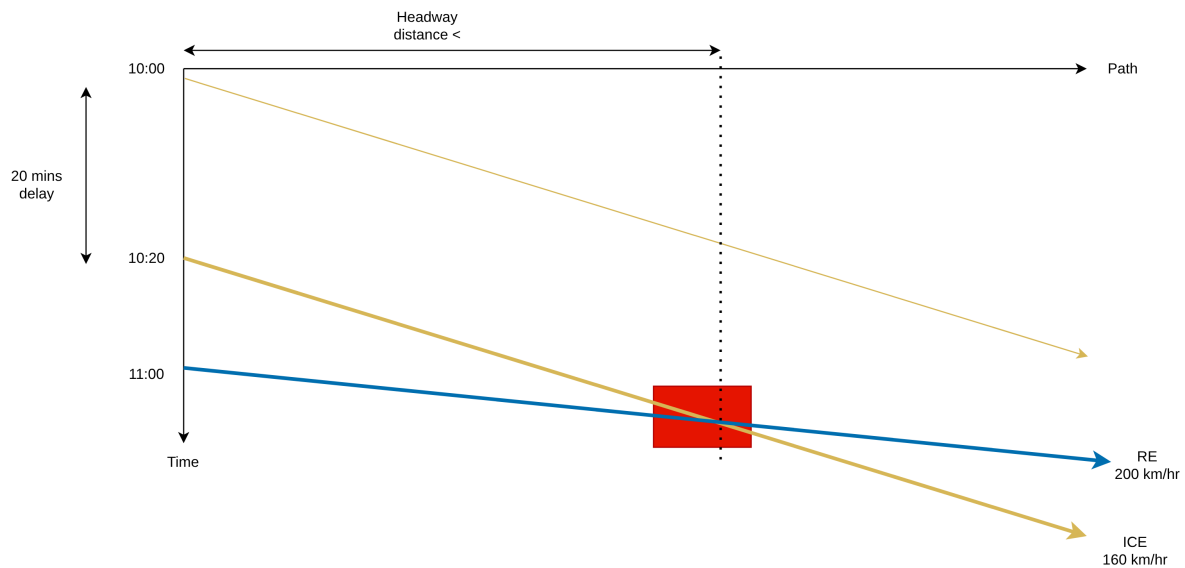


SPT3TMS-13543 - Circulation Conflict Detection

IF a circulating train is delayed due to the delay of the previous train, THEN the TMS shall detect a Circulation_Conflict [✓ Done / To be decided]

SPT3TMS-13542 - Headway Conflict Detection

IF [two or more trains try to occupy the same infrastructure element simultaneously] AND [the following delayed train(s) is faster than the preceeding train], THEN the TMS shall detect a Headway_Conflict (the time impact on the Headway_Conflict) [✓ Done / To be decided]



SPT3TMS-13546 - Calculate & Display The Effect Of The Conflict

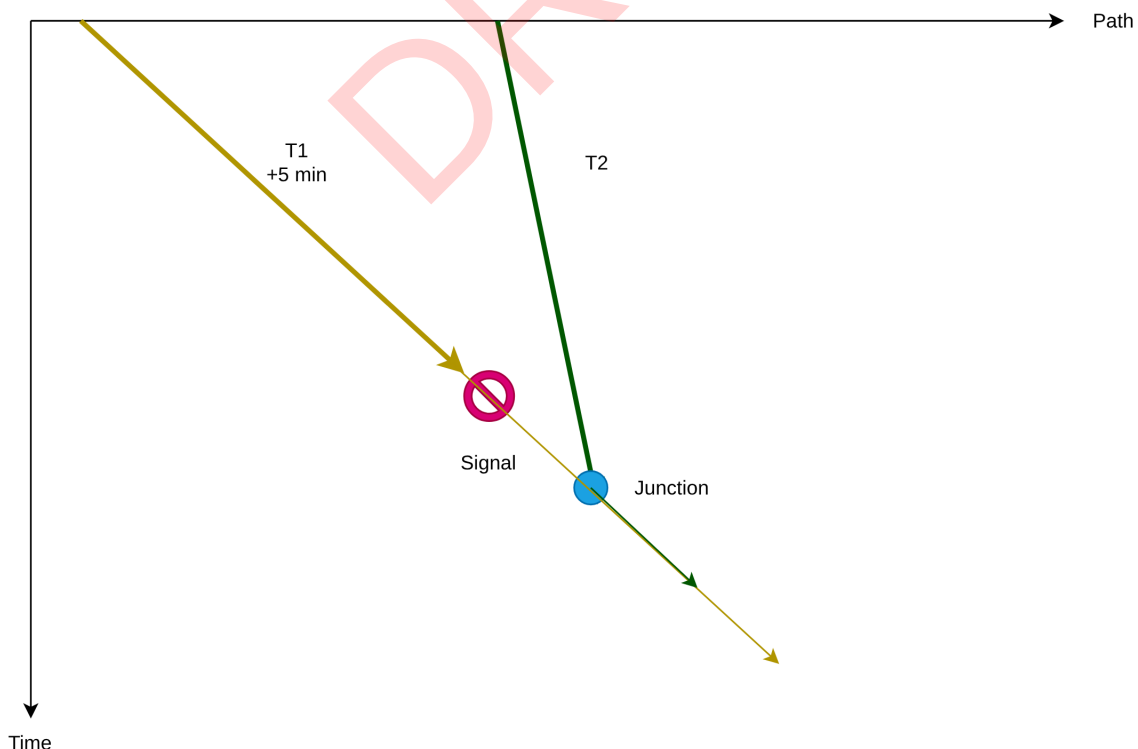
The TMS shall [calculate AND display] the effect of the conflict on the train [until the conflict disappears OR until a new conflict is detected on the same train] [✓ Done / To be decided]

SPT3TMS-13553 - Restriction Conflict Detection

IF a train is delayed due to a Temporary_Capacity_Restriction, THEN the TMS shall detect a Restriction_Conflict [✓ Done / To be decided]

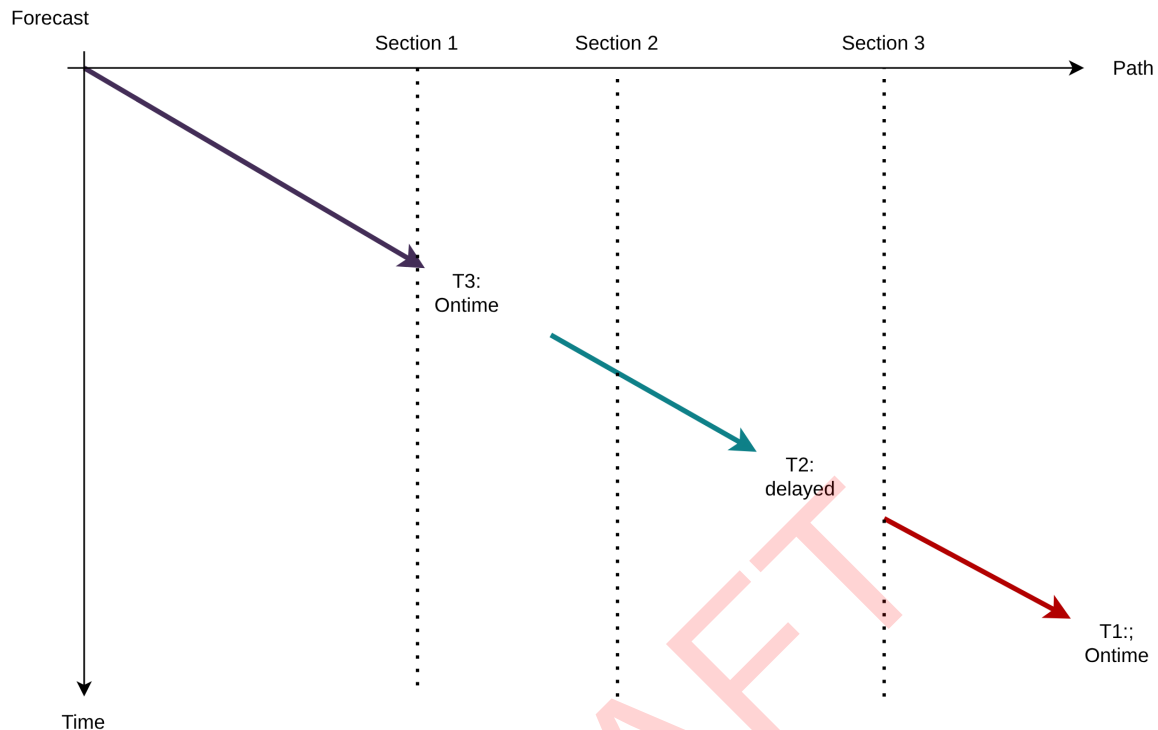
SPT3TMS-13551 - Crossing Conflict Detection

