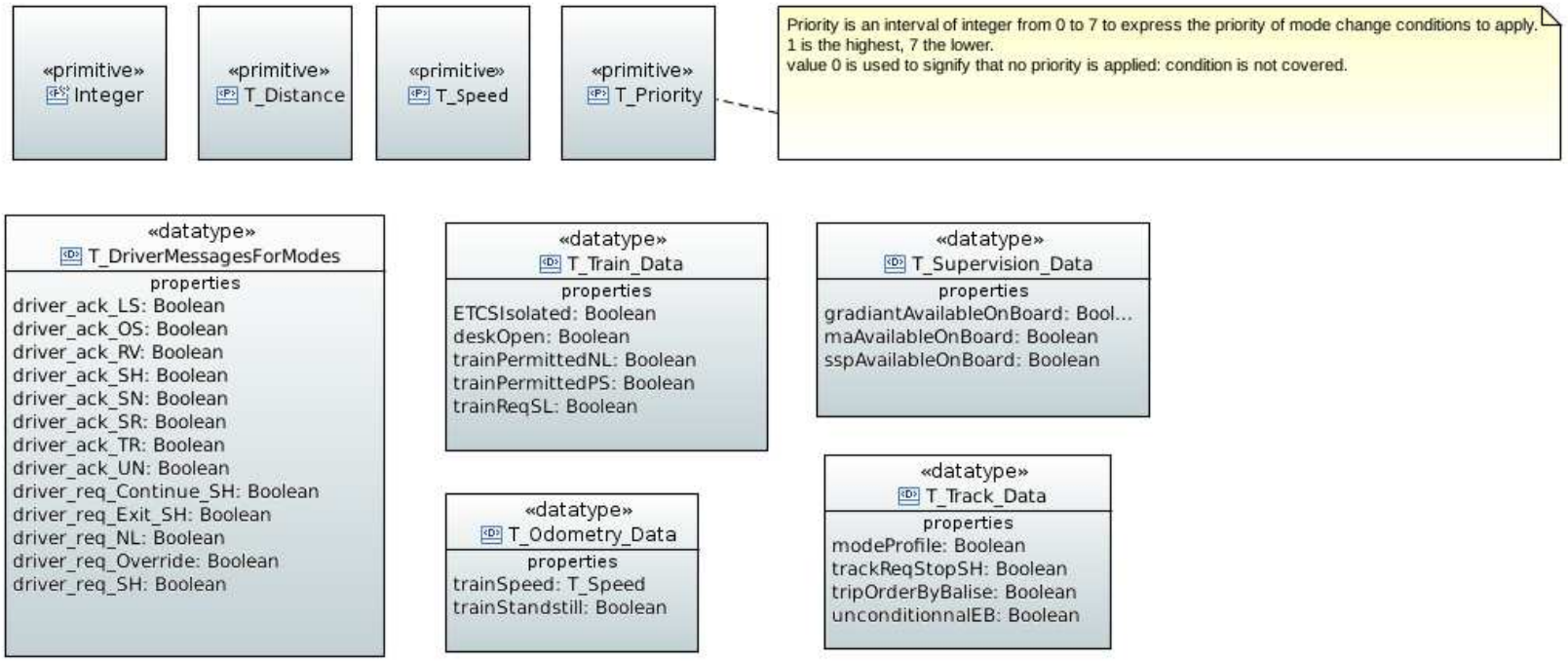
1. ONGOING WORK

1.1 DataType in SysML



1.2 Inputs

1.2.1 From trackside

Name	Type	Description	Related req
Dist_level_transition	D_LEVEL_TR	Information issue from packet 41	SRS-26 §5.10, 7.4.2.9, 7.4.2.11.2
Required_level_transition	M_LEVEL_TR	Information issue from packet 41 or 46	SRS-26 §5.10, 7.4.2.9, 7.4.2.11.2
Id_NTC_level_transition	NID_NTC	Information issue from packet 41 or 46	SRS-26 §5.10, 7.4.2.9, 7.4.2.11.2
Length_ack_level_transition	L_ACKLEVELTR	Information issue from packet 41	SRS-26 §5.10, 7.4.2.9, 7.4.2.11.2
Dist_ma_mode	D_MAMODE	Information issue from packet 80 "The max safe front end of the train is inside the {OS/LS/SH} area"	SRS-26 §4.6, 5.7, 5.9, 5.19, 7.4.2.26
Available_ma_mode	M_MAMODE	Information issue from packet 80 "A mode profile for {OS/LS/SH} area has been received and is used" or "A mode profile for {OS/LS/SH} area is on-board"	SRS-26 §4.6, 5.7, 5.9, 5.19, 7.4.2.26
Speed_ma_mode	V_MAMODE	Information issue from packet 80 SRS-26 §5.19.3.2 "The speed is lower than the Limited Supervision mode speed limit (national value, or value given in the mode profile)." + 5.7.3.2 + 5.9.3.2	SRS-26 §4.6, 5.7, 5.9, 5.19, 7.4.2.26
Length_ma_mode	L_MAMODE	Information issue from packet 80	SRS-26 §4.6, 5.7, 5.9, 5.19,

		"The max safe front end of the train is inside the {OS/LS/SH} area"	7.4.2.26
Length_ack_ma_mode	L_ACKMAMODE	Information issue from packet 80 "An ackn. request for {OS/LS/SH} is displayed to the driver"	SRS-26 §4.6, 5.7, 5.9, 5.19, 7.4.2.26
Qualif_ma_mode	Q_MAMODE	Information issue from packet 80 *Todo : used for mode management ?*	SRS-26 §4.6, 5.7, 5.9, 5.19, 7.4.2.26
Dist_start_reversing_area	D_STARTREVERSE	Information issue from packet 138 SRS-26 §5.13.1.2 "The area where initiation of reversing will be possible is announced to the ERTMS/ETCS on-board equipment by trackside"	SRS-26 §4.6, 5.13, 7.4.2.34
Length_reverse_area	L_REVERSEAREA	Information issue from packet 138 SRS-26 §5.13.1.2 "The area where initiation of reversing will be possible is announced to the ERTMS/ETCS on-board equipment by trackside"	SRS-26 §4.6, 5.13, 7.4.2.34
	D_REVERSE	Information issue from packet 138 *Todo : used for mode management ?*	
	L_REVERSE	Information issue from packet 138 *Todo : used for mode management ?*	
Track_Req_stop_shunting	boolean	Packet 135 received	SRS-26 §4.6, 5.8, 7.4.2.31
Track_Req_stop_staff_resp	boolean	Packet 137 received	SRS-26 §4.6, 5.8, 7.4.2.31
	V_NVSHUNT	National value by default or from packet 3 To compare to Speed_ma_mode *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVSTFF	National value by default or from packet 3	SRS-26 §4.6, 7.4.2.1.1

		Todo : to clarify	
	V_NVONSIGHT	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVLIMSUPERV	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVUNFIT	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVREL	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	D_NVROLL	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVALLOWOVERTRP	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	V_NVSUPOVTRP	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	D_NVOVTRP	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	T_NVOVTRP	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	D_NVPOTRP	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	D_NVSTFF	National value by default or from packet 3 *Todo : to clarify*	SRS-26 §4.6, 7.4.2.1.1
	T_NVCONTACT		SRS-26 §4.6, condition [41]

Todo : Discuss if management of supervision fo balise in SH or SR mode (packet 49 and 63) is on the scope of supervision function or mode management. Inked to condition [52], [54] of SRS-26 § 4.6

1.2.2 From driver

Name	Type	Description	Related req
Level_from_driver	T_LEVEL	ERTMS/ETCS level	SRS-26 §4.6, 4.7.2, 5.10
Driver_start	Boolean	Start	SRS-26 §4.6, 4.7.2, 5.4
Driver_req_override	Boolean	Override request	SRS-26 §4.6, 4.7.2, condition [37]
Driver_req_SH	Boolean	Shunting request	SRS-26 §4.6, 4.7.2, condition [5, 35]
Driver_req_continue_SH	Boolean	“Continue Shunting on desk closure” request	SRS-26 §4.6, 4.7.2, condition [26, 27]
Driver_req_exit_SH	Boolean	“Exit of Shunting” request	SRS-26 §4.6, 4.7.2, condition [19]
Driver_req_NL	Boolean	Non Leading request	SRS-26 §4.6, 4.7.2, condition [46, 47]
Driver_ack_Level_tr	Boolean	Ackn of level transition	SRS-26 §4.6, 4.7.2, 5.10.4
Driver_ack_LS	Boolean	Ackn of Limited Supervision mode	SRS-26 §4.6, 4.7.2, condition [70]
Driver_ack_OS	Boolean	Ackn of On Sight mode	SRS-26 §4.6, 4.7.2, condition [15]

