

[REQ\_5.4.1.4-3]

{GOA1: M; GOA2: M; GOA3: O; GOA4: n/a}

UGTMS shall provide information of the closed and locked status of train and platform doors to the interface with the external train HMI. (M for GOA1, M for GOA2, O for GOA3, not applicable for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			SE I1 TR I1	
B	WS X2 OBS X3	WS I3	OBS O2	SE I2 TR I3	

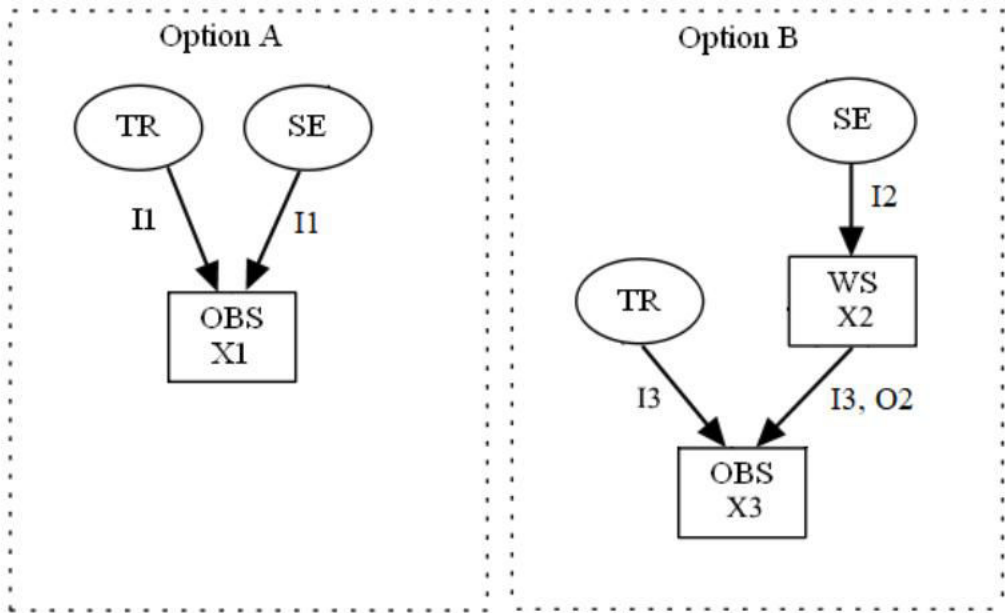
This requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.4.1.1-3).

The output to THMI is provided by REQ\_6.5.2-1.

Option A: Platform doors are interfaced to OBS through DCS: processing is done in OBS.

Option B: Platform doors are interfaced to WS: processing is done by OBS and WS.

**NOTE** The platform doors closed and locked status is sent by WS to OBS.



**FCN 5.4.2 – Prevent injuries to persons between cars or between platform and train**

**FCN 5.4.2.1 – Control gap fillers, moveable train steps and similar devices**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

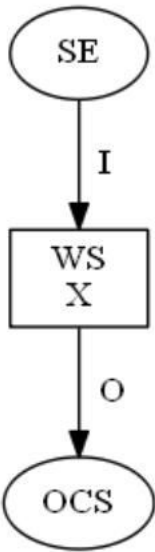
**Mandatory: all GOAs if gap fillers, movable train steps and similar devices are used by UGTMS**

[REQ\_5.4.2.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide to the interface with the external operations control HMI the operational status of the wayside gap fillers and similar devices.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O	SE I	
NOTE The device status is sent by WS to OCS. The output to OHMI is provided by REQ_6.5.1-2.					

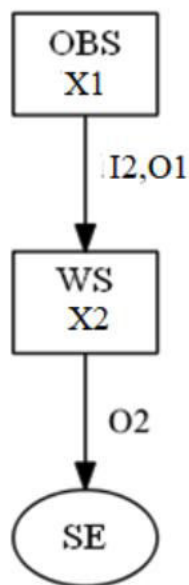


[REQ\_5.4.2.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

For predefined platforms, UGTMS shall request movement of wayside gap fillers and similar devices to the required position. Requests shall be made to the specific interface with the external wayside device.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X2 OBS X1	OBS I2	WS O1		SE O2
NOTE   OBS sends the movement request to WS. WS forwards the received movement request.					

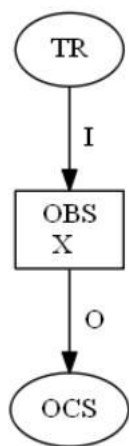


[REQ\_5.4.2.1-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide to the interface with the external operations control HMI the operational status of the onboard gap fillers, movable train steps and similar devices.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O	TR I	
NOTE The output to OHMI is provided by REQ_6.5.1-2. The device status is sent by OBS to OCS.					



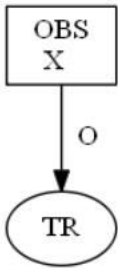
[REQ\_5.4.2.1-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

For predefined platforms, UGTMS shall request movement of onboard gap fillers, movable train steps and similar devices to the required position. Requests shall be made to the specific interface with the train.



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE OBS requests the device movement.					



**FCN 5.4.2.2 – Supervise detection of persons between cars or platform and train**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

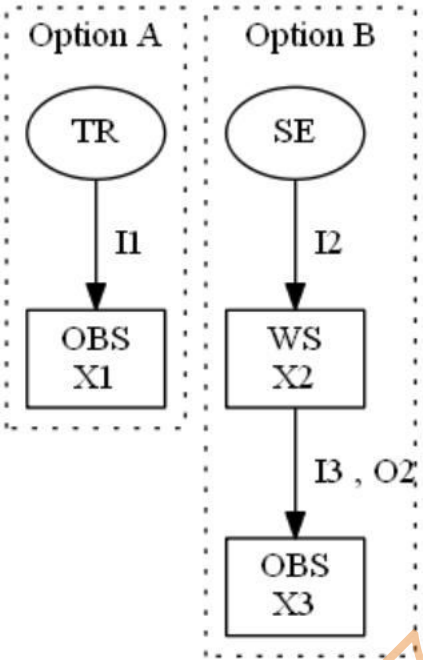
**Mandatory: all GOAs if devices detecting persons between cars or between platform and train are used by UGTMS**

[REQ\_5.4.2.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a detection status is received from the external device, UGTMS shall prevent the train from departing, as safe departure conditions are not fulfilled.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			TR I1	
B	WS X2 OBS X3	WS I3	OBS O2	SE I2	
<p>This requirement can be implemented in two ways, according to the place where the detection devices are located, onboard, or on the platform (the options defined for the allocation of this requirement are not design options decided for UGTMS, but result from the design of the external environment and how it is connected to UGTMS):</p> <p>Option A: the detection device is located onboard: processing is done only in OBS.</p> <p>NOTE 1 OBS considers the device status in safe starting conditions.</p> <p>Option B: the detection device is located on the platform: processing is done in WS (data forwarding) and OBS.</p> <p>NOTE 2 WS forwards the received status to OBS.</p> <p>NOTE 3 OBS considers the device status in safe starting conditions.</p>					



[REQ\_5.4.2.2-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the detection status of the external device via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1		OCS O1	TR I1	
B	WS X2		OCS O2	SE I2	

This requirement can be implemented in two ways, according to the place where the detection devices are located, onboard, or on the platform (the choice of option has to be the same as the one made for REQ\_5.4.2.2-1).

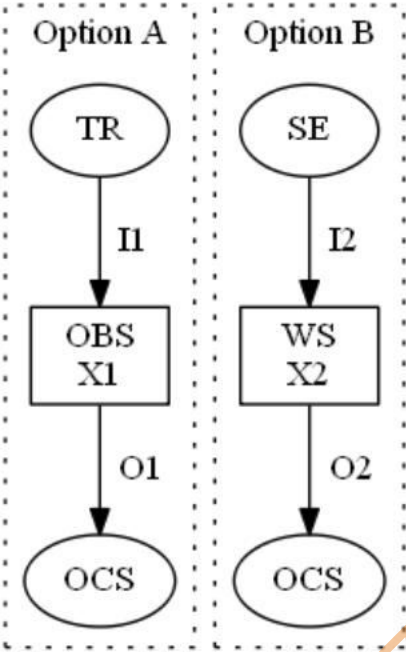
The output to OHMI is provided by REQ\_6.5.1-2.

Option A: the detection device is located onboard: processing is done in OBS.

NOTE 1 OBS sends the device status to OCS.

Option B: the detection device is located on the platform: processing is done in WS

NOTE 2 WS sends the device status to OCS.



[REQ\_5.4.2.2-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The detection status of the external device shall be maintained by UGTMS until it is released by operations staff using a safety-related command provided via the interface with the external operations control HMI. This can only be done if the external condition having caused the triggering of the detection is no longer active.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1	OCS I1			
B	WS X2	OCS I2			

This requirement can be implemented in two ways, according to the place where the detection devices are located: onboard, or on the platform (the choice of option has to be the same as the one made for REQ\_5.4.2.2-1):

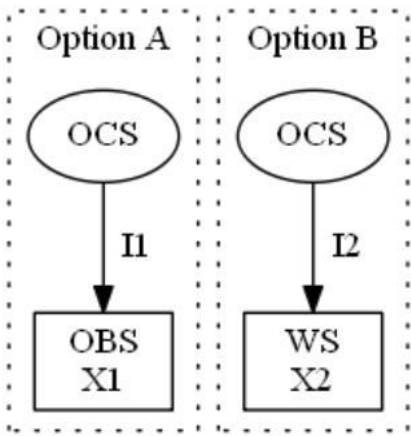
Option A: the detection device is located onboard: processing is done in OBS.

NOTE 1 The input from/output to OHMI is provided by REQ\_6.5.1-3.

Option B: the detection device is located on the platform: processing is done in WS

NOTE 2 The input from/output to OHMI is provided by REQ\_6.5.1-3.

The condition to be checked is the one in REQ\_5.4.2.2-1.



**FCN 5.4.3 – Ensure train departure**

**FCN 5.4.3.1 – Authorize train departure (safety-related conditions)**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

**[REQ\_5.4.3.1-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall authorize the train to leave the station when the following conditions are met:

- UGTMS has received the confirmation that all train doors and all platform doors (if handled by UGTMS) are closed and locked (O for GOA1, M for GOA2, M for GOA3, M for GOA4);
- the train is not immobilised in the station by emergency braking;
- the start of the train is not inhibited (e.g. by activated onboard passenger alarm device, fire/smoke detection).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			SE I1 TR I1	
B	WS X3 OBS X2	WS I2	OBS O3	SE I3 TR I2	

This requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.4.1.1-3):

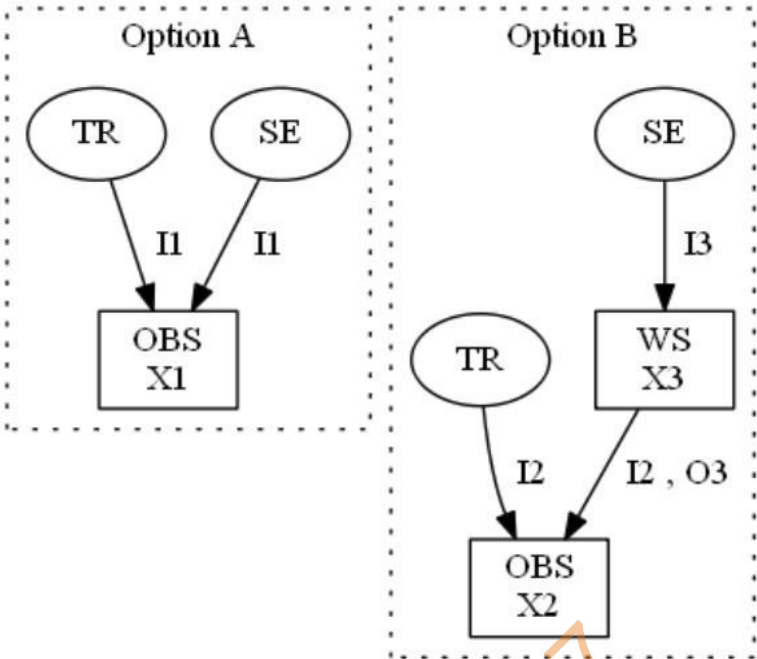
Option A: Platform doors are interfaced to OBS through DCS: processing is done only in OBS.

NOTE 1 OBS authorizes the train to leave according to door status received from the platform doors directly via the DCS, and from the train (but not its HMI).

Option B: Platform doors are interfaced to WS: processing is done by OBS and WS (data forwarding).

NOTE 2 OBS authorizes the train to leave according to door status received from WS and from the train (but not its HMI).

NOTE 3 WS forwards to OBS the platform door status.



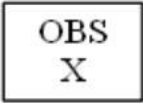
[REQ\_5.4.3.1-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide station departure authorization for safety-related conditions to the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				

NOTE The output to THMI is provided by REQ\_6.5.2-1.



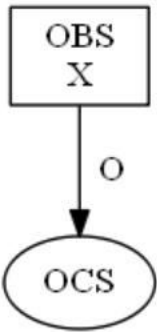
[REQ\_5.4.3.1-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide the reason for which train departure is not authorized for safety-related conditions to the interface

- with the external train HMI (O), and
- with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
<p>NOTE The output to OHMI is provided by REQ_6.5.1-2.</p> <p>The output to THMI is provided by REQ_6.5.2-1.</p> <p>OBS sends the reason for which station departure is not authorized to OCS.</p>					



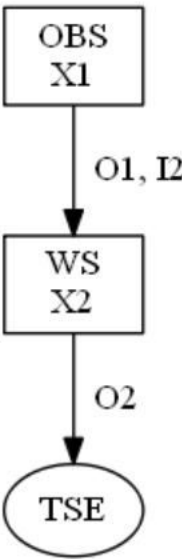
[REQ\_5.4.3.1-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide station departure authorization for safety-related conditions to the interface with the external wayside device (e.g. indicator). (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 WS X2	OBS I2	WS O1		TSE O2
<p>NOTE 1 OBS is sending the departure authorization to WS.</p> <p>NOTE 2 The wayside indicator, part of the trackside signalling equipment, is connected to WS. WS forwards the received departure authorization to the external wayside indicator.</p>					





**FCN 5.4.3.2 – Authorize train departure (operational conditions)**

{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

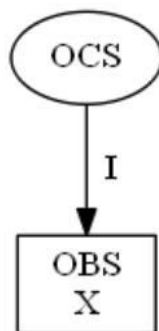
**[REQ\_5.4.3.2-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

- UGTMS shall authorize the train to leave the station when the following conditions are met:
- the train is not held in station by the train regulation (including for connecting services (O));
  - the dwell time has elapsed;
  - the train is able to completely leave the station;
  - the train is assigned a mission that is not completed (O for GOA1, O for GOA2, M for GOA3, M for GOA4);
  - there is no constraint preventing the train from reaching the next station (e.g. lack of traction power, stranded train). (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
NOTE The conditions to authorize station departure that are sent by OCS to OBS are the ones corresponding to the 1 <sup>st</sup> , 4 <sup>th</sup> and 5 <sup>th</sup> bullet of the requirement. The other conditions are internal to OBS.					