WHEN two trains enter a junction from two sides of a single track section, IF [one train is delayed] AND [one is waiting at the signal before], THEN the TMS detects a Crossing_Conflict [✓ Done / To be decided]



SPT3TMS-13549 - Sequence Conflict Detection

WHEN a train is delayed, IF the sequence of trains occupying a section is changed, THEN the TMS shall detect a Sequence_Conflict [✓ Done / To be decided]



SPT3TMS-13547 - Train Length Comparison With Section Length

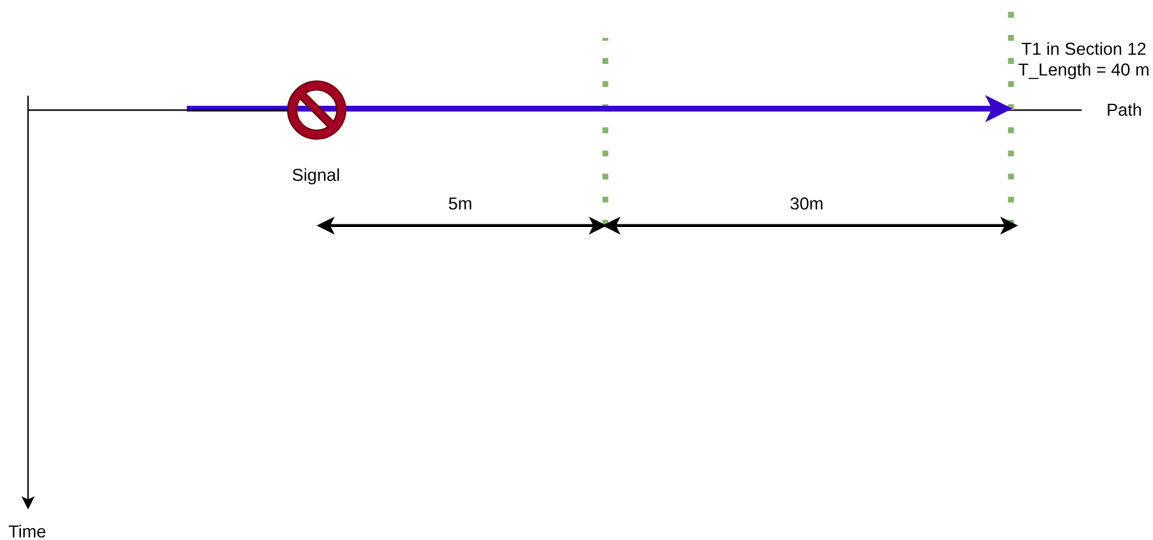
The TMS shall compare the Train_Length with Section_Length [✓ Done / To be decided]

SPT3TMS-13561 - Path Length Conflict Detection

IF the Actual_Train_Length is greater than the distance between the stopping location AND the last signal, THEN the TMS shall detect a Path_Length_Conflict [🔍 Content to be approved]

SPT3TMS-13559 - Path Length Conflict Detection

IF the overtake track length is less than the train, THEN the TMS shall detect a Path_Length_Conflict [✓ Done / To be decided]



SPT3TMS-13557 - Differentiation Between Direct & Indirect Occupation Conflict

The TMS shall differentiate between detected conflicts due to [direct network occupancy] AND [indirect network occupancy] [✓ Done / To be decided]

SPT3TMS-13555 - Indirect Network Occupancy Conflict Detection

IF a train is delayed, WHEN two trains occupy the same infrastructure WHILE in rolling state, THEN the TMS shall detect an Indirect_Network_Occupancy conflict [✓ Done / To be decided]

SPT3TMS-13563 - Availability Conflict Detection

The TMS shall detect the types of Availability_Conflict [✓ Done / To be decided]

SPT3TMS-13487 - Electrification Unavailability Conflict Detection

WHEN there is no electrification on the network, the TMS shall detect an Electrification_Unavailability_Conflict [✓ Done / To be decided]

SPT3TMS-13486 - Switch Blockage Conflict Detection

WHEN a switch is occupied by a train, the TMS shall detect a Switch_Blockage_Conflict [✓ Done / To be decided]

SPT3TMS-13493 - Conflict Detection Deactivation Temporary Possession

WHEN a Temporary_Possession, the TMS shall provide the option of deactivation of Conflict_Detection within the Temporary_Possession [✓ Done / To be decided]

SPT3TMS-13491 - Conflict Detection Deactivation For Possession

The TMS shall ignore conflicts for each train within the possession [✓ Done / To be decided]

SPT3TMS-13489 - Conflict Detection Deactivation Within The Temporary Capacity Restriction Zone For A Time Frame

The TMS shall ignore conflicts for a specific time frame within the Temporary_Capacity_Restriction zone [✓ Done / To be decided]

SPT3TMS-13488 - Conflict Detection Deactivation Within The Temporary Capacity Restriction Zone For A Train

The TMS shall ignore conflicts for a specific train within the Temporary_Capacity_Restriction zone [✓ Done / To be decided]

SPT3TMS-13501 - Conflict Message Formation

The TMS shall form a Conflict_Message [✓ Done / To be decided]

SPT3TMS-13499 - Conflict ID Attribute In Conflict Message

The Conflict_Message shall contain the Conflict_ID [✓ Done / To be decided]

SPT3TMS-13497 - Conflict Location Attribute In Conflict Message

The Conflict_Message shall contain the Conflict_Location [✓ Done / To be decided]

SPT3TMS-13495 - Conflict Type Attribute In Conflict Message

The Conflict_Message shall contain the Conflict_Type [✓ Done / To be decided]

SPT3TMS-13506 - Train Number Attribute In Conflict Message

The Conflict_Message shall contain the involved Train_Number(s) [✓ Done / To be decided]

SPT3TMS-13505 - Conflict Timestamp Attribute In Conflict Message

The Conflict_Message shall contain the Conflict_Timestamp [✓ Done / To be decided]

SPT3TMS-13504 - Conflict Message Sending To The Conflict Solution

The TMS shall send the Conflict_Message to the Conflict_Solution [✓ Done / To be decided]

SPT3TMS-13507 - Time-Distance Line Highlight With The Conflict

The TMS shall highlight the time-distance line with the conflict [until the conflict is resolved] OR [until the next detected conflict] [✓ Done / To be decided]

The TMS shall highlight the conflict in the time-distance graph, with different symbols for detected conflicts, solved conflicts, and conflicts which were not solved. The display requirement is mentioned in SPT3TMS-9186

SPT3TMS-13513 - Involved Trains Highlight In A Conflict

The TMS shall highlight the trains involved in a conflict [✓ Done / To be decided]

SPT3TMS-13512 - Conflict Type Differentiation

The TMS shall assign each Conflict_Type a different sign [✓ Done / To be decided]

SPT3TMS-13511 - Conflict Activation By An Authorised User

The TMS shall contain a Conflict_Activation by an Authorised_User [✓ Done / To be decided]

SPT3TMS-13617 - Conflict Deactivation By An Authorised User

The TMS shall contain a Conflict_Deactivation by an Authorised_User [✓ Done / To be decided]