Driver_ack_SH	Boolean	Ackn of Shunting mode	SRS-26 §4.6, 4.7.2, condition [50]
Driver_ack_SR	Boolean	Ackn of Staff Resp. mode	SRS-26 §4.6, 4.7.2, condition [8]
Driver_ack_UN	Boolean	Ackn of Unfitted mode	SRS-26 §4.6, 4.7.2, condition [60]
Driver_ack_RV	Boolean	Ackn of Reversing mode	SRS-26 §4.6, 4.7.2, condition [59]
Driver_ack_SN	Boolean	Ackn of SN mode	SRS-26 §4.6, 4.7.2, condition [58]
Driver_ack_TR	Boolean	Ackn of Train Trip	SRS-26 §4.6, 4.7.2, condition [7, 62, 63, 68]
	Boolean	Ackn for Post Trip distance exceeded *(supervision ?)*	SRS-26 §4.6, 4.7.2, SRS-26 § 3.14.1.7.4
	Boolean	Ackn for reversing distance exceeded *(supervision ?)*	SRS-26 §4.6, 4.7.2, SRS-26 § 3.14.1.7.1
		SR mode speed limit and distance *(supervision ?)*	SRS-26 §4.6, 4.7.2, SRS-26 § 3.11.7.1.3
		Isolation *TODO :Clarify if the Driver isolate the on-board equipment by a switch (as describe in subset 034) or by a command on DMI*	SRS-26 §4.6, 4.7.2, condition [1]

1.2.3 Desk/Train (subset-034)

Name	Type	Description	Related req

Train_req_SL	Boolean	Subset 034 :“The sleeping information is defined as a two state input with the following values: • Sleeping requested • Sleeping not requested.“	Subset-034, SRS-26 §4.6, condition [3, 14]
Train_permitted PS	Boolean	Subset 034 :“The passive shunting information is defined as a two state input with the following values: • Passive shunting permitted • Passive shunting not permitted.”	Subset-034, SRS-26 §4.6, condition [26, 30]
Train_permitted_NL	Boolean	Subset 034 :“The non-leading information is defined as a two state input with the following values: • Non-leading permitted • Non-leading not permitted.”	Subset-034, SRS-26 §4.6, condition [46, 47]
ETCS_Isolated	Boolean	Subset 034 :“The isolation information is defined as a two state output with the following values: • ETCS isolated • ETCS not isolated.”	Subset-034, SRS-26 §4.6, condition [1]
Desk_open	Boolean	Subset 034 :“The cab status information is defined as a two state input with the following values: • Cab active • Cab not active.	Subset-034, SRS-26 §4.6, condition [2,…]

		Note 1: The cab status input is used by ERTMS/ETCS onboard for various purposes as defined in [1] or by an STM as defined in [3]. The expression "desk open" in [1] is equivalent to "Cab active" and "desk closed" in [1] is equivalent to "Cab not active".” *TODO: clarify for how many Cab/desk we need this information*	
Direction_Controller	{Forward, Neutral, Backward}	“The direction controller information is defined as a three state input with the following values: • Forward • Neutral • Backward. The notion of forward direction shall correspond to the train orientation defined by the active (virtual) cab as defined in **Erreur ! Source du renvoi introuvable.**, i.e. when the direction controller is in forward position, this means that the train movement will be in the direction of the active (virtual) cab. If no cab is active the direction controller information may have any value, but shall be ignored by ERTMS/ETCS onboard. Note: The direction controller input is used by ERTMS/ETCS onboard to prevent train movement which conflicts with the current position of the direction controller in the active cab and to detect the driver's intention to reverse, which is one of the conditions for entering Reversing mode. The direction controller input is also used by an STM as defined in [3].”	Subset-034, SRS-26 §5.13.1.4

1.2.4 From other functions

Name	Type	Description	Related req
Train_position		*From calculate train position, structure ?*	
Train_speed		*From odometer ?*	
Fault_detected		*Fault detected by in-board, the system is going in system failure mode*	SRS-26 §4.6, condition [13]
EOA_overpassed		*From supervision , for trip mode*	SRS-26 §4.6, condition [12, 16]

1.2.5 Missing data for the mode transition conditions SRS-26 §4.6

Name	Type	Description	Related req
Train_standstill	Boolean	*Form the speed ?*	SRS-26 §4.6, condition [3,…]
On-boardPowered	Boolean		SRS-26 §4.6, condition [4,29]
		"The onboard reacts according to a linking reaction set to "trip", "the train/engine receives and uses a trip order given by balise", "unconditional emergency stop message is accepted"	SRS-26 §4.6, condition [17, 18, 20, 32]
		"a National Trip Procedure is active"	SRS-26 §4.6, condition [35, 38]
		"override" function is active" *TODO maybe internal data*	SRS-26 §4.6, condition [42, 46]
		"The system version number X of a received balise telegram is greater than the highest version number X supported by the on-board equipment"	SRS-26 §4.6, condition [65]
		"A balise group contained in the linking information is passed in the unexpected direction"	SRS-26 §4.6, condition [66]

1.3 Outputs

TODO

1.3.1 To trackside

Name	Type	Description	Related req

M_MODE (Packets 0, 1)

M_LEVEL (Packets 0, 1)

NID_NTC (Packets 0, 1)

1.3.2 To driver

Name	Type	Description	Related req

- SRS-26 §4.7.2

ERTMS/ETCS Mode
Current ERTMS/ETCS level
Trip reason
Plain text information
Reversing allowed
Override status
Shunting refused by RBC
Shunting request not answered by RBC
Entry in FS/OS
Level transition announcement
SR mode proposed
OS/LS/SH mode proposed
SN mode proposed
UN mode proposed
RV mode proposed
Brake reason

1.3.3 Desk/Train (subset-034)

Name	Type	Description	Related req
EB_commanded	boolean	Subset 034 : “The emergency brake command (EBC) is defined as a two state output with the following values: • Emergency brake commanded • Emergency brake not commanded.”	Subset-034, SRS-26 §4 some modes request EB command

1.3.4 To other function

Name	Type	Description	Related req
Status_of_mission	{Start, End, On-going}	Information necessary to manage exchange with driver and RBC + storage of information	SRS-26 §5.4.3, SRS-26 §5.5.3.1

- Ask establishment of a communication session (see SRS-26 §3.4.2)
- Send position report at modes or levels change (SRS-26 §3.5.6.1.4)
- Selection of speed restriction depending on Modes (SRS-26 § 3.10.2.2)