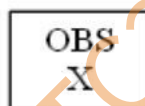


[REQ\_5.4.3.2-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide station departure authorization for operational conditions to the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
The output to THMI is provided by REQ_6.5.2-1.					



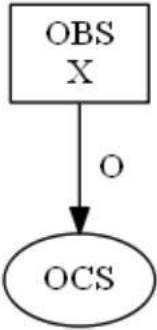
[REQ\_5.4.3.2-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide the reason for which train departure is not authorized for operational conditions to the interface

- with the external train HMI (O), and
- with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The output to OHMI is provided by REQ_6.5.1-2. The output to THMI is provided by REQ_6.5.2-1. OBS sends the reason for which station departure is not authorized to OCS.					



[REQ\_5.4.3.2-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide the dwell time information to the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The output to THMI is provided by REQ_6.5.2-1.					

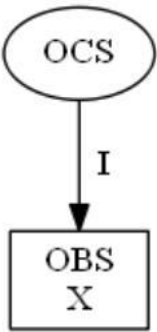


[REQ\_5.4.3.2-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall authorize the train to leave the station by a command provided via the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
NOTE The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					

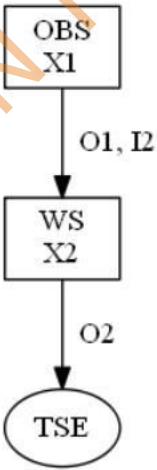


[REQ\_5.4.3.2-6]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide station departure authorization for operational conditions to the interface with the external wayside device (e.g. indicator). (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 WS X2	OBS I2	WS O1		TSE O2
NOTE 1 OBS is sending the departure authorization to WS.					
NOTE 2 The wayside indicator, part of the trackside signalling equipment, is connected to WS. WS forwards the received departure authorization to the external wayside indicator.					



FCN 5.4.3.3 – Command train departure

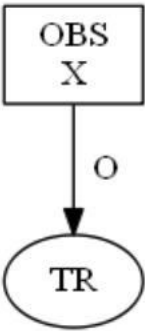
{GOA1: n/a; GOA2: M; GOA3: M; GOA4: M}

[REQ\_5.4.3.3-1]

{GOA1: n/a; GOA2: O; GOA3: O; GOA4: M}

UGTMS shall command automatically the train to depart as soon as departure is authorized (safety and operational conditions fulfilled). (not applicable for GOA1, O for GOA2, O for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE OBS processing on the basis of operational conditions provided by REQ_5.4.3.2-1 (by OCS or internally by OBS), and of safety ones provided by REQ_5.4.3.1-1.					

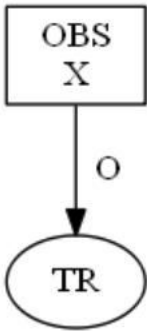


[REQ\_5.4.3.3-2]

{GOA1: n/a; GOA2: O; GOA3: O; GOA4: n/a}

UGTMS shall command the train to depart upon manual action of the train operator when departure is authorized (safety and operational conditions fulfilled). (not applicable for GOA1, O for GOA2, O for GOA3, not applicable for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE OBS triggers the start from the command of the train operator from THMI provided either by REQ_6.5.2-1 or REQ_6.5.2-2, on the basis of operational conditions provided by REQ_5.4.3.2- 1 (by OCS or internally by OBS), and of safety conditions provided by REQ_5.4.3.1-1.					



[REQ\_5.4.3.3-3]

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**FCN 5.5 – Operate a train**

**FCN 5.5.1 – Put in or take out of operation**

**FCN 5.5.1.1 – Awake trains**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

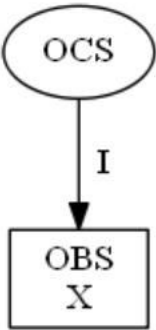
[REQ\_5.5.1.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The UGTMS onboard equipment shall be activated by the mission or by a command provided via the interface

- with the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- with the external operations control HMI (O for GOA1, O for GOA2, O for GOA3, M for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
<div>NOTE The activation of OBS is triggered by either</div> <div><div>– one input from OCS coming from<ul style="list-style-type: none"><li>• a mission provided by REQ_6.2.1-2, or</li><li>• OHMI provided either by REQ_6.5.1-2 or REQ_6.5.1-3, or</li></ul><li>– one input from THMI provided either by REQ_6.5.2-1 or REQ_6.5.2-2.</li></div></div> <div></div>					

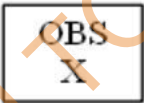


[REQ\_5.5.1.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall allow trains to enter revenue service only when functions necessary for convenient, reliable and safe revenue service are active, tested and are working according to site specific guidelines and regulations.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The statuses of functions necessary for convenient, reliable and safe revenue service are provided by REQ_5.5.9.1-1, and/or REQ_5.5.9.1- 2 and/or REQ_5.5.9.1- 3.					



**FCN 5.5.1.2 – Set trains to sleep**

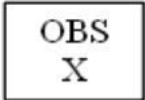
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_5.5.1.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When the train is set to sleep in its stabling location, the UGTMS onboard equipment shall be de-energised, except for all functions required to awake the train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The set to sleep is provided by REQ_5.5.1.2-2.					



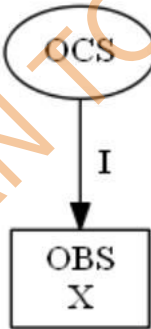
[REQ\_5.5.1.2-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall enable setting the train to sleep by the mission or by a command provided via the interface

- with the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- with the external operations control HMI. (O for GOA1, O for GOA2, O for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
NOTE The set to sleep of OBS is triggered by either <ul style="list-style-type: none"><li>– one input from OCS coming from<ul style="list-style-type: none"><li>• a mission provided by REQ_6.2.1-2, or</li><li>• OHMI provided either by REQ_6.5.1-2 or REQ_6.5.1-3, or</li></ul></li><li>– one input from THMI provided either by REQ_6.5.2-1 or REQ_6.5.2-2.</li></ul>					



[REQ\_5.5.1.2-3]

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**FCN 5.5.2 – Manage driving modes**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

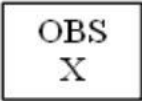
[REQ\_5.5.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall manage driving modes, depending on the GOA and the operational status of UGTMS onboard and wayside equipment.



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The requirement is a statement which is understood as the fact that UGTMS provides some manual and automatic driving modes, from inputs from THMI provided either by REQ_6.5.2-1 or REQ_6.5.2-2, and from OBS internal processing.					



[REQ\_5.5.2-2]

{GOA1: n/a; GOA2: M; GOA3: M; GOA4: M}

In automatic driving mode, UGTMS shall perform all UGTMS functions of the train of the corresponding GOA. (not applicable for GOA1, M for GOA2, M for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				



[REQ\_5.5.2-3]

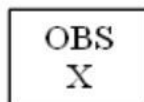
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[REQ\_5.5.2-4]

{GOA1: M; GOA2: O; GOA3: O; GOA4: O}

In full supervised manual driving mode, UGTMS shall ensure the protection of the train by application of the train protection profile. (M for GOA1, O for GOA2, O for GOA3, O for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The output to the train (but not its HMI) is provided by REQ_5.1.4.2-5.					

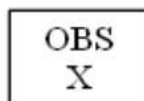


**[REQ\_5.5.2-5]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In partial supervised manual driving mode, UGTMS shall as a minimum enforce the respect of a predefined constant speed limit. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The output to the train (but not its HMI) is provided by REQ_5.1.4.2-5.					



**[REQ\_5.5.2-6]**

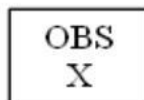
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**[REQ\_5.5.2-7]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall manage a transition from one driving mode to the other either automatically, or following an action from the train operator via the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The input from THMI is provided either by REQ_6.5.2-1 or REQ_6.5.2-2.					



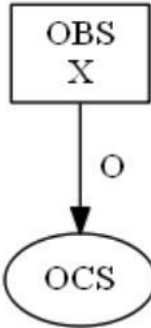
**[REQ\_5.5.2-8]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The driving mode in force shall be provided

- to the interface with the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The output to THMI is provided by REQ_6.5.2-1. The output to OHMI is provided by REQ_6.5.1-2.					

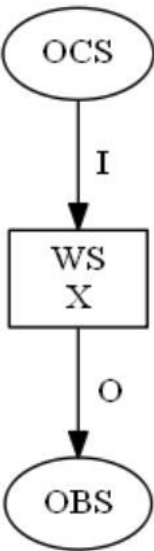


[REQ\_5.5.2-9]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall inhibit a designated driving mode on selected sections of the line on reception of a command from the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X	OCS I	OBS O		
NOTE The input from OHMI is provided by either REQ_6.5.1-2 or REQ_6.5.1-3. The train location is provided by REQ_5.1.2.1.4-1.					

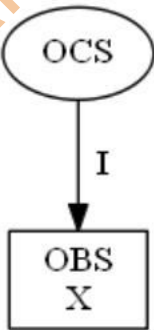


[REQ\_5.5.2-10]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall inhibit a designated driving mode for a selected train on reception of a command from the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
NOTE The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



[REQ\_5.5.2-11]

{GOA1: n/a; GOA2: O; GOA3: n/a; GOA4: n/a}

UGTMS shall perform unattended turnback of the trains (n/a for GOA1, O for GOA2, n/a for GOA3, n/a for GOA4)

- after the train has stopped in pre-defined turnback areas, and
- on receiving a command provided via the interface with the external train HMI, or an external wayside device (e.g. key, button), or the external operations control HMI.

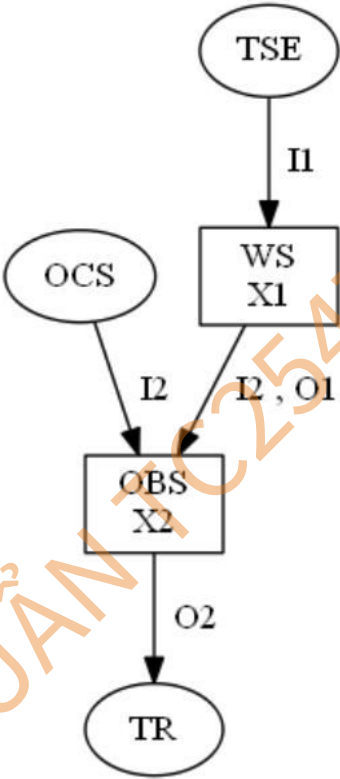
Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X1 OBS X2	WS I2 OCS I2	OBS O1	TSE I1	TR O2

It is assumed that the wayside HMI, part of the trackside signalling equipment, is connected to WS.

The processing is done by WS (data forwarding) and OBS.

NOTE 1 WS forwards to OBS the command received from the external wayside device.

NOTE 2 OBS performs the turnback as required on input from the THMI provided either by REQ\_6.5.2-1 or REQ\_6.5.2-2, from WS or from OCS (the input from OHMI is provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3).



**FCN 5.5.3 – Manage movement of trains after unexpected stops**

{GOA1: n/a; GOA2: M; GOA3: M; GOA4: M}

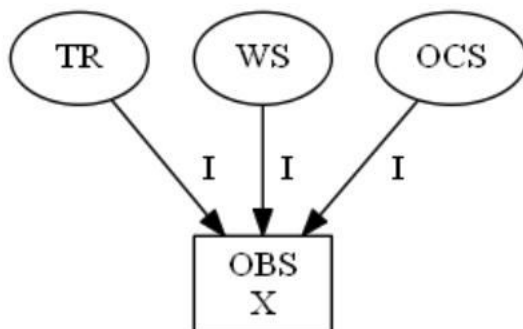
**[REQ\_5.5.3-1]**

{GOA1: n/a; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall authorize the train to restart motion in automatic driving mode when the following conditions are met:

- the conditions that caused the train to stop are no longer present;
- the train doors are closed and locked;
- the train is not immobilised in emergency braking.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	WS I OCS I		TR I	
NOTE Conditions can come from WS or OCS.					

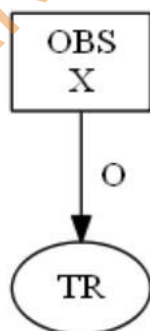


[REQ\_5.5.3-2]

{GOA1: n/a; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall restart automatically the train as soon as authorization is granted. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE Conditions for granting the authorization are given in REQ_5.5.3-1.					



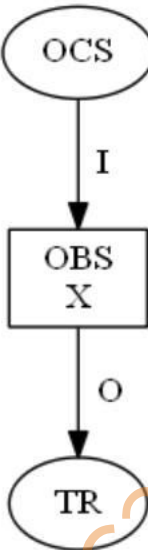
[REQ\_5.5.3-3]

{GOA1: n/a; GOA2: O; GOA3: O; GOA4: O}

After the authorization is granted, UGTMS shall restart train motion following a command provided via the interface

- with the external operations control HMI (O), or
- with the external train HMI (O for GOA2, O for GOA3, not applicable for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			TR O
<div>NOTE After the authorization is granted (REQ_5.5.3-1), OBS restarts the train</div> <div><div>- when receiving a specific command from OCS; the input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3, or</div><div>- via the input from THMI provided either by REQ_6.5.2-1 and REQ_6.5.2-2.</div></div>					



[REQ\_5.5.3-4]

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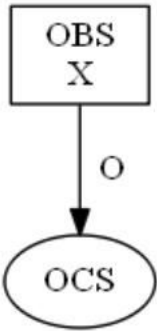
[REQ\_5.5.3-5]

{GOA1: n/a; GOA2: O; GOA3: O; GOA4: O}

Depending on conditions to be defined by the transport authority and the elapsed time since a train has stopped unexpectedly, UGTMS shall provide the information about this unexpected stop to the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
<div>NOTE The output to OHMI is provided by REQ_6.5.1-2.</div>					





**FCN 5.5.4 – Manage stabling**

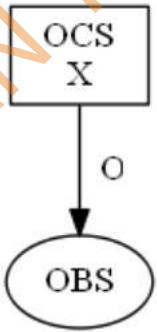
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_5.5.4-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall assign trains to designated stabling locations according to the timetable or on receiving commands from the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		OBS O		
NOTE The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



[REQ\_5.5.4-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall change the use of a mainline track section for stabling purposes on receiving a command from the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



**FCN 5.5.5 – Deleted**

**FCN 5.5.6 – Restrict train entry to station**

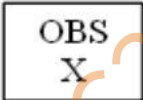
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_5.5.6-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall prevent the entry in station to a train serving the station if the train cannot be berthed entirely in station.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The processing is using the movement authority, which is received from WS, as described in FCN 5.1.4.1.					



**[REQ\_5.5.6-2]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall prevent entry into a station to a train that is intended to skip the station when the train cannot leave the station entirely. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The processing is using the movement authority, which is received from WS, as described in FCN 5.1.4.1.					