SPT3TMS-13615 - Display conflict function

The TMS shall contain a display conflict function [✓ Done / To be decided]

SPT3TMS-13613 - Hiding conflict function

The TMS shall contain a hide conflict function [✓ Done / To be decided]

SPT3TMS-8970 - Conflict Root Cause Classification

WHERE possible, the TMS shall assign for each detected conflict a conflict Root_Cause [✓ Done / To be decided]

SPT3TMS-8963 - Conflict Detection Threshold

The TMS shall contain conflict threshold parameters [✓ Done / To be decided]

To set a minimum conditions to consider or recognise a conflict. e.g., two different trains will stop at the same platform at the same time

SPT3TMS-13525 - Conflicts Below The Threshold Exclusion

The TMS shall ignore conflicts below the threshold [✓ Done / To be decided]

SPT3TMS-8975 - Conflict Detection Due To A Dispatching Order

When a dispatching order causes a conflict, the TMS shall raise a flag to the Dispatcher [✓ Done / To be decided]

SPT3TMS-8976 - Conflict Detection Time Horizon

The TMS shall contain a conflict detection horizon in minutes [✓ Done / To be decided]

To set the lower and upper limit for the conflict detection time window

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18 Resolve Conflicts & Manage Connections

For other dispatching measures, the list could be expanded in the future

SPT3TMS-8988 - Conflict Solution

WHEN a conflict is detected, the TMS shall solve the conflict [✓ Done / To be decided]

SPT3TMS-13611 - Dispatching Measures Provision To The Dispatcher

WHEN a conflict is detected, the TMS shall provide Dispatching_Measures to the Dispatcher which can be processed manual or automatic. [🔒 Content to be approved]

SPT3TMS-9024 - Dispatching Measures

The TMS shall contain a set of Dispatching_Measures [✓ Done / To be decided]

SPT3TMS-9025 - Route Change

The TMS shall contain a Route_Change function [✓ Done / To be decided]

SPT3TMS-9026 - Track Change

The TMS shall contain a Track_Change function [✓ Done / To be decided]

SPT3TMS-9027 - Platform Change

The TMS shall contain a Platform_Change function [✓ Done / To be decided]

SPT3TMS-9028 - Arrival Datetime Change

The TMS shall contain an Arrival_Datetime_Change function [✓ Done / To be decided]

SPT3TMS-9029 - Departure Datetime Change

The TMS shall contain a Departure_Datetime_Change function [✓ Done / To be decided]

SPT3TMS-9030 - Driving Strategy Change

The TMS shall contain a Driving_Strategy_Change function [✓ Done / To be decided]

SPT3TMS-9031 - Complete Train Cancellation

The TMS shall contain a Complete_Train_Cancellation function [✓ Done / To be decided]

SPT3TMS-9032 - Partial Train Cancellation

The TMS shall contain a Partial_Train_Cancellation function [✓ Done / To be decided]

SPT3TMS-9033 - Extra Train Addition

The TMS shall contain a Add_Train function [✓ Done / To be decided]

SPT3TMS-9035 - Connection Change

The TMS shall contain a Connection_Change function [✓ Done / To be decided]

SPT3TMS-9036 - Skip a Stop

The TMS shall contain an Skip_Stop function [✓ Done / To be decided]

SPT3TMS-13621 - Train Activate

The TMS shall contain a Train_Activate function [✓ Done / To be decided]

To consider it in the forecast calculations

SPT3TMS-10206 - Train Deactivation

The TMS shall contain a Train_Deactivate function [✓ Done / To be decided]

To remove it from the forecast calculations

SPT3TMS-13620 - Train Standby Function

The TMS shall contain a Train_Standby function [✓ Done / To be decided]

SPT3TMS-10205 - Change of Train Sequence

The TMS shall contain a Train_Sequence_Change function [✓ Done / To be decided]

SPT3TMS-13619 - Train Consist Change function

The TMS shall contain a Train_Consist_Change function [✓ Done / To be decided]

SPT3TMS-9039 - Dispatching Measure Sequential execution

The TMS shall execute the Dispatching_Measures for one train at a time [✓ Done / To be decided]

SPT3TMS-9040 - Bulk Dispatching Measures Execution

The TMS shall execute the Dispatching_Measures for a group of trains at the same time [✓ Done / To be decided]

The execution doesn't depend on manual or automatic dispatching measures execution

SPT3TMS-13618 - Effect Of Each Dispatching Measure On The Potential Delays

The TMS shall calculate the effect of each Dispatching_Measure on the potential delays [✓ Done / To be decided]

SPT3TMS-13580 - Dispatching Measures Execution Priority

The TMS shall execute the Dispatching_Measures with [the lowest potential deviations for a train] OR [the lowest overall deviations for the other train runs] [✓ Done / To be decided]

SPT3TMS-13578 - Dispatching Measure Assignment To A Train Number

For each active Dispatching_Measure, the TMS shall assign a Dispatching_Measure_Number to a Train_Number [✓ Done / To be decided]

SPT3TMS-13577 - Dispatching Measures That Are Allowed Within The Conflict

The TMS shall execute the Dispatching_Measures that are allowed within the Conflict_Type [✓ Done / To be decided]

To make sure that the measures could be executed, e.g., a train with traction conflict needs a rerouting or track change

SPT3TMS-13590 - Preferred List Of Dispatching Measures

For each Conflict_Type, the TMS shall contain a list of preferred Dispatching_Measures [✓ Done / To be decided]

SPT3TMS-13588 - Execution Of The Preferred Dispatching Measures First

The TMS shall execute the preferred Dispatching_Measures first [✓ Done / To be decided]

SPT3TMS-13586 - Route Change Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13596 - Track Change Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13595 - Complete Train Cancellation Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13594 - Partial Train Cancellation Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13593 - Edit Stop Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13601 - Train Deactivate Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Train_Deactivate measure [✓ Done / To be decided]

SPT3TMS-13599 - Train Consist Change Measure For Traction Conflict

WHEN a Traction_Conflict, the TMS shall contain Train_Consist_Change measure [✓ Done / To be decided]

SPT3TMS-13597 - Platform Change Measure For Platform Length Conflict

WHEN a Platform_Length_Conflict, the TMS shall contain Platform_Change measure [✓ Done / To be decided]

SPT3TMS-13674 - Platform Length Conflict Measure For Platform Length Conflict

WHEN a Platform_Length_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13673 - Edit Stop Measure For Platform Length Conflict

WHEN a Platform_Length_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13672 - Train Consist Change Measure For Platform Length Conflict

WHEN a Platform_Length_Conflict, the TMS shall contain Train_Consist_Change measure [✓ Done / To be decided]

SPT3TMS-13671 - Route Change Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13678 - Track Change Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13677 - Complete Train Cancellation Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13676 - Partial Train Cancellation Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13675 - Edit Stop Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13680 - Train Deactivate Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Train_Deactivate measure [✓ Done / To be decided]

SPT3TMS-13679 - Train Consist Change Measure For Permission Conflict

WHEN a Permission_Conflict, the TMS shall contain Train_Consist_Change measure [✓ Done / To be decided]

SPT3TMS-13502 - Arrival Datetime Change Measure For Connection Conflict

WHEN a Connection_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13500 - Departure Datetime Change Measure For Connection Conflict

WHEN a Connection_Conflict, the TMS shall contain Departure_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13498 - Driving Strategy Change Measure For Connection Conflict

WHEN a Connection_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13496 - Connection Change Measure For Connection Conflict

WHEN a Connection_Conflict, the TMS shall contain Connection_Change measure [✓ Done / To be decided]

SPT3TMS-13494 - Complete Train Cancellation Measure For Cancelled Train Conflict

WHEN a Cancelled_Train_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13492 - Partial Train Cancellation Measure For Cancelled Train Conflict

WHEN a Cancelled_Train_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13490 - Edit Stop Measure For Cancelled Train Conflict