1.4 Internal

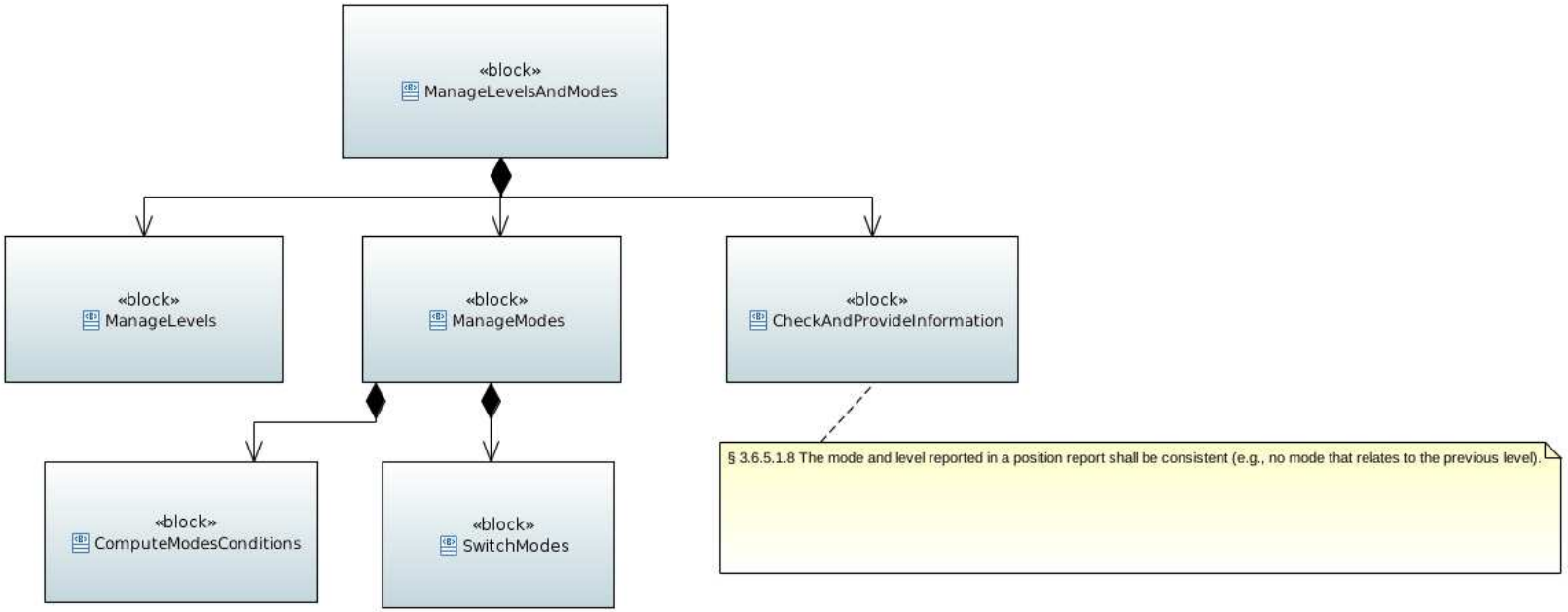
TODO

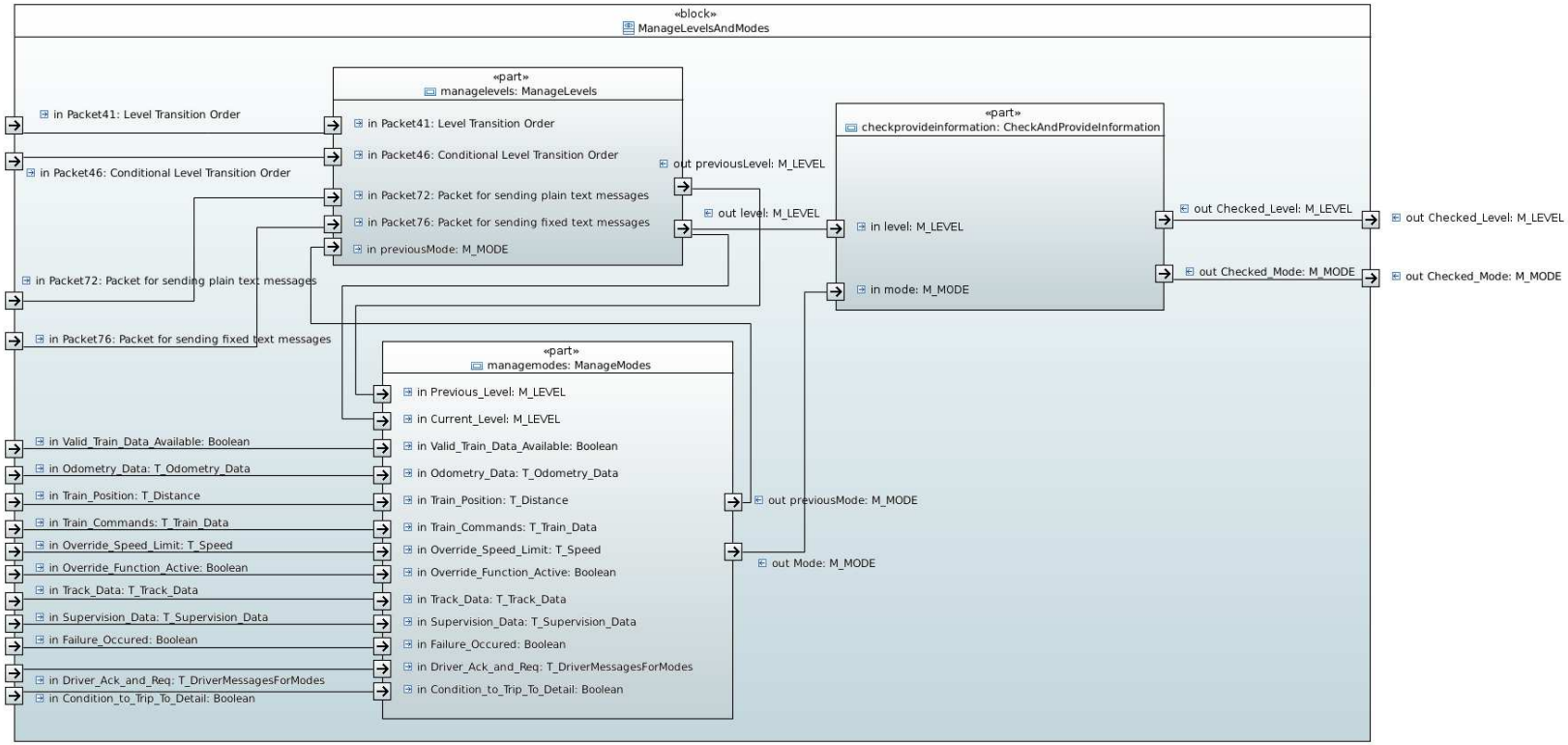
Name	Type	Description	Related req

- Current Level
- Current Mode
- Previous Level
- Previous Mode
- List of Required Level
- List of verified transition conditions

1.5 Architecture

1.5.1 High level





1.5.2 ProvideInformation

1.5.2.1.1 Description

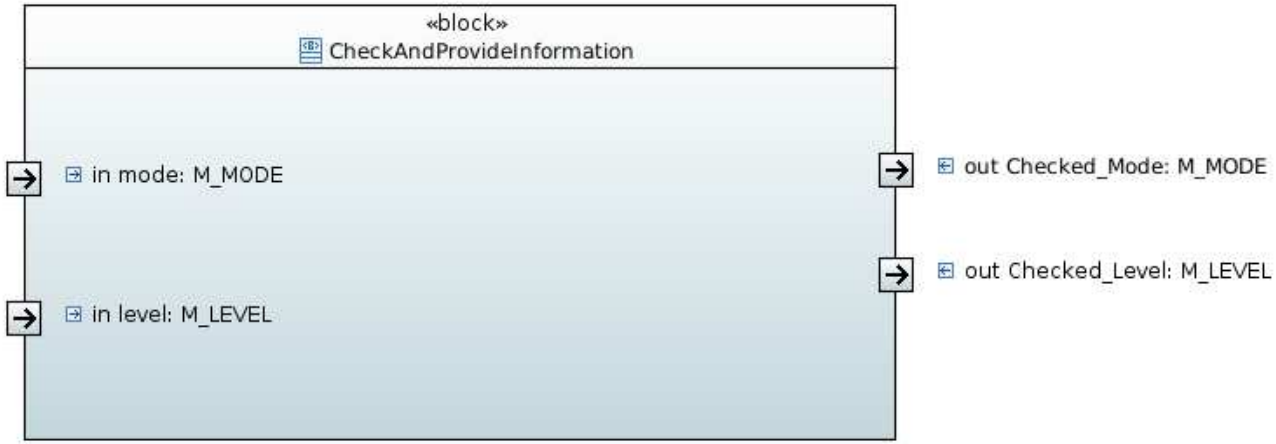
TODO

- *To provide level and mode to apply to other function*

- *To request EB ?*
- *To req message to send to driver*
- *To check that computed mode and Level are coherent (indeed, unfitted mode and Level 0) cf*

3.6.5.1.8	*The mode and level reported in a position report shall be consistent (e.g., no mode that relates to the previous level).*

Architecture of the function to clarify in function of the allocated tasks.



1.5.2.1.2 Inputs

1.5.2.1.3 Outputs

1.5.2.1.4 Requirements

SRS-26 § 3:

A set of requirements which needs mode or level information:.

3.5.2.4	The on-board shall establish a communication session a) At Start of Mission (only if level 2 or 3). b) If ordered from trackside. c) If a mode change, not considered as an End of Mission, has to be reported to the RBC (only if level 2 or 3) d) If the driver has manually changed the level to 2 or 3 e) When the train front reaches the end of an announced radio hole f) When the previous communication session is considered as terminated due to loss of safe radio connection (refer to 3.5.4.2.1) g) When a Start of Mission procedure, during which no communication session could be established, is completed in level 2 or 3
3.6.5.1.4	The on-board equipment shall send position reports as requested by the RBC in the position report parameters. In addition, it shall also send a position report if at least one of the events listed hereafter occurs: a) The train reaches standstill, if applicable to the current mode. b) The mode changes. c) The driver confirms train integrity. d) A loss of train integrity is detected. e) The train passes a RBC/RBC border with its min safe rear end. f) The train passes a level transition border (from level 2/3 to level 0, NTC, 1) with its min safe rear end. g) The level changes.

	h) A communication session is successfully established. i) Intentionally moved. j) The train passes an LRBG compliant balise group (see 3.6.2.2.2), if no position report parameters are stored on-board. k) The train passes a RBC/RBC border with its max safe front end.
3.6.5.1.8	The mode and level reported in a position report shall be consistent (e.g., no mode that relates to the previous level).
3.7.1.1	To control the train movement in an ERTMS/ETCS based system the ERTMS/ETCS on-board equipment shall be given information from the trackside system both concerning the route set for the train and the track description for that route. The following information shall be given from the trackside a) Permission and distance to run, the Movement Authority (MA) (see section **Erreur ! Source du renvoi introuvable.**) b) When needed, limitations related to the movement authority, i.e. Mode profile for On Sight, Limited Supervision or Shunting and signalling related speed restriction (see sections **Erreur ! Source du renvoi introuvable.** and **Erreur ! Source du renvoi introuvable.**). Mode profile and Signalling related Speed restriction shall always be sent together with the MA to which the information belongs c) Track description covering as a minimum the whole distance defined by the MA. Track description includes the following information • The Static Speed Profile (SSP) (see section **Erreur ! Source du renvoi introuvable.**).

	• The gradient profile (see section **Erreur ! Source du renvoi introuvable.**). • Optionally Axle load Speed Profile (ASP) (see section **Erreur ! Source du renvoi introuvable.**) • Optionally Speed restriction to ensure a given permitted braking distance (see section 3.11.11) • Optionally track conditions (see section **Erreur ! Source du renvoi introuvable.**). • Optionally route suitability data (see section **Erreur ! Source du renvoi introuvable.**). • Optionally areas where reversing is permitted (see section **Erreur ! Source du renvoi introuvable.**). • Optionally changed adhesion factor (see section **Erreur ! Source du renvoi introuvable.**). d) Linking information when available.
3.11.7.1	The value of the mode related speed restriction shall be determined by the corresponding national value or the corresponding default values if the national values are not applicable.
3.11.7.1.1	Exception 1: For the modes On Sight, Limited Supervision and Shunting the speed limit can also be given from the trackside. The speed limit given from the trackside shall prevail over the National value and the default value
3.11.7.1.2	Exception 2: For the mode Reversing there is no National/Default value. The speed limit is always given from trackside.