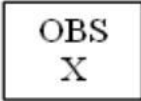


**[REQ\_5.5.6-3]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

When the entry is prevented, UGTMS shall stop the train at the station entry stopping point in such a way that a train stopped at this point does not foul crossovers. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				



**FCN 5.5.7 – Change the travel direction**

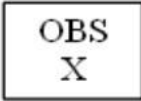
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

**[REQ\_5.5.7-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall permit a change in travel direction only when the train is detected at standstill.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The standstill information is provided by REQ_5.1.5.1-3 "zero-speed status".					



**[REQ\_5.5.7-2]**

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**[REQ\_5.5.7-3]**

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**FCN 5.5.8 – Couple and uncouple a train**

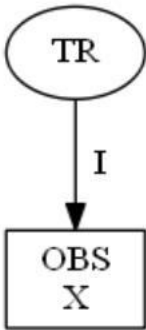
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_5.5.8-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Several coupled train units shall be managed by UGTMS as a single train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	
NOTE The processing is done by OBS with receiving the coupling status as input from the train (but not its HMI).					



[REQ\_5.5.8-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: M}

UGTMS shall determine automatically the length of a train consisting of predefined units. (O for GOA1, O for GOA2, O for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			TR H	
B	OBS X2				

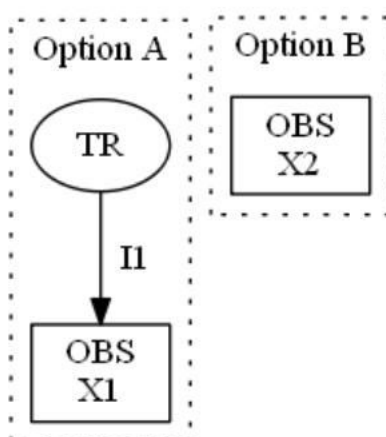
This requirement can be implemented in two ways (the options defined for the allocation of this requirement are not design options decided for UGTMS, but result from the design of the external environment and how it is connected to UGTMS):

Option A: information about train length is provided by the train (but not its HMI).

NOTE 1 The processing is done by OBS with input from the train (but not its HMI).

Option B: information about train length is elaborated by OBS (e.g. onboard configuration data).

NOTE 2 The processing is done by OBS.

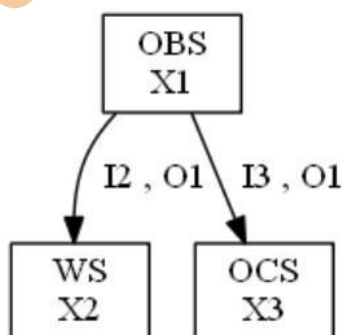


[REQ\_5.5.8-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall reconfigure automatically each part of the uncoupled train so that they can be operated independently.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X2 OBS X1 OCS X3	OBS I2 I3	WS O1 OCS O1		
<p>NOTE 1 Each OBS of the split parts reconfigure itself, and sends to WS and OCS its data.</p> <p>NOTE 2 WS manages the two new trains.</p> <p>NOTE 3 OCS manages the two new trains.</p>					

**FCN 5.5.8.1 – Couple trains automatically**

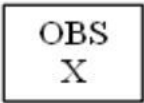
{GOA1: n/a; GOA2: n/a; GOA3: O; GOA4: O}

[REQ\_5.5.8.1-1]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

UGTMS shall perform automatic coupling of trains at designated areas such as sidings, depots, stabling areas and along platforms.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE Automatic coupling is defined by the mission, known by OBS thanks to REQ_6.2.1-2.					



[REQ\_5.5.8.1-2]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

Before actual automatic coupling, UGTMS shall continuously supervise the train speed, to ensure that it is below the maximum allowable coupling speed, up to the coupling event.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE Speed value is provided by REQ_5.1.5.1-1.					



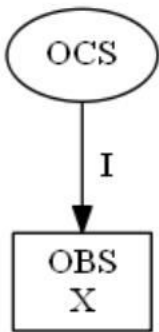
[REQ\_5.5.8.1-3]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

UGTMS shall perform automatic coupling of compatible trains by command provided via the interface with the external operations control HMI or according to the train mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
The requirement is understood as UGTMS is not in charge of checking compatibility of trains to be coupled when the command is issued from the OHMI.					
NOTE The requirement is processed by OBS when triggered by					
– an input from OCS, coming from an input from OHMI provided either by REQ_6.5.1-2 or REQ_6.5.1-3; in that case UGTMS is not in charge of checking the compatibility of trains to be coupled, or					
– a mission known by OBS thanks to REQ_6.2.1-2.					



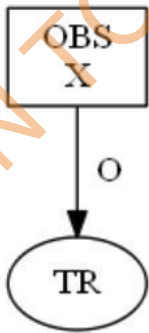


[REQ\_5.5.8.1-4]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

During automatic coupling, UGTMS shall maintain one train stationary.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
<div>NOTE The output to the train (but not its HMI) has actually two significations:<ul style="list-style-type: none"><li>From the point of view of the train which is kept stationary, it is the request for holding train brakes.</li><li>From the point of view of the moving train, it is the request for moving this train, as covered by REQ_5.1.4.2-2, to the stationary one.</li></ul></div>					



**FCN 5.5.8.2 – Uncouple trains automatically**

{GOA1: n/a; GOA2: n/a; GOA3: O; GOA4: O}

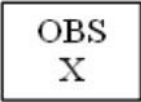
[REQ\_5.5.8.2-1]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

UGTMS shall perform the automatic uncoupling of trains at designated areas such as sidings, depots, stabling areas and along platforms.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
<div>NOTE Automatic splitting is defined by the mission, known by OBS thanks to REQ_6.2.1-2.</div>					





[REQ\_5.5.8.2-2]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

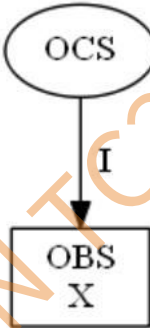
UGTMS shall perform automatic uncoupling by command provided via the interface with the external operations control HMI or according to the train mission.

NOTE 4 The unit to be uncoupled is given in the command or the mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			

NOTE The requirement is processed by OBS when triggered by

- an input from OCS, coming from an input from OHMI provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3, or
- a mission known by OBS thanks to REQ\_6.2.1-2.

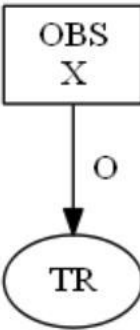


[REQ\_5.5.8.2-3]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

Prior to automatic uncoupling, UGTMS shall maintain the train stationary.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O

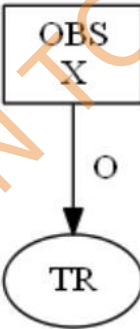


[REQ\_5.5.8.2-4]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

During automatic uncoupling, UGTMS shall maintain one train stationary.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
<div>NOTE The output to the train (but not its HMI) has actually two significations:<ul style="list-style-type: none"><li>From the point of view of the train, which is kept stationary, it is the request for holding train brakes.</li><li>From the point of view of the moving train, it is the request for moving this train from the stationary one.</li></ul></div>					



[REQ\_5.5.8.2-5]

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**FCN 5.5.9 – Supervise the status of UGTMS**

**FCN 5.5.9.1 – Supervise UGTMS equipment status prior to entering service**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

[REQ\_5.5.9.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When UGTMS equipment is activated (either remotely or by a staff local activation), it shall execute various test procedures to determine whether the equipment (including redundant if any) can operate safely and is fit for service.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 SPTS X2 WS X3 OCS X4				
NOTE 1 The UGTMS onboard subsystem which performs tests is the OBS.					
NOTE 2 The UGTMS onboard subsystem which performs tests is the onboard part of the SPTS.					
NOTE 3 The UGTMS wayside subsystem which performs tests is the WS.					
NOTE 4 The UGTMS wayside subsystem which performs tests is the OCS.					



[REQ\_5.5.9.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The UGTMS equipment shall perform tests to ensure the safety of UGTMS functions.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 SPTS X2 WS X3 OCS X4				
NOTE 1 The UGTMS onboard subsystem which performs tests is the OBS.					
NOTE 2 The UGTMS onboard subsystem which performs tests is the onboard part of the SPTS.					
NOTE 3 The UGTMS wayside subsystem which performs tests is the WS.					
NOTE 4 The UGTMS wayside subsystem which performs tests is the OCS.					

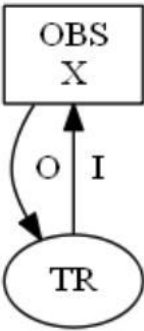


[REQ\_5.5.9.1-3]

{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

The onboard UGTMS equipment shall perform tests to ensure the safe activation of external equipment necessary for safety. (O for GOA1, O for GOA2, M for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O

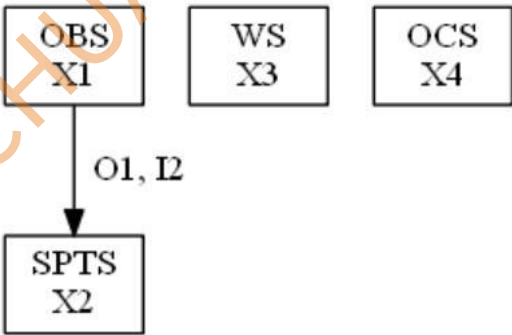


[REQ\_5.5.9.1-4]

{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

All tests shall start and run automatically, without requiring any action by staff. (O for GOA1, O for GOA2, M for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 SPTS X2 WS X3 OCS X4	OBS I2	SPTS O1		
NOTE 1 The UGTMS onboard subsystem which performs self-tests is the OBS. NOTE 2 The UGTMS onboard subsystem which performs self-tests is the onboard part of the SPTS. NOTE 3 The UGTMS wayside subsystem which performs self-tests is the WS. NOTE 4 The UGTMS wayside subsystem which performs self-tests is the OCS.					



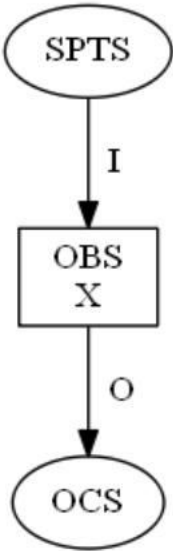
[REQ\_5.5.9.1-5]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The result of the tests of the UGTMS onboard equipment (including any fault detected) shall be provided to the interface with

- the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- the external operations control HMI (O for GOA1, O for GOA2, O for GOA3, M for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	SPTS I	OCS O		
NOTE The output to THMI is provided by REQ_6.5.2-1 and the output to OHMI is provided by REQ_6.5.1-2.					

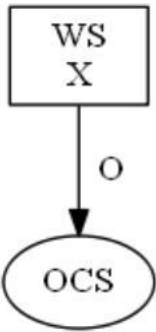


[REQ\_5.5.9.1-6]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The result of the tests of the UGTMS wayside equipment (including any fault detected) shall be provided to the interface with external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O		
NOTE The output to OHMI is provided by REQ_6.5.1-2.					



**FCN 5.5.9.2 – Supervise UGTMS equipment status during operation**

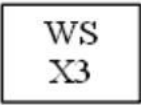
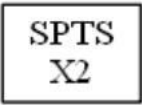
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

**[REQ\_5.5.9.2-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The status of UGTMS shall be supervised by performing tests during operation, without any impact on the system performances (e.g. no impact on train movement, availability of driving modes).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 SPTS X2 WS X3 OCS X4				
NOTE 1 The UGTMS onboard subsystem which performs tests is the OBS.					
NOTE 2 The UGTMS onboard subsystem which performs tests is the onboard part of the SPTS.					
NOTE 3 The UGTMS wayside subsystem which performs tests is the WS.					
NOTE 4 The UGTMS wayside subsystem which performs tests is the OCS.					



**[REQ\_5.5.9.2-2]**

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**[REQ\_5.5.9.2-3]**

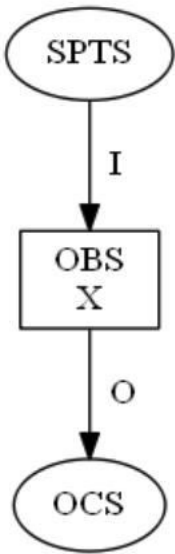
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The result of failed tests of the UGTMS onboard equipment (including any fault detected) shall be provided to the interface with

- the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- the external operations control HMI (O for GOA1, O for GOA2, O for GOA3, M for GOA4)



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	SPTS I	OCS O		
NOTE The output to THMI is provided by REQ_6.5.2-1 and the output to OHMI is provided by REQ_6.5.1-2.					

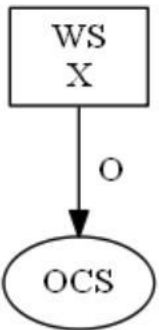


[REQ\_5.5.9.2-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The result of failed tests of the UGTMS wayside equipment shall be provided to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O		
NOTE The output to OHMI is provided by REQ_6.5.1-2.					



**FCN 5.5.9.3 – Test emergency braking performance**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

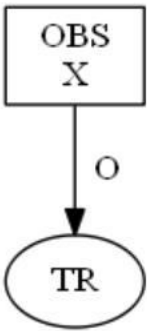
**[REQ\_5.5.9.3-1]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

During the dynamic emergency braking test, UGTMS shall stop the train using the emergency brake and monitor that its braking performance is satisfactory. (O)

NOTE 5 Such type of test is carried out as specified by the transport authority (e.g. once a day, after a train maintenance in workshop). The actions to be taken following such failed test are specified by the transport authority.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE The objective is to get a measurement of the performance related to emergency brake, for instance by measuring the braking distance.					



**[REQ\_5.5.9.3-2]**

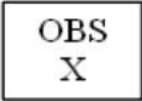
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**[REQ\_5.5.9.3-3]**

{GOA1: M; GOA2: M; GOA3: O; GOA4: n/a}

The result of the emergency braking test shall be provided to the interface with the external train HMI (M for GOA1, M for GOA2, O for GOA3, not applicable for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The output to THMI is provided by REQ_6.5.2-1.					

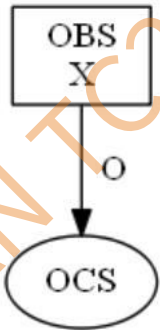


[REQ\_5.5.9.3-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The result of the emergency braking test shall be reported to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The local facilities are considered part of OHMI. The output to OHMI is provided by REQ_6.5.1-2.					



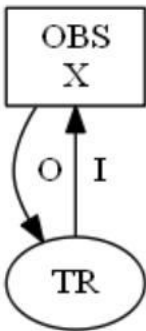
[REQ\_5.5.9.3-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall perform a static emergency braking test while at standstill. (O)

NOTE 6 Conditions for triggering such kind of test are specified by the transport authority. The actions to be taken following such failed test are specified by the transport authority.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O



**FCN 5.5.9.4 – React to detected train equipment failure**

{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

[REQ\_5.5.9.4-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When train equipment failures are reported, UGTMS shall inhibit further train movement at the next station or at the destination of journey, in accordance with the significance of the failure.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			THMI I1 TR I1 VCS I1 CSS I1 PIS I1	
B	OBS X2 OCS X3	OCS I2 OBS I3	OCS O2 OBS O3	THMI I2 TR I2 VCS I2 CSS I2 PIS I2	

This requirement can be implemented in two ways:

Option A:

NOTE 1 OBS receives equipment failure information from THMI, TR, VCS, CCS, and PIS.