WHEN a Cancelled_Train_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13503 - Train Deactivate Measure For Cancelled Train Conflict

WHEN a Cancelled_Train_Conflict, the TMS shall contain Train_Deactivate measure [✓ Done / To be decided]

SPT3TMS-13562 - Partial Train Cancellation Measure For Inactive Train Conflict

WHEN an Inactive_Train_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13560 - Edit Stop Measure For Inactive Train Conflict

WHEN an Inactive_Train_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13558 - Train Inactive Measure For Inactive Train Conflict

WHEN an Inactive_Train_Conflict, the TMS shall contain Train_Inactive measure [✓ Done / To be decided]

SPT3TMS-13556 - Route Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13554 - Track Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13552 - Arrival Datetime Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13550 - Departure Datetime Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Departure_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13548 - Driving Strategy Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13564 - Edit Stop Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13545 - Train Sequence Change Measure For Track Occupancy Conflict

WHEN a Track_Occupancy_Conflict, the TMS shall contain Train_Sequence_Change measure [✓ Done / To be decided]

SPT3TMS-13544 - Platform Change Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Platform_Change measure [✓ Done / To be decided]

SPT3TMS-13541 - Arrival Datetime Change Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13539 - Departure Datetime Change Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Departure_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13537 - Driving Strategy Change Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13535 - Edit Stop Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13533 - Train Sequence Change Measure For Platform Occupancy Conflict

WHEN a Platform_Occupancy_Conflict, the TMS shall contain Train_Sequence_Change measure [✓ Done / To be decided]

SPT3TMS-13531 - Route Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13529 - Track Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13527 - Platform Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Platform_Change measure [✓ Done / To be decided]

SPT3TMS-13524 - Arrival Datetime Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13523 - Departure Datetime Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Departure_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13522 - Driving Strategy Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13606 - Complete Train Cancellation Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13605 - Partial Train Cancellation Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13604 - Add Train Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Add_Train measure [✓ Done / To be decided]

SPT3TMS-13603 - Edit Stop Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13602 - Train Sequence Change Measure For Circulation Conflict

WHEN a Circulation_Conflict, the TMS shall contain Train_Sequence_Change measure [✓ Done / To be decided]

SPT3TMS-13600 - Track Change Measure For Headway Conflict

WHEN a Headway_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13598 - Arrival Datetime Change Measure For Headway Conflict

WHEN a Headway_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13592 - Driving Strategy Change Measure For Headway Conflict

WHEN a Headway_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13591 - Edit Stop Measure For Headway Conflict

WHEN a Headway_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13589 - Train Sequence Change Measure For Headway Conflict

WHEN a Headway_Conflict, the TMS shall contain Train_Sequence_Change measure [✓ Done / To be decided]

SPT3TMS-13587 - Route Change Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13585 - Track Change Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13584 - Arrival Timedate Change Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Arrival_Timedate_Change measure [✓ Done / To be decided]

SPT3TMS-13583 - Platform Change Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Platform_Change measure [✓ Done / To be decided]

SPT3TMS-13582 - Driving Strategy Change Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13581 - Complete Train Cancellation Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13579 - Partial Train Cancellation Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13571 - Train Deactivate Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Train_Deactivate measure [✓ Done / To be decided]

SPT3TMS-13570 - Train Standby Measure For Restriction Conflict

WHEN a Restriction_Conflict, the TMS shall contain Train_Standby measure [✓ Done / To be decided]

SPT3TMS-13569 - Driving Strategy Change Measure For Crossing Conflict

WHEN a Crossing_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13567 - Edit Stop Measure For Crossing Conflict

WHEN a Crossing_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13565 - Track Change Measure For Sequence Conflict

WHEN a Sequence_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13647 - Arrival Datetime Change Measure For Sequence Conflict

WHEN a Sequence_Conflict, the TMS shall contain Arrival_Datetime_Change measure [✓ Done / To be decided]

SPT3TMS-13646 - Driving Strategy Change Measure For Sequence Conflict

WHEN a Sequence_Conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

SPT3TMS-13645 - Edit Stop Measure For Sequence Conflict

WHEN a Sequence_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13644 - Train Sequence Change Measure For Sequence Conflict

WHEN a Sequence_Conflict, the TMS shall contain Train_Sequence_Change measure [✓ Done / To be decided]

SPT3TMS-13642 - Route Change Measure For Availability Conflict

WHEN an Availability_Conflict, the TMS shall contain Route_Change measure [✓ Done / To be decided]

SPT3TMS-13635 - Track Change Measure For Availability Conflict

WHEN an Availability_Conflict, the TMS shall contain Track_Change measure [✓ Done / To be decided]

SPT3TMS-13633 - Complete Train Cancellation Measure For Availability Conflict

WHEN an Availability_Conflict, the TMS shall contain Complete_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13632 - Partial Train Cancellation Measure For Availability Conflict

WHEN an Availability_Conflict, the TMS shall contain Partial_Train_Cancellation measure [✓ Done / To be decided]

SPT3TMS-13631 - Train Deactivate Measure For Availability Conflict

WHEN an Availability_Conflict, the TMS shall contain Train_Deactivate measure [✓ Done / To be decided]

SPT3TMS-13630 - Edit Stop Measure For Path Length Conflict

WHEN a Path_Length_Conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13628 - Train Consist Change Measure For Path Length Conflict

WHEN a Path_Length_Conflict, the TMS shall contain Train_Consist_Change measure [✓ Done / To be decided]

SPT3TMS-13626 - Driving Strategy Change Measure For Indirect_Network Occupancy Conflict

WHEN an Indirect_Network_Occupancy conflict, the TMS shall contain Driving_Strategy_Change measure [✓ Done / To be decided]

For example to switch to an energy optimisation strategy until the train stops in front of a signal

SPT3TMS-13624 - Edit Stop Measure For Indirect_Network Occupancy Conflict

WHEN an Indirect_Network_Occupancy conflict, the TMS shall contain Edit_Stop measure [✓ Done / To be decided]

SPT3TMS-13623 - Automatic Conflict Solution Option

The TMS shall contain an Automatic_Conflict_Solution option [✓ Done / To be decided]

SPT3TMS-13622 - Effect On Business Rules Calculation In Automatic Conflict Solution

WHEN Automatic_Conflict_Solution, the TMS shall calculate the effect the of each Dispatching_Measure on the defined Business_Rules [✓ Done / To be decided]

SPT3TMS-13616 - Dispatching Measure Selection In Automatic Conflict Solution

WHEN Automatic_Conflict_Solution, the TMS shall select a Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13614 - Dispatching Measure Execution In Automatic Conflict Solution

WHEN Automatic_Conflict_Solution, the TMS shall execute the selected Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13612 - Semi Automatic Conflict Solution Option

The TMS shall contain a Semi_Automatic_Conflict_Solution option [✓ Done / To be decided]

SPT3TMS-13610 - Effect On Business Rules Calculation In Semi Automatic Conflict Solution

WHEN Semi_Automatic_Conflict_Solution, the TMS shall calculate the effect the of each Dispatching_Measure on the defined Business_Rules [✓ Done / To be decided]

SPT3TMS-13609 - Dispatching Measure Selection In Semi Automatic Conflict Solution

WHEN Semi_Automatic_Conflict_Solution, the TMS shall select a Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13608 - Dispatching Measure Execution In Semi Automatic Conflict Solution

WHEN Semi_Automatic_Conflict_Solution, the TMS shall execute the selected Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13607 - Dispatching Measure Display In Semi Automatic Conflict Solution

WHEN Semi_Automatic_Conflict_Solution, the TMS shall display the executed Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13670 - Configurable Reaction Time In Semi Automatic Conflict Solution

WHEN Semi_Automatic_Conflict_Solution, the TMS shall contain a configurable Reaction_Time for Dispatching_Measure suppression [✓ Done / To be decided]

In case the dispatcher wants to cancel the dispatching measure and override it

SPT3TMS-13668 - Manual Conflict Solution Option

The TMS shall contain a Manual_Conflict_Solution option [✓ Done / To be decided]