3.11.7.1.3	Exception 3: For the mode Staff Responsible the speed limit can also be entered by the driver. The speed limit given by the driver shall prevail over the National/Default value.
3.12.3.4.2	The following events can be used to define the start condition: • Location • Mode (start display as soon as in mode) • Level (start display as soon as in level)
3.12.3.4.3	The following events can be used to define the end condition: • Location • Time • Mode (stop display when leaving mode) • Level (stop display when leaving level)
3.14.1.3	If the emergency brake command was triggered due to a trip condition (see chapter 4) the emergency brake command shall be released at standstill and after driver acknowledgement of the trip condition.
3.14.1.7.1	If the brake command was triggered due to an overpassed reversing distance related to a reversing area or due to any further movement in the direction opposite to the train orientation while the reversing distance is still overpassed, the brake command shall be released if the reversing distance becomes extended so that the reversing distance is no longer overpassed, or at standstill after driver acknowledgement.
3.14.1.7.3	If the brake command was triggered due to the detection of a train movement while modifying/revalidating train data or while entering SR speed/distance limits, the brake command shall be released at standstill and after driver acknowledgement..
3.14.1.7.4	If the brake command was triggered due to an overpassed distance allowed for moving

	backwards in Post Trip mode or due to any further movement in the direction opposite to the train orientation while the distance allowed for moving backwards in Post Trip mode is still overpassed, the brake command shall be released at standstill and after driver acknowledgement.
3.15.1.3.3	As soon as the on-board equipment has established the session with the Accepting RBC, it shall send its Train Data unless it is in sleeping or non leading mode.
3.15.3.1	ERTMS/ETCS shall allow Splitting and Joining using the normal supervision functions available (e.g. On-sight, Shunting).
3.15.8.1	After being switched off (i.e. once in No Power mode), the ERTMS/ETCS on-board equipment shall be capable, if fitted with, to detect and record whether the engine has been moved or not, during a period of at least 72 hours.
3.15.8.2	When powered on again, the ERTMS/ETCS on-board equipment shall use, if available, the memorised information about cold movement in order to update the status of information stored by on-board equipment (see chapter 4 section 4.11 for details).
3.15.8.3	Note: information memorised by Cold Movement Detection function is considered as not available if: a) no Cold Movement Detection function is implemented in the ERTMS/ETCS on-board equipment, OR the Cold Movement Detection function has encountered a condition, during the No Power period, which prevents the use of the Cold Movement information (e.g. the battery ensuring the Cold Movement Detection function has run down during the No Power period).

1.6 ManageLevels

1.6.1 Description

TODO

1.6.2 Inputs- Outputs

Data	I/O	type	ok
announcement	I (BG/RBC)	transition information pos/level	x
announcement	O (DMI)	pos/level	
level trans	I (BG)	conditional / immediate transition	x
position	I data	estimated front	
train mode	I / data	current mode of train	
MA	I (BG/RBC)	new MA after transitions	x
priority table	I (BG/RBC)	list of levels with prio	x
level	I / data	current level	
mobile terminal	I / data	at least 1 terminal available	
NTC system	I / data	National System X is available	
selected lt	O (DMI)	level transition info	
available level	O (DMI)	level information / selectable	
contact order	I (BG)	message order	x

first section desc	I	MA + track desc / LOA	x?
train data	O (RBC)	?	x
level report	O (DMI?)	level + position report	x?
terminate order	I (BG/RBC)	order to terminate comm session	x
message "no enter"	O (RBC)	msg won't enter announced RBC area	
speed limit	I / data / ?	speed limit unequipped	
position	I / data	min safe rear end	
first section desc	I	MA (lvl 2/3) + track desc	x?
position report	O (RBC)	position report after transition	x
first section desc	I	MA (lvl 1) + track desc	x?
interface STM	I / data	bool	
conditional lt	I		x?
level change manual	I (DMI)	level	
contact info	I / data	id + tel number	x?
level change report	O (RBC)	level selection	x?
position	I	max safe front	
ack poisition	I	position	
driver ack	I (DMI)	level change ack from driver	x
service brake	O	de/activate service brake	
train trip	O	train tripped	

1.6.3 Requirements

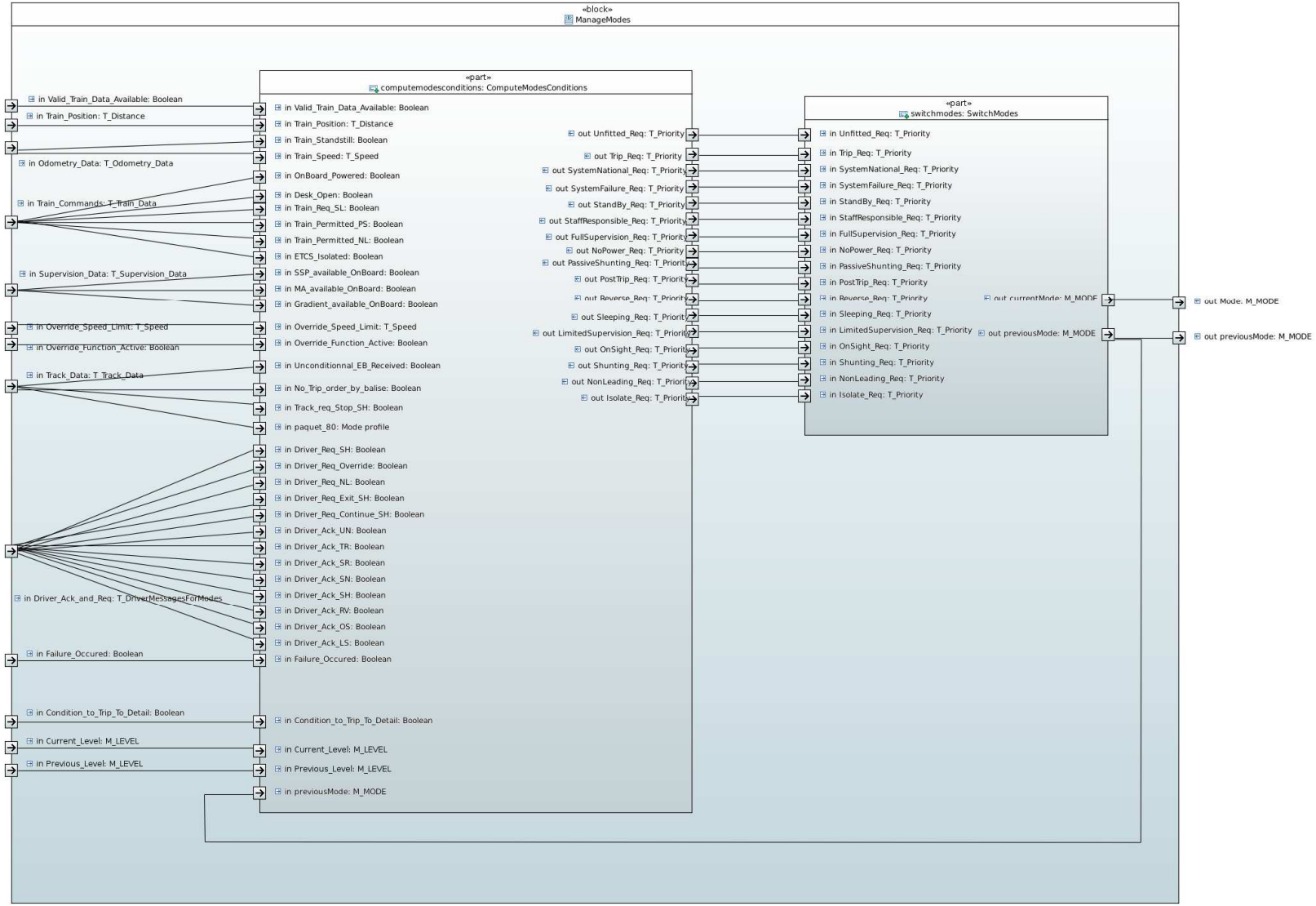
SRS-26 § 3:

3.18.4.2.1	The driver shall have the possibility to enter the ERTMS/ETCS level during a start of a mission.
3.18.4.2.2	The ERTMS/ETCS level information is required for train operation except sleeping mode.
3.18.4.2.3	In normal operation after the start of mission the driver shall not have to select the ERTMS/ETCS level (all other level transitions are executed automatically).
3.18.4.2.4	For operational fallback situations: at standstill, the onboard equipment shall allow the driver to change the ERTMS/ETCS level..
3.18.4.2.5	If the table of supported levels given by trackside is available, the selection of level by the driver shall be limited to those contained in this table. If the table of trackside supported levels is not available, the driver can select any level within a default list configured on-board.
3.18.4.3.2	If the driver enters level 2/3, at start of mission, the ERTMS/ETCS on-board equipment shall offer the driver different means to select the RBC contact information (including RBC identity, RBC telephone number, and the identity of the radio network to be used), for details see chapter 5, Start of Mission procedure.
3.18.4.3.3	In normal operation after the start of mission, the driver shall have no further possibility to modify the RBC contact information (all further modifications of this data are executed automatically). Exception: after a manual level change to level 2/3 and if either no Mobile Terminal is registered to a Radio Network or no valid RBC-ID/phone number is available, the ERTMS/ETCS on-board equipment shall request the driver to select the RBC contact information by the same means as for Start of Mission.