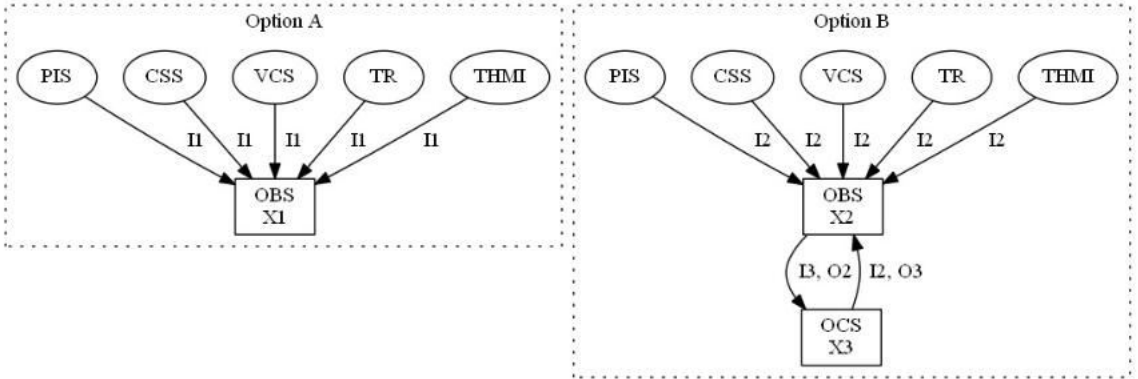
OBS evaluates this information and inhibits further train movement where necessary.

Option B:

NOTE 2 OBS receives equipment failure information from THMI, TR, VCS, CCS, and PIS.

OBS forwards this information to OCS.

NOTE 3 OCS evaluates this information and imposes OBS to inhibit further train movement where necessary.



[REQ\_5.5.9.4-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When the train equipment failure is no longer reported, UGTMS shall resume normal operation automatically.

NOTE 7 The corresponding list of failures for which an automatic resumption of train movement is possible is specified by the transport authority.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1			THMI I1 TR I1 VCS I1 CSS I1 PIS I1	
B	OBS X2 OCS X3	OCS I2 OBS I3	OCS O2 OBS O3	THMI I2 TR I2 VCS I2 CSS I2 PIS I2	

This requirement can be implemented in two ways:

Option A:

NOTE 1 OBS receives equipment failure information from THMI, TR, VCS, CCS, and PIS.

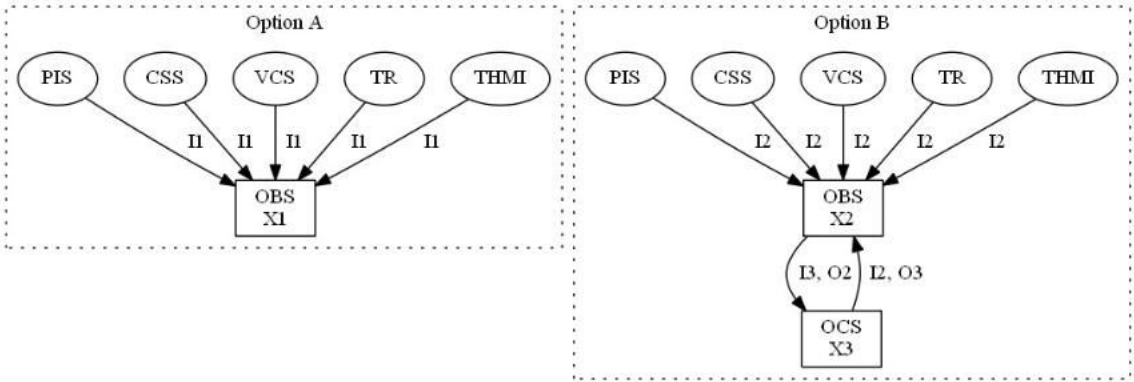
OBS evaluates this information and inhibits further train movement where necessary.

Option B:

NOTE 2 OBS receives equipment failure information from THMI, TR, VCS, CCS, and PIS.

OBS forwards this information to OCS.

NOTE 3 OCS evaluates this information and imposes OBS to inhibit further train movement where necessary.



[REQ\_5.5.9.4-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When the train equipment failure is no longer reported, UGTMS shall permit the resumption of operation of the affected train by command issued from the interface

- with the external operations control HMI, (O for GOA1, O for GOA2, M for GOA3, M for GOA4) or
- with the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4).

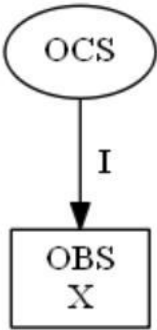
NOTE 8 The corresponding list of failures for which a resumption of train movement requires an operator command is specified by the transport authority.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			

NOTE The acting authorized staff can be an OCC staff or the train operator, or the train attendant.

The input from OHMI is provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3.

The input from THMI is provided either by REQ\_6.5.2-1 or REQ\_6.5.2-2.



**FCN 5.5.10 – Manage traction power supply on train**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_5.5.10-1]

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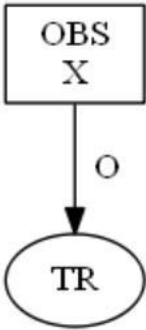


[REQ\_5.5.10-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide output commands for lowering and raising current collector(s) to the train at predetermined locations.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O



[REQ\_5.5.10-3]

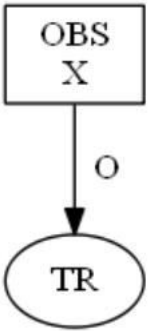
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[REQ\_5.5.10-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall command switching from one power supply system to another (e.g. AC/DC) at predetermined locations.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O



**FCN 5.5.11 – Manage train washing**

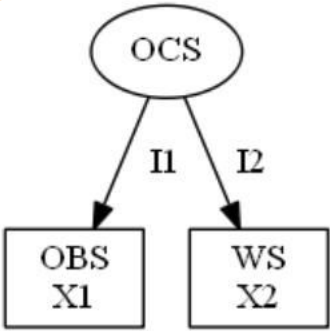
{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

[REQ\_5.5.11-1]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

UGTMS shall control the train to enter the wash track, and shall launch the train washing process by command provided via the interface with the external operations control HMI or according to the train mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 WS X2	OCS I1 OCS I2			
<p>NOTE 1 The processing by OBS corresponds to the one of missions (train mission is known by OBS thanks to REQ_6.2.1-2). The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3. The corresponding route setting is covered by REQ_6.2.2-6.</p> <p>NOTE 2 The processing by WS corresponds to the command issued by OCS for launching the train washing process.</p>					



[REQ\_5.5.11-2]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

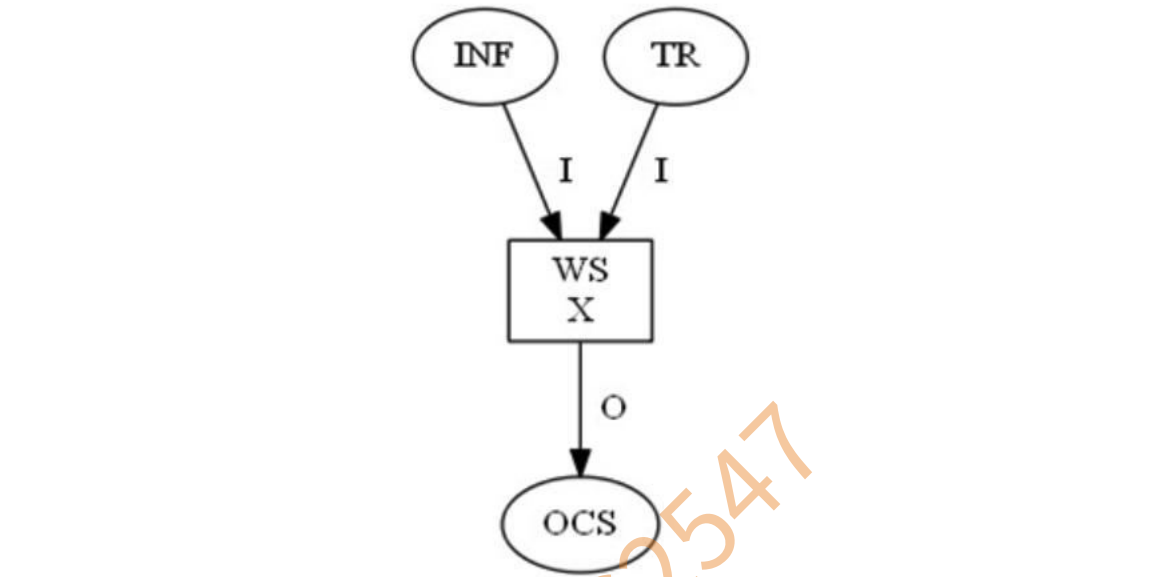
Before starting the train washing process, UGTMS shall ensure that

- the washing machine is ready for washing, and
- the train is ready for washing, depending on conditions defined by the transport authority (e.g. status provided directly by the train).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O	INF I TR I	

NOTE

WS is inquiring and checking the status received from the washing machine and from the train.  
Then WS informs OCS about the readiness of the washing machine and of the train.



[REQ\_5.5.11-3]

{GOA1: n/a; GOA2: n/a; GOA3: O; GOA4: O}

Once the train has reached the correct position, UGTMS shall command the start of the washing and keep the train stationary at the specified location during washing. (O)

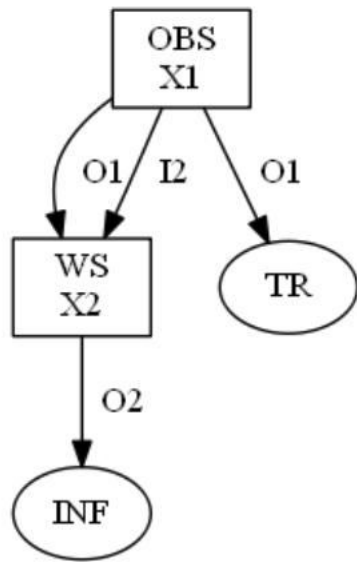
Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X2 OBS X1	OBS I2	WS O1		INF O2 TR O1

NOTE 1

The train has reached the proper position for performing the washing, which is given in the mission or the dedicated command.

NOTE 2

OBS is informing WS that the train is immobilized and about the effective launch of the washing, and WS forwards the information to the washing machine.

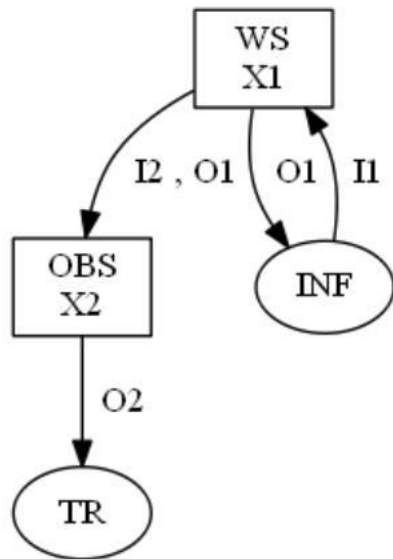


[REQ\_5.5.11-4]

{GOA1: n/a; GOA2: n/a; GOA3: O; GOA4: O}

Once the train has reached the correct position, UGTMS shall command the start of the washing and control the train movement during washing at the specified speed through the washing machine. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X1 OBS X2	WS I2	OBS O1	INF I1	INF O1 TR O2
<p>NOTE 1 The train has reached the proper position for performing the washing, which is given in the mission or the dedicated command.</p> <p>WS informs the washing machine that the train is ready to move within the machine, and the washing machine sends the confirmation that the washing can start. WS forwards it to OBS.</p> <p>NOTE 2 OBS ensures that the train is proceeding at the specified speed.</p>					

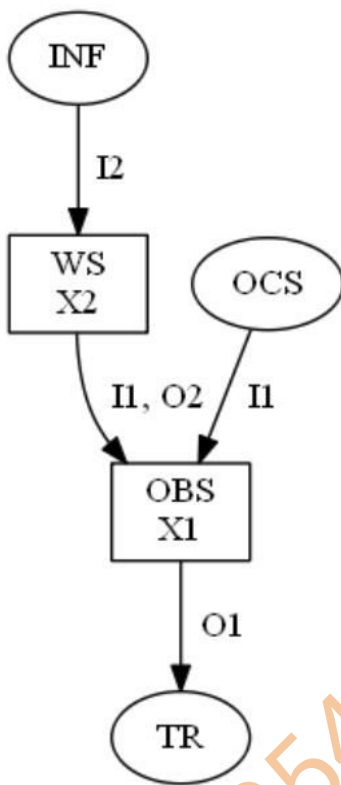


[REQ\_5.5.11-5]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

In case the washing is done with a moving train, UGTMS shall stop the train immediately based on a command provided via the interface with the external operations control HMI, or when receiving the washing machine status indicating a failure.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 WS X2	OCS I1 WS I1	OBS O2	INF I2	TR O1
NOTE 1 The command provided via the interface with the external operations control HMI is sent by OCS to OBS. The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					
NOTE 2 When the washing machine status I2 is received by WS, WS forwards the information I1 to OBS.					



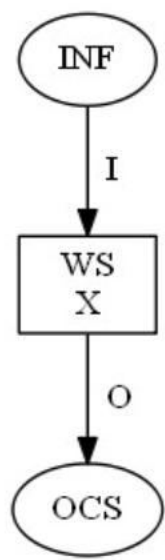
[REQ\_5.5.11-6]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

UGTMS shall consider the train washing process as completed when it receives the completion/cancellation status from the washing machine.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O	INF I	
NOTE WS inquires and checks the status received from the washing machine.					



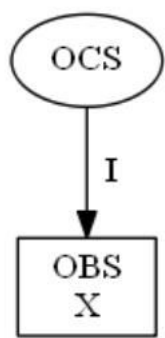


[REQ\_5.5.11-7]

{GOA1: n/a; GOA2: n/a; GOA3: M; GOA4: M}

After the train washing process is completed, UGTMS shall control the train to exit the wash track by command provided via the interface with the external operations control HMI or according to the train mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			
NOTE The control of train movement to exit the wash track is done as covered by FCN 5.1 and FCN 5.2. The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



**FCN 5.5.12 – Manage non-stopping areas**

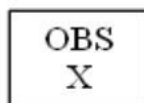
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_5.5.12-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall prevent a train from stopping in a non-stopping area (which are associated for instance to flood gates).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				

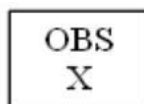


**[REQ\_5.5.12-2]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall only authorize the train to go through a non-stopping area if it can clear the area completely.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				



**FCN 5.6 – Ensure detection and management of emergency situations**

**FCN 5.6.1 – React to detected onboard fire/smoke**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

***Mandatory: all GOAs if onboard fire/smoke detection device is used by UGTMS***

**[REQ\_5.6.1-1]**

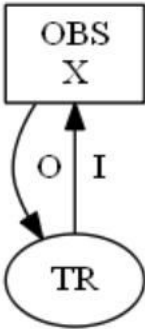
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of onboard fire/smoke detection, UGTMS shall hold the train concerned at the next station, or next evacuation point if any.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O

**NOTE**

- Input I from external onboard fire/smoke detection devices.
- Output O to immobilize the train at the next station or evacuation point if any. The checking of location (station or evacuation point if any) and zero-speed status is done by the OBS.