SPT3TMS-13667 - Dispatching Measure Display In Manual Conflict Solution

WHEN Manual_Conflict_Solution, the TMS shall display each Dispatching_Measure to the Dispatcher [✓ Done / To be decided]

SPT3TMS-13666 - Dispatching Measure Execution In Manual Conflict Solution

WHEN Manual_Conflict_Solution, the TMS shall execute the selected Dispatching_Measure by the Dispatcher [✓ Done / To be decided]

SPT3TMS-13665 - Dispatching Measure Undo Function In Manual Conflict Solution

WHEN Manual_Conflict_Solution, the TMS shall contain an Undo function to the executed Dispatching_Measure until the conflict occurrence time [✓ Done / To be decided]

To allow the the dispatcher to undo the dispatching measure before the timewindow of the conflict

SPT3TMS-13663 - Operational Decisions Message Formation

The TMS shall form an Operational_Decisions message [✓ Done / To be decided]

SPT3TMS-13662 - Decision ID In Operational Decisions Message

The Operational_Decisions message shall contain a Decision_ID [✓ Done / To be decided]

SPT3TMS-13661 - Operational Plan Reference In Operational Decisions Message

The Operational_Decisions message shall contain an Operational_Plan_Reference [✓ Done / To be decided]

SPT3TMS-13660 - Dispatching Measure In Operational Decisions Message

The Operational_Decisions message shall contain a Dispatching_Measure [✓ Done / To be decided]

SPT3TMS-13659 - Decision Description In Operational Decisions Message

The Operational_Decisions message shall contain a Decision_Description [✓ Done / To be decided]

SPT3TMS-13658 - Decision Valid From In Operational Decisions Message

The Operational_Decisions message shall contain a Decision_Valid_From [✓ Done / To be decided]

SPT3TMS-13649 - Decision Valid To In Operational Decisions Message

The Operational_Decisions message shall contain a Decision_Valid_To [✓ Done / To be decided]

SPT3TMS-13657 - The TMS shall send the Operational Decisions to the Connection Management

The TMS shall send the Operational_Decisions to the Connection_Management [✓ Done / To be decided]

SPT3TMS-13656 - The TMS shall check the Connection Relation of the train run for each stop

The TMS shall check the Connection_Relation of the train run for each stop [✓ Done / To be decided]

SPT3TMS-13655 - WHEN Implicit, the TMS shall ignore the train from the Connection_Management cal...

WHEN Implicit, the TMS shall ignore the train from the Connection_Management calculations [✓ Done / To be decided]

SPT3TMS-13654 - WHEN Explicit, the TMS shall include the train from the Connection_Management ca...

WHEN Explicit, the TMS shall include the train from the Connection_Management calculations [✓]
Done / To be decided]

SPT3TMS-13653 - WHEN Explicit, the TMS shall receive from Rail Operating Company the connection...

WHEN Explicit, the TMS shall receive from Rail Operating Company the connection stops for each train run [✓ Done / To be decided]

SPT3TMS-13652 - WHEN the connections stops are not provided by the Rail Operating Company, the T...

WHEN the connections stops are not provided by the Rail Operating Company, the TMS shall calculate the connection stops [✓ Done / To be decided]

SPT3TMS-13651 - The TMS shall check the common stops between each Operational_Plan within a defi...

The TMS shall check the common stops between each Operational_Plan within a defined timeframe [✓ Done / To be decided]

SPT3TMS-13650 - The TMS shall check the Connection_Type of the train run for each stop

The TMS shall check the Connection_Type of the train run for each stop [✓ Done / To be decided]

SPT3TMS-13681 - WHEN Free, the TMS shall remove the train run from the connection calculations

WHEN Free, the TMS shall remove the train run from the connection calculations [✓ Done / To be decided]

SPT3TMS-13688 - WHEN Planned, the TMS shall hold the connecting train up to the Minimum_Waiting_...

WHEN Planned, the TMS shall hold the connecting train up to the Minimum_Waiting_Time [✓ Done / To be decided]

SPT3TMS-13687 - WHEN Commercial, the TMS shall hold the connecting train up to the Maximum_Waiti...

WHEN Commercial, the TMS shall hold the connecting train up to the Maximum_Waiting_Time [✓ Done / To be decided]

SPT3TMS-13686 - The TMS shall contain defined Business_Rules for connections exceeding the Maxim...

The TMS shall contain defined Business_Rules for connections exceeding the Maximum_Waiting_Time [✓ Done / To be decided]

SPT3TMS-13685 - The TMS shall compare the Arrival_Time of the arriving train with Departure_Time...

The TMS shall compare the Arrival_Time of the arriving train with Departure_Time of the departing train [✓ Done / To be decided]

SPT3TMS-13684 - WHEN the Arrival_Time is before the Departure_Time plus Waiting_Time, the TMS sh...

WHEN the Arrival_Time is before the Departure_Time plus Waiting_Time, the TMS shall set the Connection_Rating to Green [✓ Done / To be decided]

SPT3TMS-13683 - WHEN the Arrival_Time is equal the Departure_Time plus Maximum_Waiting_Time, the...

WHEN the Arrival_Time is equal the Departure_Time plus Maximum_Waiting_Time, the TMS shall set the Connection_Rating to Yellow [✓ Done / To be decided]

SPT3TMS-13682 - WHEN the Arrival_Time is after the Departure_Time, the TMS shall set the Connect...

WHEN the Arrival_Time is after the Departure_Time, the TMS shall set the Connection_Rating to Red [✓ Done / To be decided]

SPT3TMS-13627 - The TMS shall update the Operational_Decisions with the Connection_Management so...

The TMS shall update the Operational_Decisions with the Connection_Management solution [✓ Done / To be decided]

SPT3TMS-13625 - The Connection_Management solution shall contain Hold_Connection

The Connection_Management solution shall contain Hold_Connection [✓ Done / To be decided]

SPT3TMS-13629 - The Connection_Management solution shall contain Release_Connection

The Connection_Management solution shall contain Release_Connection [✓ Done / To be decided]

SPT3TMS-13638 - WHEN [Planned] AND [Yellow], the TMS shall Hold the connection up to Minimum_Wai...

WHEN [Planned] AND [Yellow], the TMS shall Hold the connection up to Minimum_Waiting_Time of the connecting train [✓ Done / To be decided]

SPT3TMS-13637 - WHEN [Planned] AND [Yellow], the TMS shall Hold the connection up to Maximum_Wai...

WHEN [Planned] AND [Yellow], the TMS shall Hold the connection up to Maximum_Waiting_Time of the connecting train [✓ Done / To be decided]

SPT3TMS-13636 - WHEN [Commercial] AND [Yellow], the TMS shall Hold the connection up to Maximum_...

WHEN [Commercial] AND [Yellow], the TMS shall Hold the connection up to Maximum_Waiting_Time of the connecting train [✓ Done / To be decided]

SPT3TMS-13634 - WHEN [Commercial] AND [Red], the TMS shall Release the connecting train

WHEN [Commercial] AND [Red], the TMS shall Release the connecting train [✓ Done / To be decided]

SPT3TMS-13643 - The TMS shall update the Operational_Plan with the Operational_Decisions

The TMS shall update the Operational_Plan with the Operational_Decisions [✓ Done / To be decided]

SPT3TMS-13641 - The Operational_Plan shall contain an Operational_Plan_ID

The Operational_Plan shall contain an Operational_Plan_ID [✓ Done / To be decided]

SPT3TMS-13640 - The Operational_Plan shall contain the updated Operational_Decisions

The Operational_Plan shall contain the updated Operational_Decisions [✓ Done / To be decided]

SPT3TMS-13639 - The TMS shall send the updated Operational_Plan to the Control_Command_Signallin...

The TMS shall send the updated Operational_Plan to the Control_Command_Signalling (CCS) [✓ Done / To be decided]

SPT3TMS-13648 - The TMS shall send the updated Operational_Plan to the Automatic_Train_Operation...