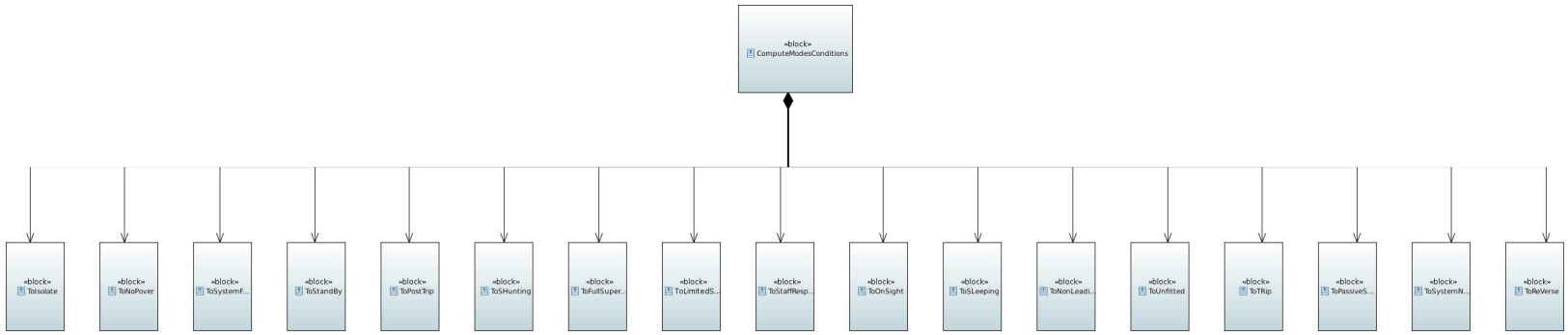
SRS-26 § 5.10:

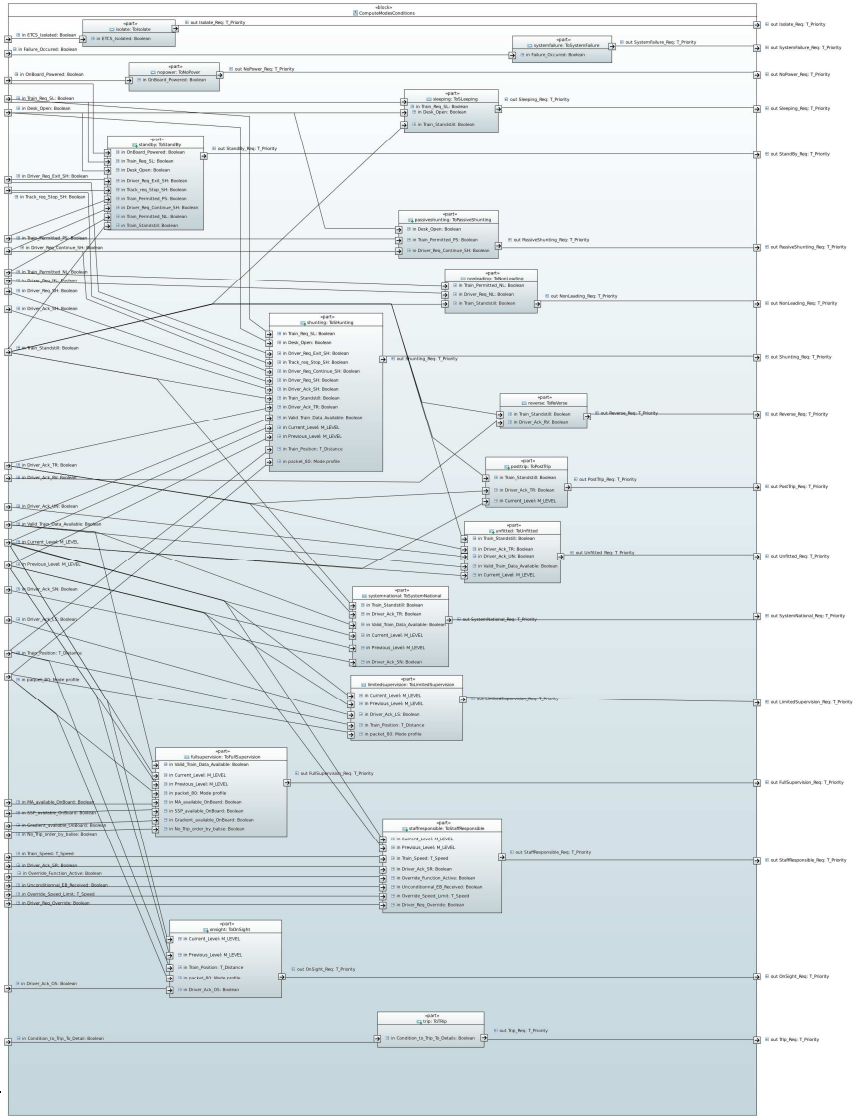
To analyse

1.7 ManageModes


«block»
ManageModes
«part»
computemodesconditions: ComputeModesConditions
in Valid_Train_Data_Available: Boolean
in Train_Position: T_Distance
in Odometry_Data: T_Odometry_Data
in Train_Commands: T_Train_Data
in Supervision_Data: T_Supervision_Data
in Override_Speed_Limit: T_Speed
in Override_Function_Active: Boolean
in Track_Data: T_Track_Data
in Driver_Ack_and_Req: T_DriverMessagesForModes
in Failure_Occured: Boolean
in Condition_to_Trip_To_Detail: Boolean
in Current_Level: M_LEVEL
in Previous_Level: M_LEVEL
in Valid_Train_Data_Available: Boolean
in Train_Position: T_Distance
in Train_Standstill: Boolean
in Train_Speed: T_Speed
in OnBoard_Powered: Boolean
in Desk_Open: Boolean
in Train_Req_SL: Boolean
in Train_Permitted_PS: Boolean
in Train_Permitted_NL: Boolean
in ETCS_Isolated: Boolean
in SSP_available_OnBoard: Boolean
in MA_available_OnBoard: Boolean
in Gradient_available_OnBoard: Boolean
in Override_Speed_Limit: T_Speed
in Override_Function_Active: Boolean
in Unconditionnal_EB_Received: Boolean
in No_Trip_order_by_balise: Boolean
in Track_req_Stop_SH: Boolean
in paquet_80: Mode profile
in Driver_Req_SH: Boolean
in Driver_Req_Override: Boolean
in Driver_Req_NL: Boolean
in Driver_Req_Exit_SH: Boolean
in Driver_Req_Continue_SH: Boolean
in Driver_Ack_UN: Boolean
in Driver_Ack_TR: Boolean
in Driver_Ack_SR: Boolean
in Driver_Ack_SN: Boolean
in Driver_Ack_SH: Boolean
in Driver_Ack_RV: Boolean
in Driver_Ack_OS: Boolean
in Driver_Ack_LS: Boolean
in Failure_Occured: Boolean
in Condition_to_Trip_To_Detail: Boolean
in Current_Level: M_LEVEL
in Previous_Level: M_LEVEL
in previousMode: M_MODE
out Unfitted_Req: T_Priority
out Trip_Req: T_Priority
out SystemNational_Req: T_Priority
out SystemFailure_Req: T_Priority
out StandBy_Req: T_Priority
out StaffResponsible_Req: T_Priority
out FullSupervision_Req: T_Priority
out NoPower_Req: T_Priority
out PassiveShunting_Req: T_Priority
out PostTrip_Req: T_Priority
out Reverse_Req: T_Priority
out Sleeping_Req: T_Priority
out LimitedSupervision_Req: T_Priority
out OnSight_Req: T_Priority
out Shunting_Req: T_Priority
out NonLeading_Req: T_Priority
out Isolate_Req: T_Priority
«part»
switchmodes: SwitchModes
in Unfitted_Req: T_Priority
in Trip_Req: T_Priority
in SystemNational_Req: T_Priority
in SystemFailure_Req: T_Priority
in StandBy_Req: T_Priority
in StaffResponsible_Req: T_Priority
in FullSupervision_Req: T_Priority
in NoPower_Req: T_Priority
in PassiveShunting_Req: T_Priority
in PostTrip_Req: T_Priority
in Reverse_Req: T_Priority
in Sleeping_Req: T_Priority
in LimitedSupervision_Req: T_Priority
in OnSight_Req: T_Priority
in Shunting_Req: T_Priority
in NonLeading_Req: T_Priority
in Isolate_Req: T_Priority
out currentMode: M_MODE
out previousMode: M_MODE
out Mode: M_MODE
out previousMode: M_MODE

1.7.1 Compute Modes Conditions





1.7.1.1 ToIsolate

1.7.1.1.1 Description

The Isolate Mode can be reached from any other mode with the highest priority.