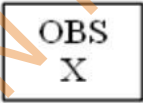


[REQ\_5.6.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Once the train has reached standstill at this location, UGTMS shall authorize the opening of the doors on the correct side and shall command the opening if the opening command is managed by UGTMS. Restart of the train shall be inhibited.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The train is immobilized as covered in REQ_5.6.1-1. The door opening authorization is provided by REQ_5.4.1.1-3. The door opening command is provided by REQ_5.4.1.2-1.					

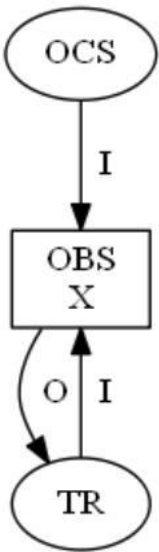


[REQ\_5.6.1-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The UGTMS fire/smoke detection status shall be maintained until it is released by operations staff using a safety-related command provided via the interface with the external operations control HMI. This can only be done if the external conditions having caused the triggering of the detection is no longer active.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I		TR I	TR O
NOTE <ul style="list-style-type: none"><li>Release command OCS I: the input from/output to OHMI is provided by REQ_6.5.1-3 (safety-related command).</li><li>Input I from external onboard fire/smoke detection devices, to check the status given by the fire/smoke detector.</li><li>Output O to the train (but not its HMI) to release the immobilization accordingly with the fire/smoke detector status.</li></ul>					

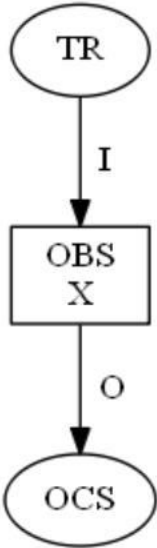


[REQ\_5.6.1-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of onboard fire/smoke detection, UGTMS shall provide the information (e.g. status and localisation) to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O	TR I	
NOTE Input I is the information of external onboard fire/smoke detection devices given by the train (but not its HMI). The output to OHMI is provided by REQ_6.5.1-2.					

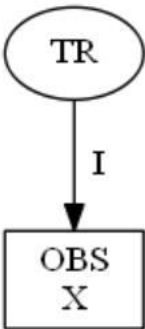


[REQ\_5.6.1-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide the information about the onboard fire/smoke detection to the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	
NOTE    Input I from external onboard fire/smoke detection devices. The output to THMI is provided by REQ_6.5.2-1.					



**FCN 5.6.2 – React to detected derailment**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

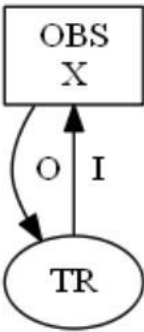
**Mandatory: all GOAs if onboard derailment detection device is used by UGTMS**

[REQ\_5.6.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall trigger and maintain emergency brake in case of derailment detected by external detector.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O
NOTE    Input I from external onboard derailment detection device. Output O for EB command.					

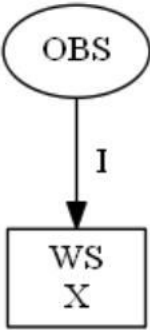


[REQ\_5.6.2-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall establish the corresponding zone of protection on the possibly endangered tracks. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X	OBS I			
NOTE    OBS I, see REQ_5.6.2-1. The OBS informs the WS for establishing the ZOP (see REQ_5.1.4.4-1).					



[REQ\_5.6.2-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

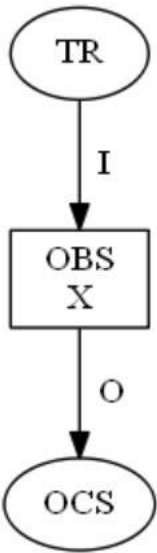
UGTMS shall provide system operational derailment status, including the specific train identification and specific detector as an emergency message to the interface with the external operations control HMI.



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O	TR I	

NOTE Input I from external onboard derailment detection device, and O information sent to the OCS.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_5.6.2-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The UGTMS derailment detection status shall be maintained until it is released by operations staff using a safety-related command provided via the interface with the external operations control HMI. This can only be done if the external conditions having caused the triggering of the detection is no longer active.

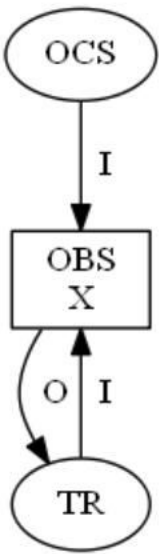
Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I		TR I	TR O

NOTE 1 OCS I is the release command.

The input from/output to OHMI is provided by REQ\_6.5.1-3 (safety-related command).

NOTE 2 TR I from external onboard derailment detection devices, to check the status given by the derailment detector.

TR O to release EB accordingly with the derailment detector status.



**FCN 5.6.3 – React to detected or suspected broken rail**

**FCN 5.6.3.1 – React to detected broken rail**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

**Mandatory: all GOAs if broken rail detection device is used by UGTMS**

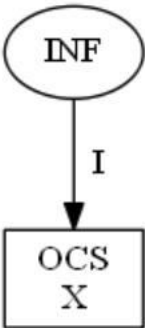
[REQ\_5.6.3.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a broken rail is reported by an external detection device, UGTMS shall establish a zone of protection.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			INF I	

NOTE INF I from external broken rail detection device.  
See REQ\_5.1.4.4-2 for establishing the ZOP via the operational command.

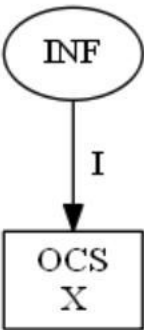


[REQ\_5.6.3.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a broken rail is reported by an external detection device, UGTMS shall provide the information about the detected broken rail to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			INF I	
NOTE    INF I from external broken rail detection device. The output to OHMI is provided by REQ_6.5.1-2.					



**FCN 5.6.3.2 – React to suspected broken rail**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

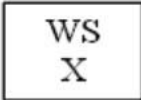
*Optional: all GOAs when track circuits are used by UGTMS for train detection*

[REQ\_5.6.3.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a broken rail is suspected on a section of track, UGTMS shall establish a zone of protection associated with the track section.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X				
NOTE    REQ_5.6.3.2-2 as pre-requisite. See REQ_5.1.4.4-1 for establishing the ZOP.					

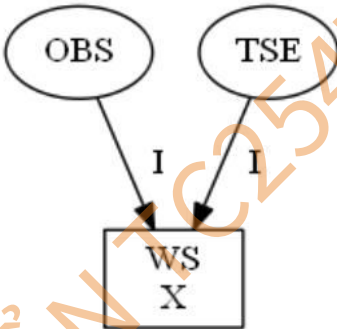


[REQ\_5.6.3.2-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall suspect a broken rail on a given section of track, if UGTMS has determined there is no train in this section, and the related track circuit reports that a train is present in this section.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X	OBS I		TSE I	
NOTE					
<div><div>– OBS I as per REQ_5.1.2.1.4-1 for location of reporting train.</div><div>– TSE I from the external train detection device (track circuits only) or EIXL (see REQ_5.1.6-1).</div></div>					

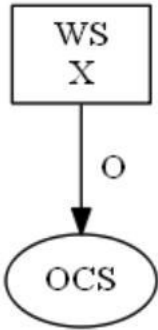


[REQ\_5.6.3.2-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the information about the suspected broken rail to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OCS O		
NOTE REQ_5.6.3.2-2 as pre-requisite.					
The output to OHMI is provided by REQ_6.5.1-2.					



**FCN 5.6.4 – Manage passenger requests**

**FCN 5.6.4.1 – Deleted**

**FCN 5.6.4.2 – React to passenger alarm device activation**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

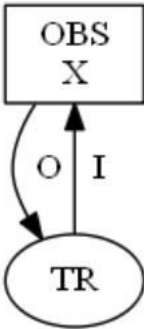
**Mandatory:** all GOAs if UGTMS is interfaced with an external onboard passenger alarm device

[REQ\_5.6.4.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of an activation of an onboard passenger alarm device in a running train, UGTMS shall command the stopping of the train in the next safe place (e.g. next station).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O
NOTE   Input I from an external onboard passenger alarm device activation. The next safe place is determined by the train reporting location covered by REQ_5.1.2.1.4-1. The output O to train (but not its HMI) for stopping the train.					

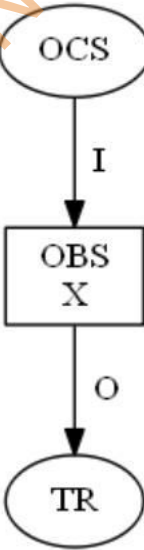


[REQ\_5.6.4.2-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a train is immobilized in the designated safe place by UGTMS following the activation of an onboard passenger alarm device, UGTMS shall maintain the immobilization until it is released by operations staff using a safety-related command provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			TR O
NOTE REQ_5.6.4.2-1 as pre-requisite.					
Output O to maintain train immobilization until receiving the release command by input I from OCS and then to release the train immobilization.					
The input from/output to the OHMI is provided by REQ_6.5.1-3.					



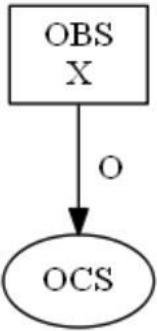
[REQ\_5.6.4.2-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of an activation of an onboard passenger alarm device, UGTMS shall provide the necessary information (status, train identification and locality inside train) to the interface with the external operations control HMI.



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The information from an external onboard passenger alarm device activation is already available in OBS, as described in REQ_5.6.4.2-1.					
The output to OHMI is provided by REQ_6.5.1-2.					

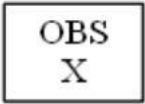


[REQ\_5.6.4.2-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case of an activation of an onboard passenger alarm device, UGTMS shall provide the necessary information (status and locality inside train) to the interface with the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The information from an external onboard passenger alarm device activation is already available in OBS, as described in REQ_5.6.4.2-1.					
The output to THMI is provided by REQ_6.5.2-1.					

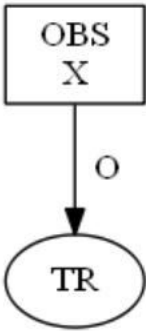


[REQ\_5.6.4.2-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

After the passenger transfer, UGTMS shall stop the train immediately if a passenger alarm device is actuated when the train is in a defined area, and under conditions defined by the transport authority (e.g. the train is expected to stop partially in the station or in the vicinity of the station). (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE The information from an external onboard passenger alarm device activation is already available in OBS, as described in REQ_5.6.4.2-1.					
Knowing if the train is in defined area is determined by train reporting location covered by REQ_5.1.2.1.4-1.					
The output O to train (but not its HMI) is for stopping immediately the train.					



**FCN 5.6.4.3 – React to emergency release of train doors**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

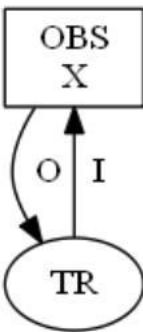
**Mandatory: all GOAs if UGTMS is interfaced with an external train doors emergency release device**

**[REQ\_5.6.4.3-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When an emergency release request of train doors is received and the train is moving, UGTMS shall allow the train to continue its ride to the next safe place (e.g. next station) where UGTMS shall stop and immobilise the train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O
NOTE Input I from emergency release request of train doors.					
The next safe place is determined by the train reporting location covered by REQ_5.1.2.1.4-1.					
The output O to train (but not its HMI) for stopping the train.					



[REQ\_5.6.4.3-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

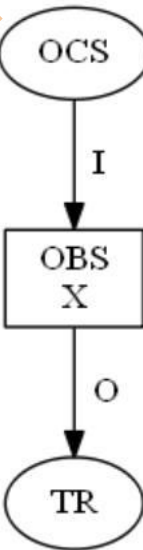
When a train is immobilized in the designated safe place by UGTMS following the activation of an onboard door emergency release device, UGTMS shall maintain the immobilization until it is released using a safety-related command provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			TR O

NOTE REQ\_5.6.4.3-1 as pre-requisite for train immobilization.

TR O to maintain train immobilization until receiving the release command by input OCS I (the information from emergency release request of train doors is already available in OBS, as described in REQ\_5.6.4.3-1.), and then to release the train immobilization.

The input from/output to the OHMI is provided by REQ\_6.5.1-3.



[REQ\_5.6.4.3-3]

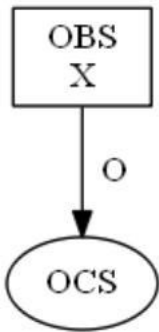
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide emergency release request of train doors to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		

NOTE The information from emergency release request of train doors is already available in OBS, as described in REQ\_5.6.4.3-1.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_5.6.4.3-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

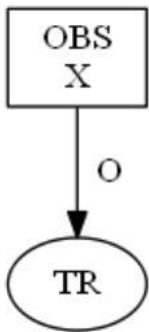
When an emergency release request of train doors is received and the train is at standstill, UGTMS shall allow the emergency release of the door under conditions defined by the transport authority. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O

NOTE The information from emergency release request of train doors is already available in OBS, as described in REQ\_5.6.4.3-1.

Standstill train determination is covered by REQ\_5.1.5.1-3 (zero speed).

The TR O to train (but not its HMI) to allow emergency release of the door.



[REQ\_5.6.4.3-5]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

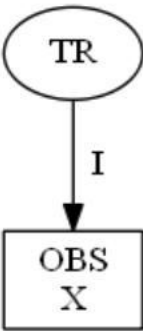
Once the door has been opened, UGTMS shall prevent the train from restarting until the emergency release request of train doors is reset, in addition to the usual conditions for restarting depending on the location of the safe place (in station or in between stations).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	

NOTE    REQ\_5.6.4.3-4 is a pre-requisite.

In addition to conditions to consider as described in FCN 5.4.3.1 (if the safe place is in a station) and in FCN 5.5.3 (if the safe place is not in a station), the processing is done by OBS with inputs coming from the train (but not its HMI):

- doors status to detect open doors;
- reset of emergency release request.



**FCN 5.6.5 – React to loss of train integrity**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_5.6.5-1]**

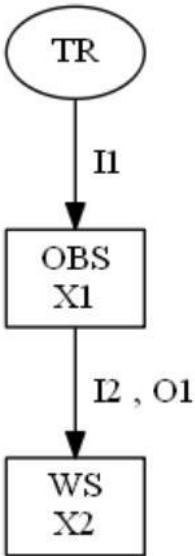
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When the information about a loss of train integrity is provided to UGTMS, UGTMS shall establish a zone of protection.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X2 OBS X1	OBS I2	WS O1	TR I1	

NOTE 1    The OBS is receiving the input I1 about train integrity from Train (but not its HMI). And when OBS is informed about a loss of train integrity, OBS sends information O1 about loss of train integrity to WS.