The TMS shall send the updated Operational_Plan to the Automatic_Train_Operations_Execution (ATO E) [✓ Done / To be decided]

SPT3TMS-13568 - The TMS shall send the updated Operational_Plan to the neighbouring TMS

The TMS shall send the updated Operational_Plan to the neighbouring TMS [✓ Done / To be decided]

SPT3TMS-13566 - The TMS shall send the updated Operational_Plan to the Passenger Information Sys...

The TMS shall send the updated Operational_Plan to the Passenger Information System [✓ Done / To be decided]

SPT3TMS-13575 - The TMS shall send the Train_Running_Information message to the Rail Operating C...

The TMS shall send the Train_Running_Information message to the Rail Operating Company [✓ Done / To be decided]

SPT3TMS-13574 - The TMS shall send the Train_Position message to the Rail Operating Company

The TMS shall send the Train_Position message to the Rail Operating Company [✓ Done / To be decided]

SPT3TMS-13573 - The Train_Running_Information message shall follow the Telematic TSI standards

The Train_Running_Information message shall follow the Telematic TSI standards [✓ Done / To be decided]

SPT3TMS-13572 - The Train_Position message shall follow the Telematic TSI standards

The Train_Position message shall follow the Telematic TSI standards [✓ Done / To be decided]

SPT3TMS-12935 - Minimisation Of Existing Delays Optimisation Dimensions

The TMS shall consider the minimisation of existing delays in the optimisation dimensions [✓ Done / To be decided]

SPT3TMS-12941 - Reduction Of Missed Connections Optimisation Dimensions

The TMS shall consider the reduction of missed connections in the optimisation dimensions [✓ Done / To be decided]

SPT3TMS-12944 - Maximising Capacity Utilization Optimisation Dimensions

The TMS shall consider maximising the capacity utilization in the optimisation dimensions [✓ Done / To be decided]

SPT3TMS-12943 - Minimisation Of Occupation In Certain Areas Optimisation Dimensions

The TMS shall consider the minimisation of infrastructure occupation in certain areas in the optimisation dimensions [✓ Done / To be decided]

SPT3TMS-12946 - Energy Efficiency Optimisation Dimensions

The TMS shall consider the energy efficiency driving in the optimisation dimensions [✓ Done / To be decided]

By reducing brake intervention and stops

SPT3TMS-12947 - Stopping In Certain Areas Optimisation Dimensions

The TMS shall consider avoiding stopping of a train in certain areas in the optimisation dimensions [✓ Done / To be decided]

SPT3TMS-12939 - Operational Plan Retrieval

The TMS shall allow the retrieval of the operational plan versions [✓ Done / To be decided]

SPT3TMS-12938 - Operational Plan Logs

The TMS shall collect operational plan logs [✓ Done / To be decided]

For processing and analytics

SPT3TMS-12239 - Update Operational Plan

The TMS shall update the Operational_Plan one minute before execution at least [✓ Done / To be decided]

SPT3TMS-8997 - Parallel Execution

The TMS shall support the parallel execution of more instances of the automatic conflict solution algorithm (solver) [✓ Done / To be decided]

To be able to compare the different scenarios and perform compliance check

SPT3TMS-12933 - Unsolvable Conflict

When a conflict is unsolvable, the TMS shall inform the dispatcher [✓ Done / To be decided]

SPT3TMS-9011 - Conflict Acceptance

The TMS shall allow the selection of a dispatching measure containing unresolvable conflicts [✓ Done / To be decided]

SPT3TMS-9012 - Solver Boundary Area

The TMS shall consider the area between a [switched on AND a switched off] solver an area of control [✓ Done / To be decided]

SPT3TMS-9013 - Passing Time Boundary Constraint

The TMS shall consider the the passing time of a train as area of control constraint [✓ Done / To be decided]

SPT3TMS-12894 - Speed Boundary Constraint

The TMS shall consider the speed as area of control constraint [✓ Done / To be decided]

SPT3TMS-12893 - Used Track Boundary Constraint

The TMS shall consider the used track as area of control constraint [✓ Done / To be decided]

SPT3TMS-9017 - Conflict Solution Instances

The TMS shall trigger more instances of the solver on the same area at the same time [✓ Done / To be decided]

SPT3TMS-9018 - Different Solution Objectives

The instance shall contain different conflict solution objectives [✓ Done / To be decided]

Each instance shall contain one objective to compare the achieved results when deemed necessary

SPT3TMS-9020 - Solution Instance Numbers

The TMS shall contain configuration of the maximum number of instances of conflict solution algorithm, on a project basis [✓ Done / To be decided]

To calculate the possible solutions and execute the best measure that is matching the business rules / defined KPIs. This is important for functional design of conflict solution, therefore we keep it under functional requirements

SPT3TMS-13906 - Dispatching Measures Execution Depending On The Spatial-Temporal Circumstances

The TMS shall allow the execution of the dispatching measures depending on the spatial-temporal circumstances [✓ Done / To be decided]

SPT3TMS-12903 - Warning Message Display

When TMS detects an unsolved conflict within a timeframe, the TMS shall raise a flag to the dispatcher [✓ Done / To be decided]

SPT3TMS-9038 - Dispatching Measure Activation

The TMS shall allow the activation of a dispatching measure into the operational plan [✓ Done / To be decided]

SPT3TMS-16003 - Multiple solutions

When TMS analyses a conflict, it shall search for sub-optimal solutions in addition to the best one. [➕ Open]

SPT3TMS-16002 - Showing solutions

When in manual or semiautomatic mode, TMS shall present the user a list of the solutions it found. [➕ Open]

SPT3TMS-16004 - Solution Ordering

TMS shall present the several solutions identified for a conflict ordered by their suitability according to the objective function.
[➕ Open]

The TMS shall hand-over the executed Dispatching Measures to the neighbouring TMS at the boundaries of the Area_Of_Control

R: For operational plans that belong to multiple responsible TMS

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19 Communication With Incident Impact Management

SPT3TMS-9042 - Incident Impact Management Interface With TMS

The TMS shall interface with an incident impact management module [✓ Done / To be decided]

To react whenever there is an incident on the railway, e.g., accident, sudden brakes, something on the track

SPT3TMS-9044 - Incident Recording

The TMS shall receive incident data from the Incident Impact Management Sytem [✓ Done / To be decided]

SPT3TMS-12899 - Restriction Type Recording

The TMS shall receive the restriction type [✓ Done / To be decided]

SPT3TMS-12898 - Restriction Location Recording

The TMS shall receive the incident location [✓ Done / To be decided]

SPT3TMS-12901 - Involved Assets Recording

The TMS shall receive the involved assets [✓ Done / To be decided]

To identify the directly involved infrastructure and rolling stock resources. e.g., two trains collided, or a train derailed

SPT3TMS-12900 - Datetime Recording

The TMS shall receive the incident start datetime [✓ Done / To be decided]

SPT3TMS-12897 - Reporting Entity Recording

The TMS shall receive the incident reporting entity [✓ Done / To be decided]

Which entity reported this incident and is involved

SPT3TMS-9057 - Impact Recognition

The TMS shall recognise the incident's impact [✓ Done / To be decided]

SPT3TMS-9058 - Affected Infrastructure

The TMS shall identify the affected infrastructure [✓ Done / To be decided]

SPT3TMS-9059 - Affected Trains

The TMS shall identify the affected trains [✓ Done / To be decided]

To identify all the affected assets including the involved ones

SPT3TMS-9061 - Conflict Detection

The TMS shall detect conflicts due to the incident [✓ Done / To be decided]

SPT3TMS-9062 - Duplicate Incident Detection

The TMS shall detect duplicate incidents [✓ Done / To be decided]

SPT3TMS-9063 - Impact Mitigation

The TMS shall execute ad-hoc [dispatching measures] OR [bulk dispatching measures] [✓ Done / To be decided]

SPT3TMS-9064 - Scenario-Based Incident Impact Management

The TMS shall contain a set of stored sequence of dispatching measures (scenario) [✓ Done / To be decided]