To leave this mode a maintenance procedure is required.

1.7.1.1.2 Inputs

- ETCS_Isolated : Isolation request by the driver via Isolation Switch : interface with the train

1.7.1.1.3 Outputs

- Isolate_Req: priority 0 (not required) or 1 (required)

1.7.1.1.4 Requirements

SRS-26 § 4.4.3:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[1]	The driver isolates the ERTMS/ETCS on-board equipment.

1.7.1.2 ToNoPower

1.7.1.2.1 Description

The NoPower mode can be reached from all modes except Isolate

1.7.1.2.2 Inputs

- On-boardPowered : powered on of EVC

Commentaire [MD1]: Input to clarify, who provides it ?

1.7.1.2.3 Outputs

- NoPower_Req : priority 0 (not required) or 2 (required)

1.7.1.2.4 Requirements

SRS-26 § 4.4.4:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[29]	the ERTMS/ETCS on-board equipment is NOT powered

1.7.1.3 ToSystemFailure

1.7.1.3.1 Description

SystemFailure mode can be reached from all modes except Isolate and NoPower.

From SystemFailure mode, the system can only switch to NoPower or Isolate modes.

1.7.1.3.2 Inputs

How are detected and reported Safety system failures?

Commentaire [MD2]: This inoput shall be clarified.

1.7.1.3.3 Outputs

1.7.1.3.4 Requirements

SRS-26 § 4.4.5:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[13]	The ERTMS/ETCS on-board equipment detects a fault that affects safety

1.7.1.4 ToSleeping

1.7.1.4.1 Description

Sleeping mode can be reached from StandBy and PassiveShunting mode. It is related to the sleeping cab.

1.7.1.4.2 Inputs

- Desk_open: cabine is open or closed
- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? how is store the information provided to DMI ?
- Train_req_SL: sleeping signal

1.7.1.4.3 Outputs

1.7.1.4.4 Requirements

SRS-26 § 4.4.6:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[14]	(The “sleeping” input signal is received) AND (train is at standstill) AND (all desks connected to the ERTMS/ETCS on-board equipment are closed)

Commentaire [MD3]: What means “all desks open” ? for how many desk is storesd the information ? all the desk of the train ?

SRS-26 § 5.5: procedure end of mission

To analyse

SRS-26 § 5.12: procedure change of train orientation

To analyse

1.7.1.5 ToStandBy

1.7.1.5.1 Description

StandBy mode is the default mode: it is selected at power-on and allow initialisation of train data.

It can be reached from all modes except Isolate, SystemFailure and Trip.

From standby mode the system can switch to all the modes except Passive shunting, PostTrip and reverse.

Commentaire [MD4]: To check with the start of mission procedure.

1.7.1.5.2 Inputs

- Desk_open: cabine is open or closed
- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? how is store the information provided to DMI ?
- On-boardPowered : powered on of EVC
- Train_req_SL: sleeping signal
- Train_permitted PS : passive Shunting information (see subet 034)
- Train_permitted_NL: non leading information (see subset 034)
- Driver_req_continue_SH: “”Continue Shunting on desk closure” function is not active”
- Driver_req_exit_SH: “driver selects “exit Shunting””
- Track_Req_stop_shunting: ”Stop Shunting on desk opening” information is stored onboard “Driver_req_exit_SH

Commentaire [MD5]: Input to clarify, who provides it ?

1.7.1.5.3 Outputs

1.7.1.5.4 Requirements

SRS-26 § 4.4.7:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[2]	(a desk is open)
[3]	(no “go sleeping” input signal is received any more) AND (train is at standstill)
[4]	The ERTMS/ETCS on-board equipment is powered.

[19]	(driver selects “exit Shunting”) AND (train is at standstill).
[22]	(a desk is open) AND (”Stop Shunting on desk opening” information is stored onboard)
[27]	(desks are closed) AND (”Continue Shunting on desk closure” function is not active)
[28]	(desks are closed)
[30]	(desks are closed) AND (no “passive shunting” input signal is received)
[47]	(no “non leading” input signal is received any more) AND (train is at standstill)

Commentaire [MD6]: Does it mean that if stop shunting information from trackside is stored, this function is no more active , without taking into account driver command ?
See also condition [26] for PS and previous condition [22]

SRS-26 § 5.5: procedure end of mission

To analyse

SRS-26 § 5.12: procedure change of train orientation

To analyse

1.7.1.6 ToShunting

1.7.1.6.1 Description

To allow shunting movements, can be reached from SB, PS, FS, LS, SR, OS, UN, TR, PT, SN modes.

1.7.1.6.2 Inputs

- Desk_open: cabine is open or closed
- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? how is store the information provided to DMI ?
- Current Level
- Previous Level
- Driver_req_SH
- Driver_ack_SH
- Train_req_SL: sleeping signal

- Driver_req_continue_SH: “”Continue Shunting on desk closure” function is not active”
- Driver_req_exit_SH: “driver selects “exit Shunting””
- Track_Req_stop_shunting: ”Stop Shunting on desk opening” information is stored onboard “
- Available_ma_mode
- Dist_ma_mode
- Length_ma_mode
- Train_position
- “no valid Train Data is on-board “Driver_req_exit_SH
- Driver_ack_TR

1.7.1.6.3 Outputs

1.7.1.6.4 Requirements

SRS-26 § 4.4.8:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[5]	(train is at standstill) AND (ERTMS/ETCS level is 0 or NTC or 1) AND (driver selects Shunting mode)
[6]	(train is at standstill) AND (ERTMS/ETCS level is 2 or 3) AND (reception of the information “Shunting granted by RBC”, due to a Shunting request from the driver)
[23]	(a desk is open) AND (no ”Stop Shunting on desk opening” information is stored onboard)
[50]	(An ackn. request for Shunting is displayed to the driver) AND (the driver acknowledges) **see {5} here under**

Commentaire [MD7]: To clarify

Commentaire [MD8]: What is this information ?

Commentaire [MD9]: As for SB mode, this information merges information from driver and track ?

[51]	(A Mode Profile defining the entry of a Shunting area is used on-board) AND (The max safe front end of the train is inside the Shunting area)
[61]	(A Mode Profile defining a Shunting area is on-board) AND (The max safe front end of the train is inside the Shunting area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[68]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is 0 or NTC) AND (no valid Train Data is on-board)

{5} The request to acknowledge Shunting is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the “Entry in Shunting” procedure and the “Start Of Mission” procedure of SRS-SRS-26 §5

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.5: procedure end of mission

To analyse

SRS-26 § 5.6: procedure shunting initiated by driver

To analyse

SRS-26 § 5.7: procedure shunting with order from trackside

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

SRS-26 § 5.12: procedure change of train orientation

To analyse

1.7.1.7 ToFullSupervision

1.7.1.7.1 Description

Iti is a nominal mode in which all functions of supervision are activated in level 1, 2 or 3.

FullSupervision mode can be reached from SB, LS, SR, OS, UN, PT, SN modes.

1.7.1.7.2 Inputs

- "valid Train Data is stored on board"
- "MA + SSP +gradient are on-board"
- Available_ma_mode
- Current Level
- Previous Level
- "no trip order is given by balise"

Commentaire [MD10]: To clarify what is store, only value or also availability ? are default values defined ?

Commentaire [MD11]: Via which packet is tranfered this information ?

1.7.1.7.3 Outputs

1.7.1.7.4 Requirements

SRS-26 § 4.4.9:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[10]	(valid Train Data is stored on board) AND (MA + SSP +gradient are on-board) AND (no specific mode is required by a Mode Profile)
[25]	(ERTMS/ETCS level switches to 1,2 or 3) AND (MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile)
[31]	(MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile) AND (ERTMS/ETCS level is 2 or 3)
[32]	(MA+SSP+gradient are on-board) AND (no specific mode is required by a Mode Profile) AND (ERTMS/ETCS level is 1) AND (no trip order is given by balise)

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.8 ToUnfitted

1.7.1.8.1 Description

Unfitted is the nominal mode associated to level 0. It can be reached from modes SB, FS, LS, SR, OS, Tr and SN.

1.7.1.8.2 Inputs

- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? How is store the information provided to DMI ?
- Current Level
- Driver_ack_TR
- "valid Train Data is stored on board"
- Driver_ack_UN

1.7.1.8.3 Outputs

1.7.1.8.4 Requirements

SRS-26 § 4.4.10:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[21]	(ERTMS/ETCS level switches to 0) **see {2} here under**
[60]	(an acknowledgement request for UN mode is displayed to the driver) AND (the

	driver acknowledges)
[62]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is 0) AND (valid Train Data is on-board)

{2} This transition to the Unfitted mode is also a transition of level.. For further information, See the “Level Transition” procedure” (SRS-SRS-26 §5) for transitions from FS/SR/OS/LS to UN and the “Start Of Mission” procedure” (SRS-SRS-26 §5) for transition from SB to UN.