NOTE 2    From the input I2, the WS is receiving the information from the OBS, and is establishing a ZOP through REQ\_5.1.4.4-1.

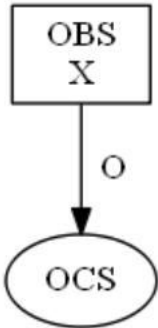


[REQ\_5.6.5-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the necessary information about loss of train integrity to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
<p>NOTE The information from train integrity coming from Train (but not its HMI) is already available in OBS, as described in REQ_5.6.5-1.</p> <p>The output to OHMI is provided by REQ_6.5.1-2.</p>					



[REQ\_5.6.5-3]

{GOA1: M; GOA2: M; GOA3: O; GOA4: O}

UGTMS shall provide the necessary information about loss of train integrity to the interface with the external train HMI. (M for GOA1, M for GOA2, O for GOA3, O for GOA4)



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The information from train integrity coming from Train (but not its HMI) is already available in OBS, as described in REQ_5.6.5-1.  The output to THMI is provided by REQ_6.5.2-1.					



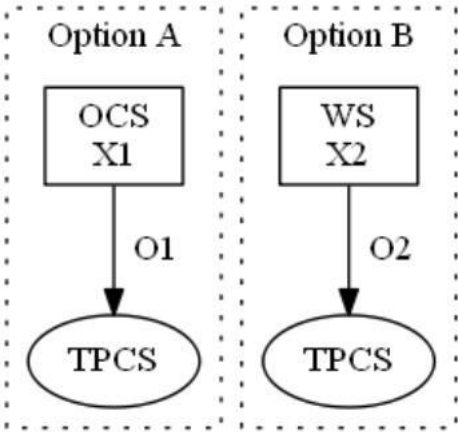
[REQ\_5.6.5-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

When the information about a loss of train integrity is provided to UGTMS, UGTMS shall request the cut off of the traction power of the concerned area. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1				TPCS O1
B	WS X2				TPCS O2
<p>This requirement can be implemented in two ways, depending on how TPCS is connected to UGTMS (the choice of option has to be the same as the one made for REQ_5.3.2.2-5):</p> <p>Option A: when TPCS is interfaced to OCS</p> <p>NOTE 1 The processing is done by the OCS. REQ_5.6.5-2 is a pre-requisite to get relevant information.</p> <p>The output O1 requests the cut off of the traction power of the concerned area.</p> <p>Option B: when TPCS is interfaced to WS</p> <p>NOTE 2 The processing is done by the WS. REQ_5.6.5-1 is a pre-requisite.</p> <p>The output O2 requests the cut off of the traction power of the concerned area.</p>					





**FCN 5.6.6 – React to the loss of train doors closed and locked status**

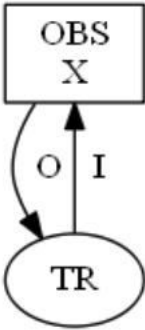
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

[REQ\_5.6.6-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case the door closed and locked status is lost and the train is stopped between stations, UGTMS shall command immobilization of the train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			TR I	TR O
<p>NOTE Input I from the train doors status.</p> <p>Train location is covered by REQ_5.1.2.1.4-1 (reporting train location) and stopping detection by REQ_5.1.5.1-3 for knowing if the train is stopped between stations.</p> <p>The output O to train (but not its HMI) to immobilize the train.</p>					

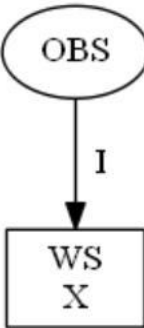


[REQ\_5.6.6-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case the door closed and locked status is lost and the train is stopped between stations, UGTMS shall establish a zone of protection. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X	OBS I			
NOTE REQ_5.6.6-1 as pre-requisite.					
The WS is processing the input I provided by the OBS and establishes a ZOP by REQ_5.1.4.4-1 (ZOP).					

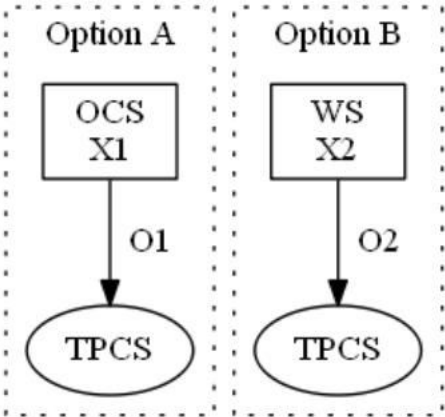


[REQ\_5.6.6-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case the door closed and locked status is lost and the train is stopped between stations, UGTMS shall request the cut off of the traction power of the concerned area. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1				TPCS O1
B	WS X2				TPCS O2
This requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ_5.3.2.2-5):					
Option A: when TPCS is interfaced to OCS					
NOTE 1 The processing is done by the OCS. REQ_5.6.6-5 is a pre-requisite to get relevant information.					
The output O1 requests the cut off of the traction power of the concerned area.					
Option B: when TPCS is interfaced to WS					
NOTE 2 The processing is done by the WS. REQ_5.6.6-2 is a pre-requisite.					
The output O2 requests the cut off of the traction power of the concerned area.					

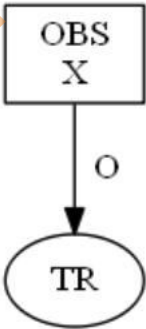


[REQ\_5.6.6-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case the door closed and locked status is lost and the train is running, UGTMS shall allow the train to proceed to the next station where it shall be stopped and immobilized. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O
NOTE The information from the train doors status is already available in OBS, as described in REQ_5.6.6-1. Train location is covered by REQ_5.1.2.1.4-1 (reporting train location) and running detection by REQ_5.1.5.1-3. The output TR O to Train (but not its HMI) to stop and to immobilize the train.					

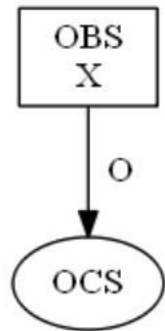


[REQ\_5.6.6-5]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the necessary information about loss of door closed and locked status to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The information from the train doors status is already available in OBS, as described in REQ_5.6.6-1. The output to OHMI is provided by REQ_6.5.1-2.					

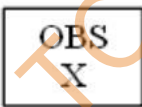


[REQ\_5.6.6-6]

{GOA1: M; GOA2: M; GOA3: O; GOA4: O}

UGTMS shall provide the necessary information about loss of door closed and locked status to the interface with the external train HMI. (M for GOA1, M for GOA2, O for GOA3, O for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				
NOTE The information from the train doors status is already available in OBS, as described in REQ_5.6.6-1. The output to THMI is provided by REQ_6.5.2-1.					



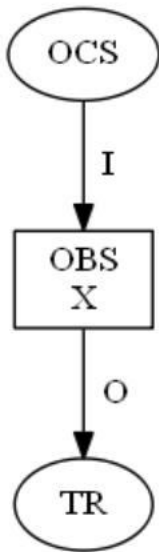
[REQ\_5.6.6-7]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When a train is immobilized by UGTMS following the loss of door closed and locked status, UGTMS shall maintain the immobilization until it is released by a safety-related command provided via the interface with

- the external train HMI (M for GOA1, M for GOA2, O for GOA3, O for GOA4), and
- the external operations control HMI (O for GOA1, O for GOA2, O for GOA3, M for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			TR O
NOTE REQ_5.6.6-1 or REQ_5.6.6-4 as pre-requisite. Output TR O to maintain train immobilization until receiving the release command by input I from OCS, and then to release the train immobilization.  The input from/output to the OHMI is provided by REQ_6.5.1-3.  The input from/output to the THMI is provided by REQ_6.5.2-2.					



**FCN 6 – Functions for Operation Management and Supervision**

**FCN 6.1 – Manage the daily timetable**

**FCN 6.1.1 – Import timetables**

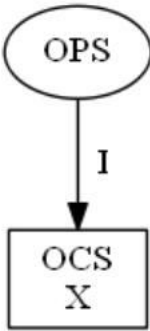
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.1.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall support import of timetables provided by an operation planning system outside UGTMS.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			OPS I	

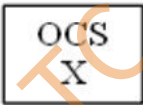


[REQ\_6.1.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the selected imported timetable to the interface with the external operations control HMI, as a result of an operational command provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



**FCN 6.1.2 – Select the timetable<sup>2</sup>**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.1.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

It shall be possible to activate a selected timetable by operational command provided via the interface with the external operations control HMI to become the operational timetable.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					





**FCN 6.1.3 – Modify the operational timetable**

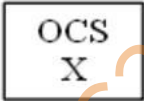
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_6.1.3-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall modify the operational timetable according to commands provided via the interface with the external operations control HMI (e.g. extra trains for sporting events, movements of engineers' trains).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



**[REQ\_6.1.3-2]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the operational timetable to the interface with the external operations control HMI to be displayed for modification.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



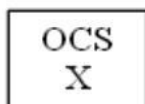
**[REQ\_6.1.3-3]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

It shall be possible to modify the timetable with short term changes (for example, terminating a train short of its normal destination) such that recourse to manual route setting is not required.



Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



## **FCN 6.2 – Manage the train service**

### **FCN 6.2.1 – Manage train missions**

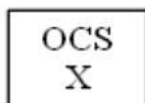
{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

#### **[REQ\_6.2.1-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall assign a mission to a train journey either by operational command provided via the interface with the external operations control HMI or automatically from the operational timetable or equivalent UGTMS internal data.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE OCS assigns a mission to a train journey:					
<ul style="list-style-type: none"> <li>– from input from OHMI provided either by REQ_6.5.1-2 or REQ_6.5.1-3, or</li> <li>– automatically from the operational timetable provided by REQ_6.1.2-1.</li> </ul>					

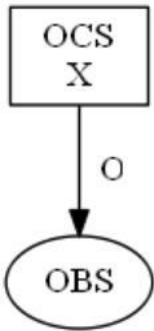


#### **[REQ\_6.2.1-2]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall assign a mission to a specific train for every scheduled train journey, and optionally, the train shall be chosen according to criteria defined by the transport authority (e.g. maintenance consideration, mileage of the train).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		OBS O		

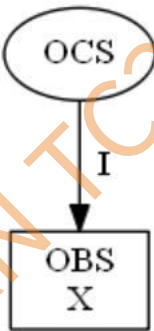


[REQ\_6.2.1-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Changes in a mission shall be taken into account as soon as possible if they are applicable considering the current time and location of the train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			

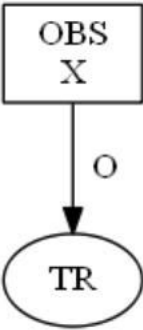


[REQ\_6.2.1-4]

{GOA1: n/a; GOA2: n/a; GOA3: n/a; GOA4: O}

When all missions assigned to the train are completed, the train shall automatically go into the stand-by state (train stopped, and doors closed). (not applicable for GOA1, not applicable for GOA2, not applicable for GOA3, O for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				TR O

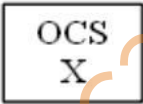


[REQ\_6.2.1-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall allow the marking of train journeys for trains which have to be sent to sidings or workshop after finishing revenue service. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



[REQ\_6.2.1-6]

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[REQ\_6.2.1-7]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Once a mission is assigned to a train, UGTMS shall create a unique train identification number associated to this specific mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

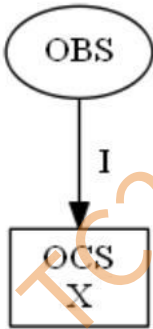


[REQ\_6.2.1-12]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

It shall be possible to create a mission only by defining the destination of the train journey. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X	OBS I			
NOTE OCS creates a mission from the destination of the train journey received: <ul style="list-style-type: none"><li>from OBS, the input from/output to THMI is provided either by REQ_6.5.2-1 or REQ_6.5.2-2, or</li><li>from an input from/output to OHMI provided either by REQ_6.5.1-2 or REQ_6.5.1-3.</li></ul>					



[REQ\_6.2.1-13]

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FCN 6.2.2 – Set routes automatically

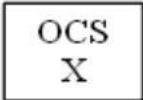
{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

[REQ\_6.2.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Where multiple routes to a given destination are possible, UGTMS shall determine the choice of route by considering the mission, the current time and train location, and optionally the level of priority of the train service.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



[REQ\_6.2.2-2]

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[REQ\_6.2.2-3]

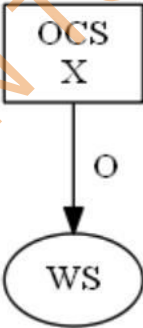
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[REQ\_6.2.2-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In order to ensure that no delay to the train is incurred, UGTMS shall automatically trigger route setting sufficiently in advance of the arrival of the train to the route origin or before the scheduled departure of the train (when the train is already at the required departure point).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		WS O		
NOTE The requirement is processed by OCS with output either to WS (REQ_5.1.1.1.1-1) or EIXL (REQ_5.1.6-3).					



[REQ\_6.2.2-5]

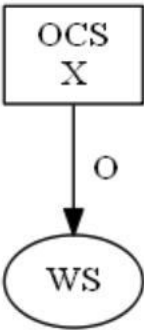
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[REQ\_6.2.2-6]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall be able to automatically trigger route setting using the information contained in the train mission.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		WS O		
NOTE The requirement is processed by OCS with output either to WS (REQ_5.1.1.1.1-1) or EIXL (REQ_5.1.6-3).					
The train mission assignment from OCS is covered by REQ_6.2.1-2.					



[REQ\_6.2.2-7]

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[REQ\_6.2.2-8]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Deadlocks (trains facing each other where one shall be backed up) shall be prevented.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



[REQ\_6.2.2-9]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Alternation of platforms (turnback and en-route) shall be managed.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

OCS  
X

[REQ\_6.2.2-10]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

Bi-directional use of tracks shall be managed. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

OCS  
X

[REQ\_6.2.2-11]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

The diversion of trains around a section of track not available for train operation shall be managed.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

OCS  
X

**FCN 6.2.3 – Regulate trains**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.2.3-1]

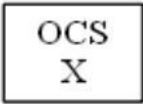
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Regulation shall be based on the current missions.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

NOTE Train mission assignment from OCS is covered by REQ\_6.2.1-2.



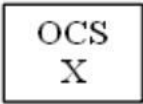


[REQ\_6.2.3-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

When trains are added to the service, UGTMS regulation shall adapt missions of trains such that the perturbation to the normal scheduled service is minimised.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

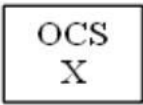


[REQ\_6.2.3-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall propose regulation strategies complying with the operational timetable or a given headway.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



[REQ\_6.2.3-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall detect deviation from timetable or headway.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

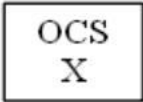


[REQ\_6.2.3-5]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide an alarm to the interface with the external operations control HMI when the advance/delay of the train exceeds a predefined value.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The output to OHMI is provided by REQ_6.5.1-2.					