SPT3TMS-9065 - Scenario Execution On All Trains

The TMS shall execute scenarios on all trains [✓ Done / To be decided]

For example to stop all trains passing by Zurich in Zurich main station

SPT3TMS-9067 - Scenario Execution On Specific Trains

The TMS shall execute scenarios on a selected type of trains [✓ Done / To be decided]

For example to stop all ICE trains travelling to Basel in their next station

SPT3TMS-9069 - Scenario Recommendation

The TMS shall recommend the scenarios according to Key_Performance_Indicators [✓ Done / To be decided]

Depending on the mitigation mode whether TMS does it or a dispatcher

SPT3TMS-9071 - Incident Impact Management Archive

When the incident is resolved, the TMS shall archive the incident impact management case [✓ Done / To be decided]

SPT3TMS-9077 - Incident Impact Management Storage

The TMS shall store each applied Dispatching Measures [✓ Done / To be decided]

SPT3TMS-9078 - Sequential Incident Impact Management Execution

The TMS shall allow sequential incident impact management execution [✓ Done / To be decided]

SPT3TMS-12951 - Sending Executed Dispatching Measures To The Incident Impact Management System

The TMS shall send the applied dispatching measures to the Incident Impact Management System [🔑 Content to be approved]

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20 Communication With Automatic Train Operations (ATO) Execution

SPT3TMS-9116 - Trains Under ATO Control

The TMS shall receive from the Capacity Management System the trains under ATO control [✓ Done / To be decided]

The trains under ATO come initially from the Capacity Management Systems as part of the Capacity Plan

SPT3TMS-9117 - Operational Plan Update

When [the Operational_Plan] OR [the infrastructure data] changes, the TMS shall update the updated Operational Plan of the affected train [✚ Open]

SPT3TMS-11393 - Earliest Arrival Time

The TMS shall calculate for all timing points of a train run under ATO control the Earliest arrival time [✓ Done / To be decided]

SPT3TMS-11395 - Latest Arrival Time

The TMS shall calculate for all timing points of a train run under ATO control the Latest arrival time [✓ Done / To be decided]

SPT3TMS-11394 - Earliest Departure Time

The TMS shall calculate for all timing points of a train run under ATO control the Earliest departure time [✓ Done / To be decided]

SPT3TMS-11392 - Latest Departure Time

The TMS shall calculate for all timing points of a train run under ATO control the Latest departure time [✓ Done / To be decided]

SPT3TMS-9123 - Sending Operational Plan to ATO Execution

The TMS shall send the Operational Plan to ATO Execution [✚ Open]

SPT3TMS-13742 - TMS shall Communication With ATO

The TMS shall communicate with ATO Execution via the TMS-CCS interface specification defined in SP (TMS-CCS Concept Interface), [✚ Open]

This interface specification was derived from the Standard Communication Interface - Operational Plan (SCI-OP) and is improved and redesigned according to the data model which is specified by SP task 2 TCCS SD1, which is to be adopted by all railways systems defined in SP initiative which will cope together into a complex and wide railway environment.

21 Human Machine Interface (HMI)

SPT3TMS-9125 - TMS Data Display

The TMS shall contain a Human-Machine Interface (HMI) [✓ Done / To be decided]

To allow manual decision selection (select dispatching orders), display TMS functions' data, and configure TMS settings, as well as view and extract the history of events both for logs and for statistical studies.

SPT3TMS-9128 - Dispatching Measure Selection in Manual Conflict Solution

WHILE manual conflict solution, The TMS shall allow the dispatcher to select a dispatching measure [✓ Done / To be decided]

SPT3TMS-12902 - Dispatching Measure Cancellation in Semi-Automatic & Manual Solution

WHILE [semi-automatic] OR [manual] conflict solution, the TMS shall allow the dispatcher to cancel the selected dispatching measure [✓ Done / To be decided]

SPT3TMS-9131 - System Settings & Configurations

The TMS shall contain configuration of the Key Performance Indicators [✓ Done / To be decided]

KPIs to be compared against conflict solution objectives, quality of the operational plan, impact analysis etc,

SPT3TMS-12910 - Conflict Solution Mode Configuration

The TMS shall contain configuration of the conflict solution mode [✓ Done / To be decided]

SPT3TMS-12909 - Conflict Detection Horizon Configuration

The TMS shall contain configuration of the conflict detection horizon [✓ Done / To be decided]

SPT3TMS-12905 - Forecast Horizon Configuration

The TMS shall contain configuration of the forecast horizon [✓ Done / To be decided]

SPT3TMS-12904 - Deviation Threshold Configuration

The TMS shall contain configuration of the deviation threshold [✓ Done / To be decided]

SPT3TMS-12907 - Conflict Detection Configuration

The TMS shall contain configuration of the Conflict Detection threshold [✓ Done / To be decided]

SPT3TMS-12906 - Dispatching Measures Configuration

The TMS shall contain configuration of the dispatching measures [✓ Done / To be decided]

SPT3TMS-12911 - Deviation Root Cause Configuration

The TMS shall contain configuration of the list of deviation root cause [✓ Done / To be decided]

SPT3TMS-12908 - Conflict Root Cause Configuration

The TMS shall contain configuration of the list of the conflict root cause [✓ Done / To be decided]

SPT3TMS-13332 - Differentiation Between Deviations And On Time

The TMS shall highlight the deviations in different colors from the normal train runs [✓ Done / To be decided]

SPT3TMS-13328 - Time Difference Display In Minutes

The TMS shall display the time difference in minutes [✓ Done / To be decided]

SPT3TMS-13326 - Location Difference Display

The TMS shall display the location difference according to the Actual_Arrival attributes [✓ Done / To be decided]

SPT3TMS-13337 - Delays Display

The TMS shall display delays in "+" sign next to the delay in minutes [✓ Done / To be decided]

SPT3TMS-13335 - Early Trains Display

The TMS shall display early trains in "-" sign next to the advanced time in minutes [✓ Done / To be decided]

SPT3TMS-9149 - Detected Deviations Display & Filter

The TMS shall [display] AND [Filter] the detected deviations [✓ Done / To be decided]

SPT3TMS-12917 - Deviations Root Cause Display & Filter

The TMS shall [display] AND [Filter] the deviations root cause [✓ Done / To be decided]

SPT3TMS-12916 - Detected conflicts Display & Filter

The TMS shall [display] AND [Filter] the detected conflicts [✓ Done / To be decided]

SPT3TMS-12919 - Forecast Data Display & Filter

The TMS shall [display] AND [Filter] the forecast data [✓ Done / To be decided]

SPT3TMS-12918 - Solved Conflicts Display & Filter

The TMS shall [display] AND [Filter] the solved conflicts [✓ Done / To be decided]

SPT3TMS-12913 - Unsolved Conflicts Display & Filter

The TMS shall [display] AND [Filter] the unsolved conflicts [✓ Done / To be decided]

SPT3TMS-12912 - Operational Plan Data Display & Filter

The TMS shall [display] AND [Filter] the operational plan data [✓ Done / To be decided]

SPT3TMS-12915 - Dispatching Measures Display & Filter

The TMS shall [display] AND [Filter] the dispatching measures [✓ Done / To be decided]

SPT3TMS-12914 - Conflict Solution Mode Display & Filter

The TMS shall [display] AND [Filter] the conflict solution mode [✓ Done / To be decided]

SPT3TMS-9166 - Specific Train Filtration Criteria

The TMS shall contain data filtration criteria by a specific train [✓ Done / To be decided]

SPT3TMS-12921 - Group Of Trains Filtration Criteria

The TMS shall contain data filtration criteria by a group of trains [✓ Done / To be decided]

SPT3TMS-12920 - Train Station Filtration Criteria

The TMS shall contain data filtration criteria by a train station [✓ Done / To be decided]

SPT3TMS-12923 - Datetime Filtration Criteria

The TMS shall contain data filtration criteria by Datetime [✓ Done / To be decided]