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.9 ToStaffResponsible

1.7.1.9.1 Description

StaffResponsible mode can be reached from SB, FS, LS, OS, UN, PT and SN modes.

1.7.1.9.2 Inputs

- Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? how is store the information provided to DMI ?
- Current Level
- Previous Level
- Driver_ack_SR
- Driver_req_override
- “the speed limit for triggering the “override” function”
- “Override function is active”
- “Unconditional emergency stop message has been received”

Commentaire [MD12]: To clarify

1.7.1.9.3 Outputs

1.7.1.9.4 Requirements

SRS-26 § 4.4.11:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[8]	(Staff Responsible mode is proposed to the driver) AND (driver acknowledges) **{4}**
[37]	(driver selects “override”) AND (train speed is under or equal to the speed limit for triggering the “override” function) **see {3} here under**
[44]	(“override” function is active) AND (ERTMS/ETCS level switches to 1) **see {3} here under**
[45]	(“override” function is active) AND (no unconditional emergency stop message has been received) AND (ERTMS/ETCS level switches to 2 or 3) **see {3} here under**

{3} See the “Override” procedure” of SRS-SRS-26 §5.

{4} The Staff Responsible mode is proposed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the “Start Of Mission” procedure and the "Train Trip" procedure of SRS-SRS-26 §5.

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.10 ToOnSight

1.7.1.10.1 Description

On Sight mode can be reached from SB, FS, LS, SR, UN, PT, SN modes.

1.7.1.10.2 Inputs

- Driver_ack_OS
- Available_ma_mode
- Dist_ma_mode
- Length_ma_mode
- Length_ack_ma_mode
- Current Level
- Previous Level
- Train_position

1.7.1.10.3 Outputs

1.7.1.10.4 Requirements

SRS-26 § 4.4.12:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[15]	(An ackn. request for On Sight is displayed to the driver) AND (the driver acknowledges) **see {1} here under**
[34]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[40]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area)
[73]	(A Mode Profile defining an On Sight area is on-board) AND (The max safe front end of the train is inside the On Sight area) AND (The estimated front end of the train is

	not inside an LS acknowledgement area)

{1} The request to acknowledge On Sight is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the “On Sight” procedure” of SRS-SRS-26 §5 (for transitions from FS/LS/UN to OS) and the "Start of mission" procedure (for transition from SB to OS).

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.9: procedure on sight

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.11 ToTrip

1.7.1.11.1 Description

TODO

1.7.1.11.2 Inputs

TODO

1.7.1.11.3 Outputs

1.7.1.11.4 Requirements

SRS-26 § 4.4.13:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[12]	(The train/engine overpasses the EOA/LOA with its min safe antenna position) AND

	(ERTMS/ETCS level is 1)
[16]	(The train/engine overpasses the EOA/LOA with its min safe front end) AND (ERTMS/ETCS level is 2 or 3).
[17]	The onboard reacts according to a linking reaction set to “trip”.
[18]	(the train/engine receives and uses a trip order given by balise) AND (override is not active)
[20]	(unconditional emergency stop message is accepted)
[35]	(driver selects Shunting mode) AND (The ERTMS/ETCS on-board equipment is interfaced to the National System through an STM) AND (a National Trip Procedure is active, **see {8} here under**)
[36]	(the identity of the over-passed balise group is not in the list of expected balises related to SR mode) AND (override is not active).
[38]	(The ERTMS/ETCS on-board equipment is interfaced to the National System through an STM) AND (The ERTMS/ETCS level switches to 0,1,2 or 3) AND (a National Trip Procedure is active) **see {8} here under**
[39]	(The ERTMS/ETCS level switches to 1,2 or 3) AND (no MA has been accepted)
[41]	(T_NVCONTACT is passed) AND (associated reaction is “train trip”)
[42]	(The train/engine overpasses the SR distance with its estimated front end) AND (override is not active)
[43]	(The train/engine overpasses the former EOA (when Override was activated) with the min safe antenna position) AND (override is not active), see {3} here under
[49]	(reception of information “stop if in shunting”) AND (override is not active)
[52]	(the identity of the over-passed balise group is not in the list of expected balise groups related to SH mode) AND (override is not active).
[54]	(reception of information “stop if in Staff Responsible”) AND (no list of expected balise groups related to SR mode has been received or the list of expected balise

Commentaire [MD13]:
FS, LS, OS -> TR
I : EOA overpassed + level

Commentaire [MD14]:
FS, LS, OS -> TR
I: EOA overpassed + level

Commentaire [MD15]:
FS, LS, OS -> TR
I : Linking reaction set to trip

Commentaire [MD16]:
FS, LS, SR, OS -> TR
I : Trip order given by balise + override mode ?

Commentaire [MD17]:
SB, FS, LS, SR, OS, UN, SN -> TR
I unconditional emergency stop message ?

	groups related to SR mode does not include the identity of the over-passed balise group) AND (override is not active)
[65]	(The system version number X of a received balise telegram is greater than the highest version number X supported by the on-board equipment) AND (ERTMS/ETCS level is 1, 2 or 3)
[66]	A balise group contained in the linking information is passed in the unexpected direction
[67]	(The ERTMS/ETCS level switches to level 1) AND (a trip order has been received) AND (override is not active)
[69]	Estimated train front end is in rear of the start location of either SSP or gradient profile stored on-board

{8} Refer to Subset-035 for details.

Commentaire [MD18]: Analyse of this mode in a future iteration.

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.12 ToPostTrip

1.7.1.12.1 Description

This mode can be reached only from trip mode, it allows to position the train in safe condition.

1.7.1.12.2 Inputs

- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? How is store the information provided to DMI ?
- Current Level
- Driver_ack_TR

1.7.1.12.3 Outputs

1.7.1.12.4 Requirements

SRS-26 § 4.4.14:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[7]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is different from 0, NTC)

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.13 ToNonLeading

1.7.1.13.1 Description

1.7.1.13.2 Inputs

- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? how is store the information provided to DMI ?
- Train_permitted_NL: non leading information (see subset 034)
- Driver_req_NL

1.7.1.13.3 Outputs

1.7.1.13.4 Requirements

SRS-26 § 4.4.15:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions

[46]	(Driver selects NON LEADING) AND (train is at standstill) AND (The “non leading” input signal is received)

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.12: procedure change of train orientation

To analyse

1.7.1.14 ToSystemNational

1.7.1.14.1 Description

1.7.1.14.2 Inputs

- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? How is store the information provided to DMI ?
- Current Level
- Previous Level
- Driver_ack_TR
- “valid Train Data is stored on board”
- Driver_ack_SN

1.7.1.14.3 Outputs

1.7.1.14.4 Requirements

SRS-26 § 4.4.17:

To analyse

SRS-26 § 4.6:

Condition	Content of the conditions

Id	
[56]	(the ERTMS/ETCS level switches to “NTC”)
[58]	(the ERTMS/ETCS level is “NTC”) AND (an acknowledgement request for SN mode is displayed to the driver) AND (the driver acknowledges)
[63]	(the driver acknowledges the train trip) AND (the train is at standstill) AND (the ERTMS/ETCS level is NTC) AND (valid Train Data is on-board)

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

1.7.1.15 ToReverse

1.7.1.15.1 Description

The Reverse mode can be reached in Level 1, 2 or 3 from FS, LS or OS modes.

1.7.1.15.2 Inputs

- Train_standstill or Train_speed: clarify if we have to check the speed (which one ?) or if the Odometry management function provide ? How is store the information provided to DMI ?
- Driver_ack_RV

1.7.1.15.3 Outputs

1.7.1.15.4 Requirements

SRS-26 § 4.4.18:

To analyse

SRS-26 § 4.6:

Condition	Content of the conditions

Id	
[59]	(train is at standstill) AND (driver has acknowledged the reversing) **see {6} here under**

{6} The request to acknowledge Reversing is displayed to the driver when certain conditions are fulfilled. These conditions are not specified here. See the “reversing” procedure of SRS-SRS-26 §5.

SRS-26 § 5.13: procedure train reversing

To analyse

1.7.1.16 To LimitedSupervision

1.7.1.16.1 Description

1.7.1.16.2 Inputs

- Driver_ack_LS
- Available_ma_mode
- Dist_ma_mode
- Length_ma_mode
- Length_ack_ma_mode
- Current Level
- Previous Level
- Train_position

1.7.1.16.3 Outputs

1.7.1.16.4 Requirements

SRS-26 § 4.4.19:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[70]	(An ackn. request for Limited Supervision is displayed to the driver) AND (the driver acknowledges) **see {7} here under**
[71]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area) AND (The ERTMS/ETCS level switches to 1,2 or 3)
[72]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area).
[74]	(A Mode Profile defining a Limited Supervision area is on-board) AND (The max safe front end of the train is inside the Limited Supervision area) AND (The estimated front end of the train is not inside an OS acknowledgement area)

{7} The request to acknowledge Limited Supervision is displayed to the driver only if certain conditions are fulfilled. These conditions are not specified here. See the “Limited Supervision” procedure” of SRS-SRS-26 §5 (for transitions from FS/OS/UN to LS) and the "Start of mission" procedure (for transition from SB to LS).