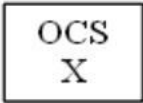


[REQ\_6.2.3-6]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case of detected deviation from timetable or headway, UGTMS shall calculate revised timings of the missions for one or more trains, in order to minimise the effects of service perturbations. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



**FCN 6.2.4 – Deleted**

**FCN 6.2.5 – Manage operational disturbances**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.2.5-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

Priority rules shall be established to manage junctions. When trains are not on schedule, UGTMS shall resolve conflicts automatically using pre-defined junction prioritisation or submit a choice of strategies to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



[REQ\_6.2.5-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of delayed operation which cannot be corrected by train regulation strategies, UGTMS shall propose corrective actions in order to return to regular operation.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



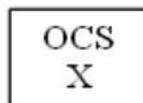
[REQ\_6.2.5-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

In case of track sections not available for train running (e.g. failed trains or failed track elements), UGTMS shall identify corrective actions to be proposed to operations staff in order:

- to continue operations (e.g. by using a crossover), or
- to maintain service in undisturbed parts of the line (e.g. turn back in defined sidings or platform tracks, shuttle service in different parts of the line).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE Inputs for track section status are given by REQ_6.3.2-9.					

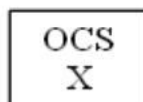


**[REQ\_6.2.5-4]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide the proposed corrective actions to the interface with the external operations control HMI to be displayed to request operations staff to modify timetable or missions or track elements.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE Inputs for track section status are given by REQ_6.3.2-9.					
The input from/output to OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					



**[REQ\_6.2.5-5]**

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**FCN 6.2.6 – Dispatch trains for energy saving**

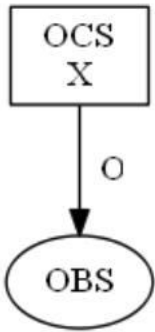
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_6.2.6-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall coordinate starting of trains in different stations of the line by modifying dwell times in accordance with the actual situation (e.g. delay, regulation) in a way that minimises the instantaneous consumption of electrical power.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		OBS O		
NOTE The requirement is processed by OCS with output to OBS, if station dwell times are managed by OBS.					

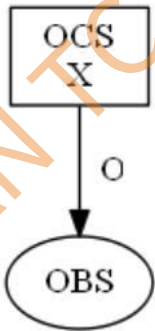


[REQ\_6.2.6-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall coordinate starting of trains in different stations of the line by modifying dwell times in a way that energy of braking trains can be used for starting trains in an optimised way. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X		OBS O		
NOTE The requirement is processed by OCS with output to OBS, if station dwell times are managed by OBS.					



**FCN 6.3 – Supervise train operations**

**FCN 6.3.1 – Supervise train tracking**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

[REQ\_6.3.1-1]

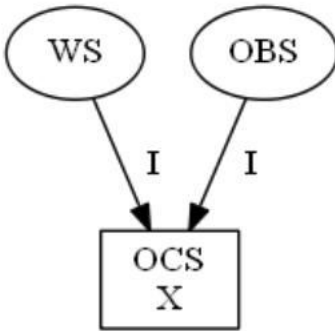
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall report the position of all trains to the external operations control HMI. This includes:

- the location of reporting trains, and
- the track sections occupied by non-reporting trains (if external train detection devices are used by UGTMS).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X	WS I OBS I			

- NOTE
- Location of reporting trains are sent to OCS directly by OBS and WS (see REQ\_5.1.2.1.4-1).
  - Track sections occupied by non-reporting trains are reported to OCS by WS (see REQ\_5.1.2.2-1), or by the EIXL (the corresponding input is provided by REQ\_5.1.6-2).
  - The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_6.3.1-2]

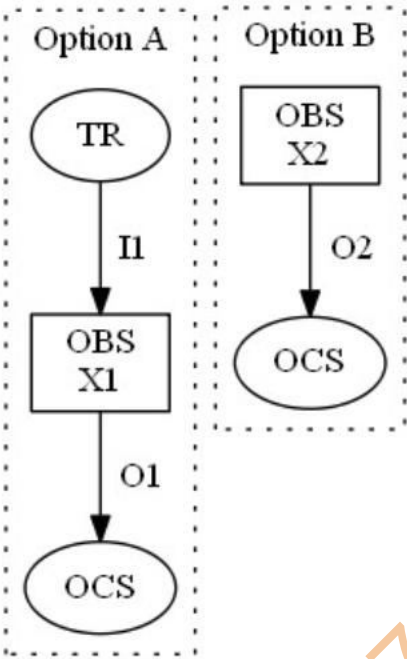
{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

For each train, UGTMS shall provide the fixed unique train related numbers (e.g. train number, unit number, car number) to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1		OCS O1	TR I1	
B	OBS X2		OCS O2		

- This requirement can be implemented in two ways:
- Option A:
- NOTE 1 Fixed unique train related number is input from the Train (but not its HMI) to the OBS and transferred to the OCS.
- Option B:
- NOTE 2 Fixed unique train related number is provided by configuration data and is transferred to the OCS.
- The output to OHMI is provided by REQ\_6.5.1-2.



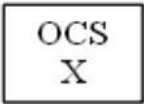


[REQ\_6.3.1-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall report the information on the train’s deviation from schedule to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The output to OHMI is provided by REQ_6.5.1-2.					



REQ\_6.3.1-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall store information about deviation from scheduled operation for the time required by the transport authority in order to support operations (e.g. investigation, analysis, elaboration of report).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				





**FCN 6.3.2 – Supervise trains and wayside equipment**

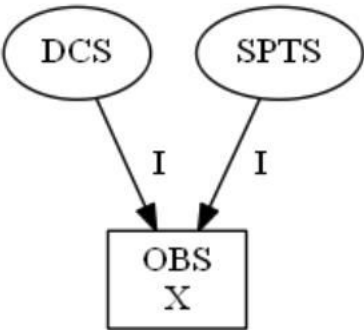
{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

**[REQ\_6.3.2-1]**

{GOA1: M; GOA2: M; GOA3: O; GOA4: O}

UGTMS shall provide all status and failure information of UGTMS onboard equipment with assigned level of priority to the interface with the external train HMI. (M for GOA1, M for GOA2, O for GOA3, O for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	DCS I SPTS I			
NOTE					
<div><div></div><div>– Status of Onboard element of SPTS and DCS as input,</div><div>– The output to THMI is provided by REQ_6.5.2-1.</div></div>					



[REQ\_6.3.2-2]

{GOA1: O; GOA2: O; GOA3: M; GOA4: M}

UGTMS shall provide all status and failure information of UGTMS onboard equipment with assigned level of priority to the interface with the external operations control HMI. (O for GOA1, O for GOA2, M for GOA3, M for GOA4)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1	DCS I1 SPTS I1	OCS O1		
B	OCS X2	OBS I2 DCS I2 SPTS I2			
C	OBS X3 DCS X4	SPTS I3	OCS O3 O4		

This requirement can be implemented in three ways:

Option A:

NOTE 1 Status of Onboard elements of SPTS and of DCS as inputs I1, consolidated by X1 OBS, and sent to OCS.

The output to OHMI is provided by REQ\_6.5.1-2.

Option B:

NOTE 2 Status of OBS and of Onboard elements of SPTS and of DCS as inputs I2 are sent directly to OCS X2.

For the DCS, I2 is the onboard DCS status.

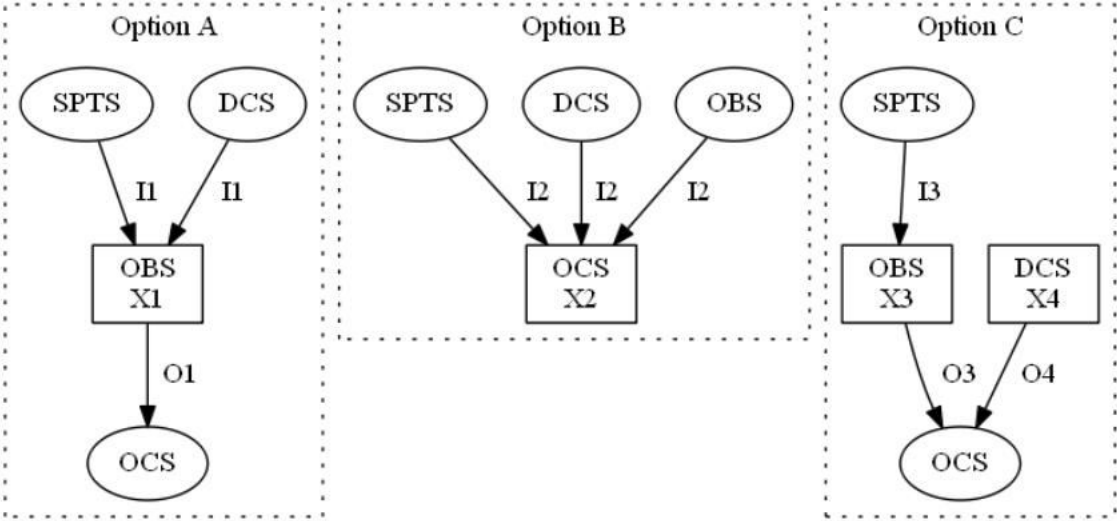
The output to OHMI is provided by REQ\_6.5.1-2.

Option C:

NOTE 3 Status of Onboard element of SPTS as inputs I3, consolidated by X3 OBS, and sent to OCS.

NOTE 4 Onboard elements of DCS status sent by X4 DCS directly to OCS.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_6.3.2-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

In case of failures of equipment, UGTMS shall provide a proposed operational action to be performed to the relevant HMI interface. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1 OCS X2				
<p>NOTE 1 OBS processing on the basis of input provided by REQ_6.3.2-1. The output to THMI is provided by REQ_6.5.2-1.</p> <p>NOTE 2 OCS processing on the basis of input provided by REQ_6.3.2-2 and 6.3.2-4. The output to OHMI is provided by REQ_6.5.1-2.</p>					



[REQ\_6.3.2-4]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide all status and failure information of UGTMS wayside equipment and operations control equipment with assigned level of priority to the interface with the external operations control HMI.

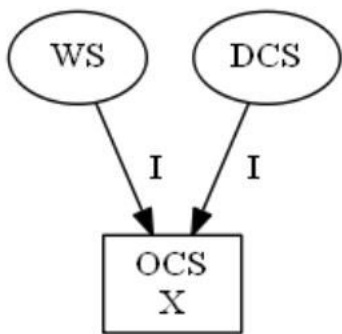
Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X	WS I DCS I			

NOTE

The DCS I corresponds to status and failure information of wayside DCS components.

There are no direct status and failure information from wayside SPTS

The status and failure information are provided as output to OHMI by REQ\_6.5.1-2.



[REQ\_6.3.2-5]

Deleted.

[REQ\_6.3.2-6]

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[REQ\_6.3.2-7]

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[REQ\_6.3.2-8]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide specified status and failure information provided by interface with the train to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OBS X1		OCS O1	TR I1	
B	OCS X2			TR I2	

This requirement can be implemented in two ways:

Option A:

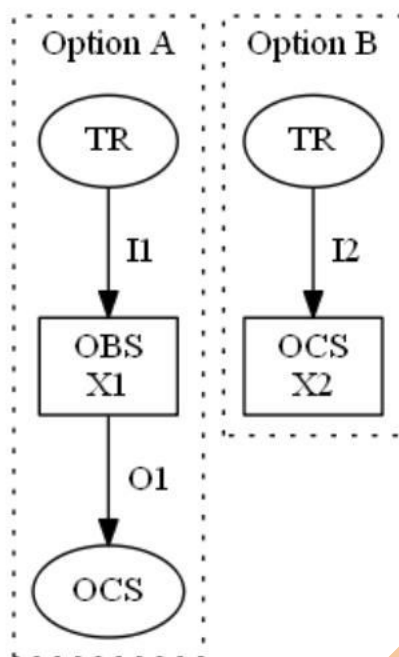
NOTE 1 Input I1 from Train (but not its HMI) are consolidated by OBS which sends O1 to OCS.

The output to OHMI is provided by REQ\_6.5.1-2.

Option B:

NOTE 2 Data I2 are directly sent by Train (but not its HMI) to OCS X2.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_6.3.2-9]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide specified status and failure information from external wayside devices (e.g. external interlocking, trackside signalling equipment such as train detection devices) to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1			TSE I1 SE I1 INF I1 EIXL I1	
B	WS X2		OCS O2	TSE I2 SE I2 INF I2 EIXL I2	

This requirement can be implemented in two ways:

Option A:

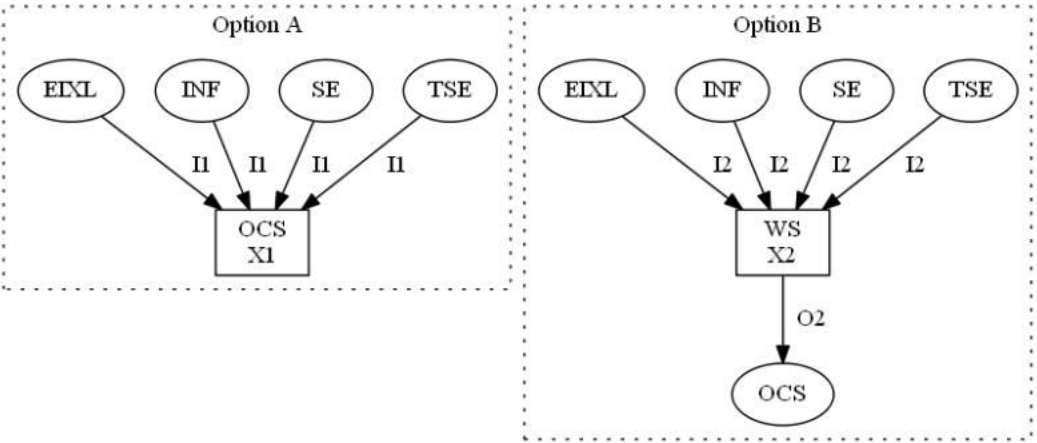
NOTE 1 Inputs 1 from external wayside devices are sent to OCS X1 through DCS

The output to OHMI is provided by REQ\_6.5.1-2.

Option B:

NOTE 2 WS X2 is consolidating the inputs I2 received from external wayside devices and is sending information O2 to the OCS.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_6.3.2-10]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall store all information about status, failures and malfunctions for the time required by the transport authority in order to support operations (e.g. investigation, analysis, elaboration of report).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				



[REQ\_6.3.2-11]

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**FCN 6.3.3 – Supervise passengers**

**FCN 6.3.3.1 – Supervise passengers on platforms**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

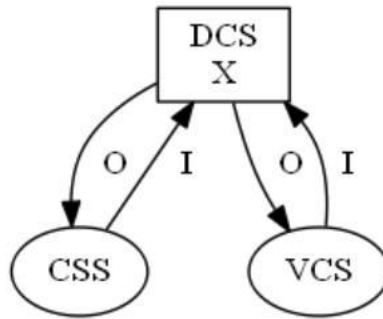
[REQ\_6.3.3.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide audio or video interfaces to monitor platforms for passenger security and system protection.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	DCS X			CSS I VCS I	CSS O VCS O
NOTE The DCS is in charge of the processing as it is providing the requested interfaces.					