SPT3TMS-12922 - Multiple Filtration Criteria

The TMS shall contain data filtration criteria by a combination of different filtration types [✓ Done / To be decided]

SPT3TMS-13238 - Incident Impact Management Filtration

The TMS shall contain filtration criteria for each Incident Impact Management attribute [✓ Done / To be decided]

SPT3TMS-9173 - Incident Impact Management View

The TMS shall display the incident impact management data [✓ Done / To be decided]

SPT3TMS-9174 - Incident Identifier Code

The TMS shall display the incident identifier code [✓ Done / To be decided]

SPT3TMS-9175 - Incident Root Cause

The TMS shall display the incident root cause [✓ Done / To be decided]

SPT3TMS-9176 - Incident Start Datetime

The TMS shall display the incident's start time received from the Incident Impact System [✓ Done / To be decided]

SPT3TMS-13909 - Incident End Datetime

WHEN provided by the Incident Impact Management system, the TMS shall display the expected incident's end time [✓ Done / To be decided]

Often this is unknown, and is hardly predictable

SPT3TMS-9177 - Incident Location

The TMS shall display the incident location [✓ Done / To be decided]

SPT3TMS-9178 - Affected Assets

The TMS shall display the affected assets [✓ Done / To be decided]

SPT3TMS-9179 - Incident Related Deviations

The TMS shall display the incident related deviations [✓ Done / To be decided]

SPT3TMS-9180 - Incident Related Conflicts

The TMS shall display the incident related conflicts [✓ Done / To be decided]

SPT3TMS-9181 - Incident Related Dispatching Measures

The TMS shall display the dispatching measures [✓ Done / To be decided]

SPT3TMS-9182 - Activation & Deactivation Of An Incident Impact Management Scenario

The TMS shall allow the [activation] AND [deactivation] of an incident impact management scenario [✓ Done / To be decided]

SPT3TMS-9183 - Unavailable Assets Highlighting Depending On The Grade Of Unavailability

The TMS shall highlight the affected assets with information on the grade of unavailability [✓ Done / To be decided]

SPT3TMS-9184 - Automatic Assignment Of an Incident Related Deviation

The TMS shall assign a deviation to an incident [✓ Done / To be decided]

SPT3TMS-12643 - Manual Assignment of Incident Related Deviations

The TMS shall contain a manually assigned deviation filed for the incident [✓ Done / To be decided]

SPT3TMS-9186 - Conflict Distinguished Display

The TMS shall display the solvable conflicts differently from the unsolvable conflicts [✓ Done / To be decided]

SPT3TMS-12925 - Deviation Distinguished Display

The TMS shall display the incident-related deviations differently from the non-incident-related deviations [✓ Done / To be decided]

SPT3TMS-12924 - Real-Time Data Distinguished Display

The TMS shall display the real-time data differently from the past data [✓ Done / To be decided]

SPT3TMS-12927 - Infrastructure Distinguished Display

The TMS shall display the available infrastructure differently from the unavailable infrastructure [✓ Done / To be decided]

SPT3TMS-12926 - Train Distinguished Display

The TMS shall display the active trains differently from the inactive trains [✓ Done / To be decided]

SPT3TMS-9192 - Data Representation

The TMS shall represent the data in [Graphical] OR [Tabular] forms [✓ Done / To be decided]

SPT3TMS-9199 - Administrative Panel in HMI

The TMS shall include an Administrative Panel [✓ Done / To be decided]

The panel shall be responsible for all user management functions (adding, deleting, defining access level for a new user)

SPT3TMS-15706 - Presentation of Restriction Areas

The TMS shall display the planned and actual Restriction_Areas [👤 Open]

SPT3TMS-15705 - Presentation of Warning Areas

The TMS shall display the planned and actual Warning_Areas [🔒 Content to be approved]

22 Glossary

22.1 Definitions

Add Train

Add a completely new train journey or add a new train journey to an existing train journey

Arrival Datetime Change

Change in the arrival time of a train in a station, either by arriving earlier or later than planned

Authorised User

A system user with write access, who can configure the system

Capacity Restriction

Capacity restriction is a temporary full or partial unavailability of network infrastructure due to construction works, maintenance, inspection works or due to environmental influences and disruptions.

Complete Train Cancellation

Completely cancel the train journey and remove the train from the Forecast calculations

Connection Change

Change the time and/or location of a connecting train

Departure Datetime Change

Change in the departure time of a train in a station, either by departing earlier or later than planned

Direct Track Possession / Occupancy

Physical occupation of a train to a network or part of the network

Driving Strategy

How to drive the train as a combination of acceleration, braking, cruising and coasting (Energy efficient, reduced maximum speed, Maximal Coasting, Minimum Time Train Control, etc..)

Driving Strategy Change

Change the driving strategy from the defined list (energy efficient, reduce maximum speed, etc..)

Dynamic Business Rules

All defined rules related to the journey dynamics, e.g. Maximum waiting time of a connecting train

Skip Stop

Remove a planned stop

Element

Any physical component that is part of the infrastructure composition (switches, tracks, signals)

End Occupancy Location

The location point where the infrastructure element (track, signal, switch, etc..) occupation has ended

End Occupancy Time

The timestamp where the infrastructure element (track, signal, switch, etc..) occupation has ended

Headway Distance

Safe distance between two running trains

Indirect Track Possession / Occupancy

Part of the infrastructure that is not directly occupied by a train, but contains a buffer area for example between the train and signal.

Infrastructure

A section of the railway network (distance on the network between two points)

Maximum Stopping Time

Maximum allowed time for a train to wait on the platform according to the defined business rules

Maximum Waiting Time

The maximum time a train can wait for another train to arrive in order to take the passengers aboard

Minimum Circulation Time

Time taken to end the arrived journey, change crew, turn around, set the information of the new journey, start a new journey for the arrived train

Minimum Stopping Time

Minimum allowed time for a train to wait on the platform according to the defined business rules

network

the entire railway infrastructure managed by an infrastructure manager

Partial Train Cancellation

Cancel parts of the train journey. E.g., Train 00715 Interlaken - Spiez - Bern - Olten - Basel -> Interlaken - Spiez - Bern

Path

Path means the infrastructure capacity needed to run a train between two places over a given time-period (Route defined in time and space).

Passenger Information Time

The duration of the platform change announcement

Pay Load Type

The contents loaded in a train. e.g., Dangerous goods is a type of the payload

Platform Change

A change in the arrival/ departure platform. E.g., Train 00175 arrival in Bern platform 3 -> Train 00175 arrival in Bern platform 7

Platform Change Time

Time for a passenger to move from the planned arrival platform to the new arrival platform

Reaction Time

In semi automatic conflict solution, the Dispatcher can decline the executed dispatching measure and override it

Route Change

To change the assigned network of the train, including a change in the assigned stops. E.g., planned journey: Interlaken -> Spiez -> Bern -> Basel New Plan: Spiez -> Zurich -> Basel

Start Occupancy Location

The location point where the infrastructure element (track, signal, switch, etc..) occupation has started

Start Occupancy Time

The timestamp where the infrastructure element (track, signal, switch, etc..) occupation has started

Timestamp

The date and time formatted in YYYY-MM-DD hh:mm:ss.SSSZ as per ISO 8601

Track Change

To change the assigned track to a train while maintaining the same journey stops

Train Activate

Activate a deactivated train

Train Consist Change

Add and/or remove wagons from the train or any other attribute in the train consist

Train Deactivate

Deactivate an active/ standby train

Train Sequence Change

Change in the train sequence among the other trains on the network

Train Standby

Change the status of a train to standby (on hold until the train run starts)

22.2 Abbreviations

ATO Automatic Train Operation

CMS Capacity Management system

HMI Human Machine Interface

KPI Key Performance Indicator

RIM Rail Infrastructure Manager

ROC Rail Operating Company

TMS Traffic Management System

TSI Technical Specifications for Interoperability

DRAFT