SRS-26 § 5.4: procedure Start of mission

To analyse

SRS-26 § 5.11: procedure train trip

To analyse

SRS-26 § 5.19: procedure limited supervision

To analyse

1.7.1.17 To PassiveShunting

1.7.1.17.1 Description

1.7.1.17.2 Inputs

- Desk_open: cabine is open or closed

- Train_permitted PS : passive Shunting information (see subet 034)
- Driver_req_continue_SH: “”Continue Shunting on desk closure” function is not active”

1.7.1.17.3 Outputs

1.7.1.17.4 Requirements

SRS-26 § 4.4.20:

To analyse

SRS-26 § 4.6:

Condition Id	Content of the conditions
[26]	(desks are closed) AND (”Continue Shunting on desk closure” function is active) AND (the “passive shunting” input signal is received)

Commentaire [MD19]: See cdtion [27] to SB

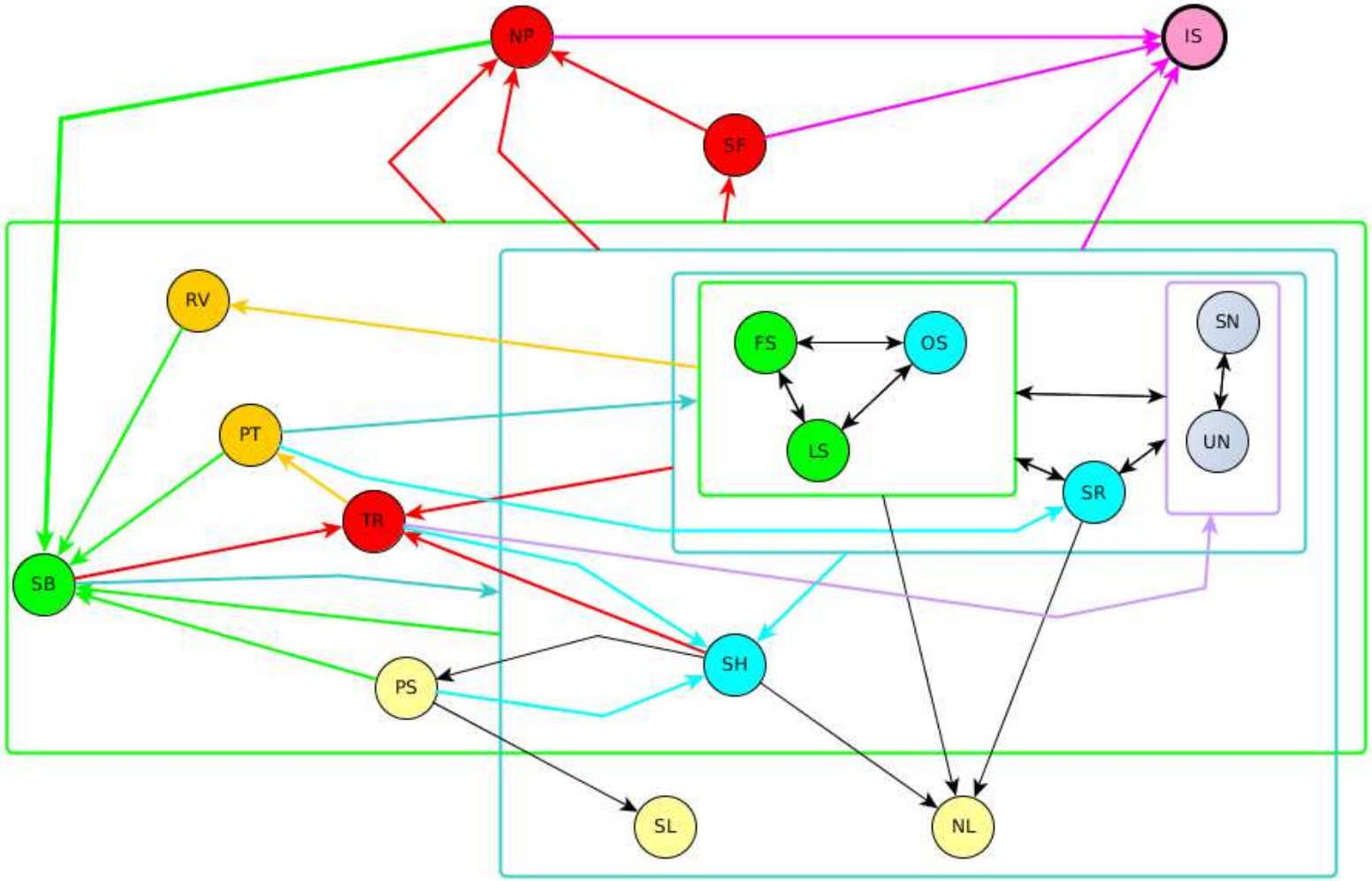
SRS-26 § 5.12: procedure change of train orientation

To analyse

1.7.2 SwitchMode

1.7.2.1.1 Description

This block is in charge to select the mode according conditions computed in “Compute Modes Conditions” block and priority defined in **SRS-26 § 4.6.1.**


NP
IS
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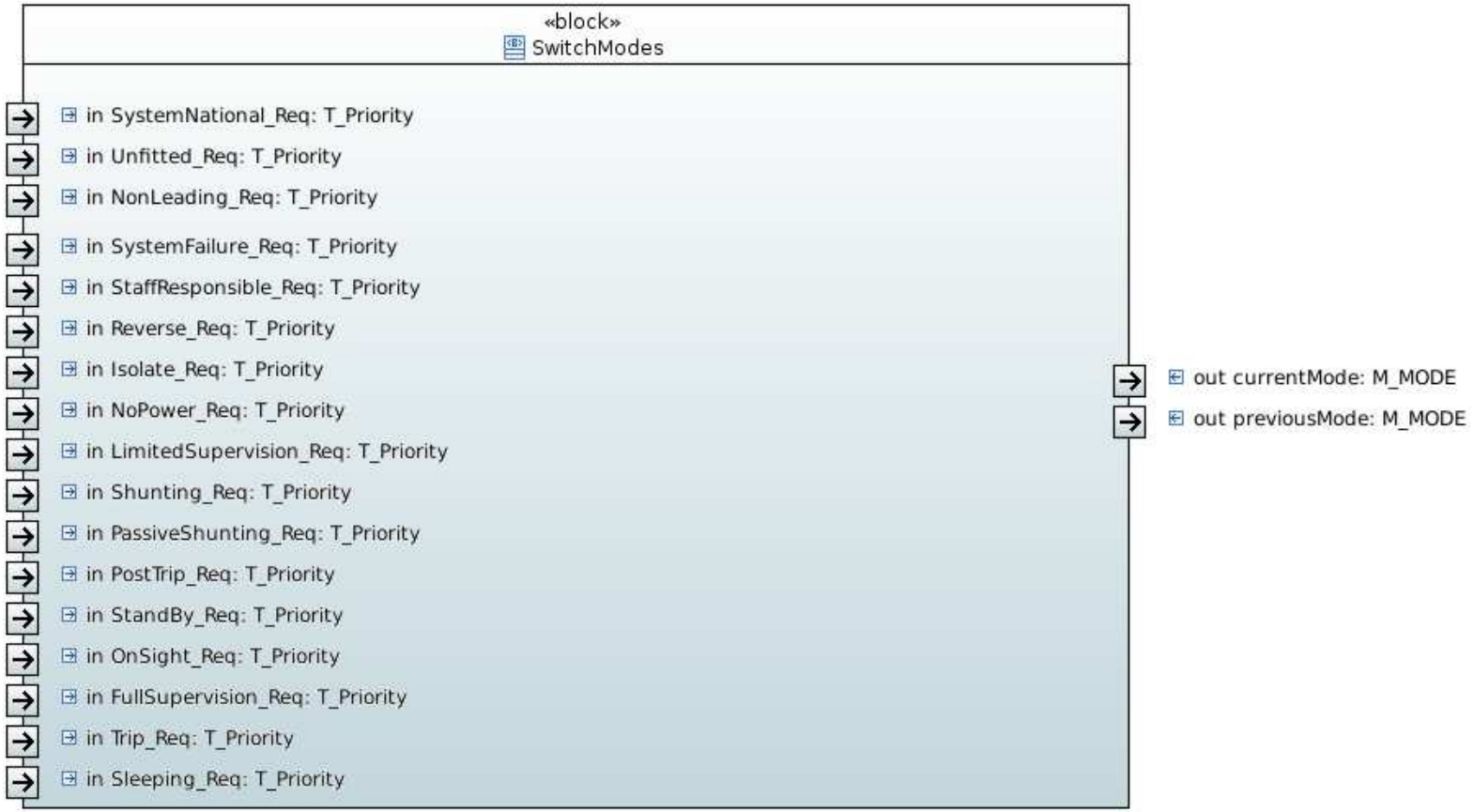
SH
PS
SL
NL



1.7.2.1.2 Inputs

The inputs are provided by “Compute Modes Conditions” block

1.7.2.1.3 Outputs

- Current Mode
- Previous Mode

1.7.2.1.4 Requirements