[REQ\_6.3.3.1-2]

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**FCN 6.3.3.2 – Supervise passengers in trains**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

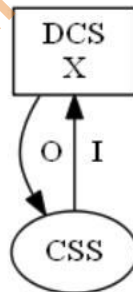
[REQ\_6.3.3.2-1]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall provide video transmission from trains (inside vehicles) to OCC. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	DCS X			CSS I	CSS O

NOTE The requirement is processed by the DCS, which forwards the data flow coming from the onboard part of the external CCTV Surveillance System to its centralized part.



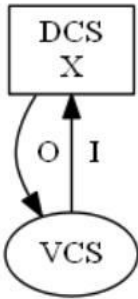
[REQ\_6.3.3.2-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide audio transmission between OCC and trains (inside vehicles) (e.g. emergency call, audio surveillance).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	DCS X			VCS I	VCS O

NOTE The requirement is processed by the DCS, which forwards the data flow between the onboard part of the external Voice Communication System and its centralized part.



**FCN 6.3.4 – Perform progressive shutdown**

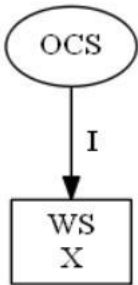
{GOA1: n/a; GOA2: n/a; GOA3: n/a; GOA4: O}

[REQ\_6.3.4-1]

{GOA1: n/a; GOA2: n/a; GOA3: n/a; GOA4: M}

UGTMS shall activate the progressive shutdown of the train service, when receiving a specific command provided via the interface with the external operations control HMI, or via a direct activation within UGTMS wayside equipment (e.g. through pushing a button or acting on a selector).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X	OCS I			
NOTE 1 The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.					
NOTE 2 The activation of the progressive shutdown of the train service results from a pushing of a button or equivalent directly connected to WS.					

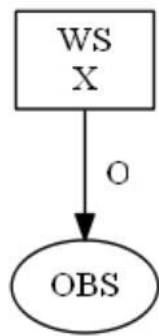


[REQ\_6.3.4-2]

{GOA1: n/a; GOA2: n/a; GOA3: n/a; GOA4: M}

When the progressive shutdown is activated, UGTMS shall permit trains to reach the next station, or a dedicated evacuation point, and to be immobilized there.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OBS O		
NOTE In case the train stops before reaching the next station, or a dedicated evacuation point, then this is covered by REQ_5.5.3-2.					

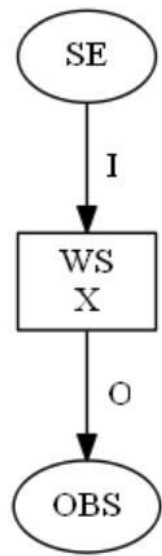


[REQ\_6.3.4-3]

{GOA1: n/a; GOA2: n/a; GOA3: n/a; GOA4: M}

When the progressive shutdown is activated, and when receiving a command provided via the interface with an external wayside equipment device (e.g. key, button), UGTMS shall command the immobilized train to leave the station, or the dedicated evacuation point, independently of the OCC, provided that conditions for safe movement of train are fulfilled in order to permit a following train to berth in such place.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X		OBS O	SE I	
NOTE The corresponding movement of the train is covered in REQ_5.4.3.3-1.					
The command of the train to leave the station comes from a device on the platform.					



**FCN 6.4 – Control traction power**

**FCN 6.4.1 – Monitor traction power supply**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.4.1-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall monitor the status of sections (on/off) provided by the interface with the traction power supply equipment and provide traction power status (on/off) to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1			TPCS I1	
B	WS X2		OCS O2	TPCS I2	

The requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.3.2.2-5):

Option A: when TPCS is interfaced to OCS

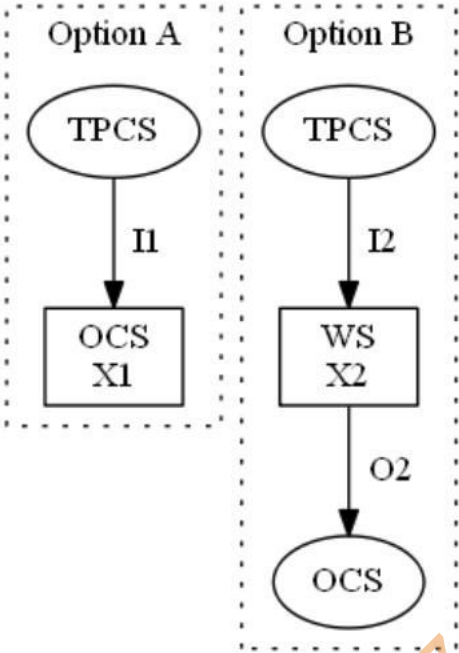
NOTE 1 Status of section I1 is sent from traction power supply to OCS.

The output to OHMI is provided by REQ\_6.5.1-2.

Option B: when TPCS is interfaced to WS

NOTE 2 Status of section I2 is sent from traction power supply to WS. WS is sending the information O2 to the OCS.

The output to OHMI is provided by REQ\_6.5.1-2.



[REQ\_6.4.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall monitor the interface to the external traction power supply equipment and provide status information to the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1			TPCS I1	
B	WS X2		OCS O2	TPCS I2	

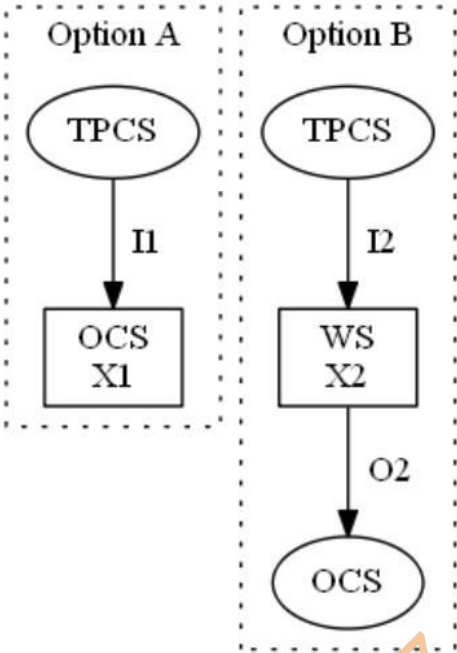
The requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.3.2.2-5):

Option A: when TPCS is interfaced to OCS

NOTE 1 Monitoring of the interface from traction power supply is processed by OCS X1 based on input I1. The output to OHMI is provided by REQ\_6.5.1-2.

Option B: when TPCS is interfaced to WS

NOTE 2 Monitoring of the interface from traction power supply is processed by WS X2 based on input I2. WS is sending the information O2 to the OCS. The output to OHMI is provided by REQ\_6.5.1-2.



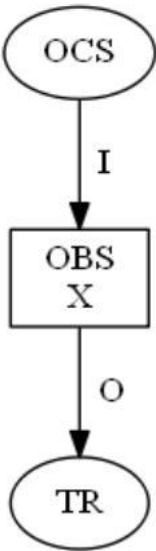
[REQ\_6.4.1-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

When traction power is lost in a section ahead of the train, UGTMS shall apply the service brake if it is possible to stop the train in advance of the section. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X	OCS I			TR O
NOTE The processing is done by OBS with inputs from OCS (the status of electrical sections is processed by OCS, see REQ_6.4.1-1).					





[REQ\_6.4.1-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

When traction power is lost in a section ahead of the train, UGTMS shall hold the train in the preceding station. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The processing is done by OCS. The status of electrical sections is known by OCS, see REQ_6.4.1-1, and for the holding of the train in the preceding station, see REQ_5.2.3.2-2					



**FCN 6.4.2 – Command traction power supply**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.4.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall command the traction power supply (on/off) on all sections or on designated sections via the interface with the external operations control HMI acting on the external traction power supply control equipment.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1				TPCS O1
B	WS X2	OCS I2			TPCS O2

The requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.3.2.2-5):

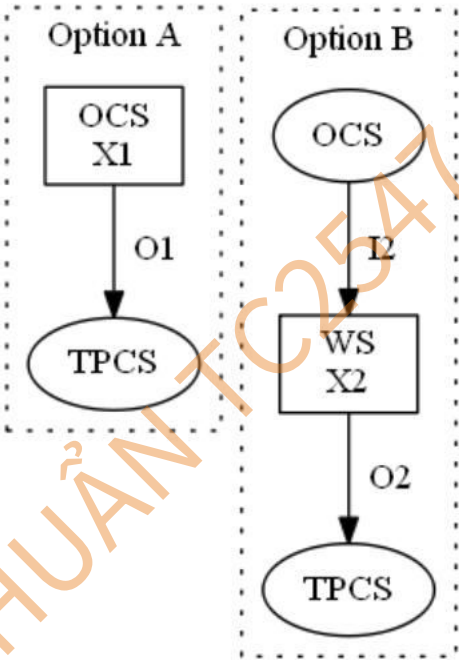
Option A: the external system is connected only to the OCS.

NOTE 1 The input from OHMI is provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3.

Option B: the requirement is processed by WS.

NOTE 2 WS X2 is in charge of the command O2 of the external equipment, as received from OCS.

The input from OHMI is provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3.



**FCN 6.4.3 – Control regenerative braking**

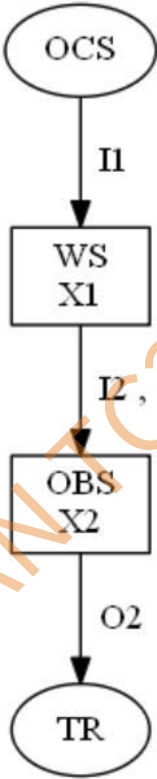
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

[REQ\_6.4.3-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall withdraw authorization for regenerative braking on all trains in the area selected by staff provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X1 OBS X2	OCS I1 WS I2	OBS O1		TR O2
<p>WS receives the information about the selected area from the OCS, and sends the relevant information to the OBS within this area.</p> <p>NOTE 1 WS X1 is receiving the input I1 from the OCS, determines all trains in the concerned area and sends information O1 about withdrawal of authorization of regenerative braking to OBS of concerned trains.</p> <p>The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3.</p> <p>NOTE 2 OBS X2 is receiving the input I2 from the WS, and is processing the command O2 to the train, as received from WS</p>					



[REQ\_6.4.3-2]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall withdraw authorization for regenerative braking on all trains that could feed a traction power supply section that has been cut off. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1 WS X2 OBS X3	OCS I2 WS I3	WS O1 OBS O2	TPCS I1	TR O3
B	WS X4 OBS X5	WS I5	OBS O4	TPCS I4	TR O5

The requirement can be implemented in two ways (the choice of option has to be the same as the one made for REQ\_5.3.2.2-5):

Option A: TPCS is interfaced with OCS.

The processing is done by OCS, WS and OBS.

NOTE 1 OCS is sending the information O1 to the WS about the cut-off status of the traction power supply section I1.

NOTE 2 WS X2 is receiving the input I2 from the OCS, determines all trains in the concerned area and sends information O2 about withdrawal of authorization of regenerative braking to OBS of concerned trains.

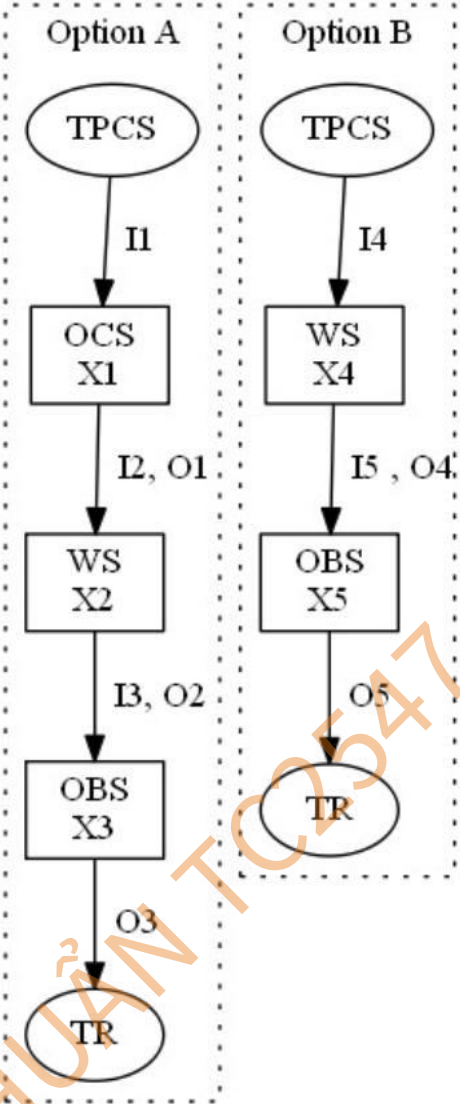
NOTE 3 OBS commands the inhibition of regenerative braking to the train through O3.

Option B: TPCS is interfaced with WS.

The processing is done by WS and OBS.

NOTE 4 WS is sending the information O4 about the cut-off status of the traction power supply section I3 to the OBS.

NOTE 5 OBS commands the inhibition of regenerative braking to the train through O5.



**FCN 6.5 – Manage the interface with the HMI**

**FCN 6.5.1 – Manage the interface with the operations control HMI**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

[REQ\_6.5.1-1]

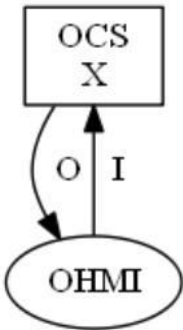
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[REQ\_6.5.1-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall manage information (including operational statuses) to and from the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			OHMI I	OHMI O
NOTE The data are already sent/received to/from OCS through the concerned REQ.					



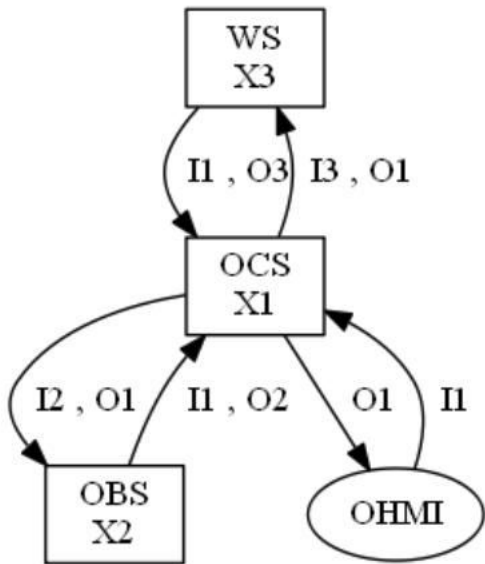
[REQ\_6.5.1-3]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide a safe data exchange from/to the interface with the external operations control HMI in order to ensure provision of safety-related commands.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X3 OBS X2 OCS X1	WS I1 OBS I1 OCS I2 I3	WS O1 OBS O1 OCS O2 O3	OHMI I1	OHMI O1
NOTE Such data exchange is not processed at OCS level only. It involves as well WS and OBS. This implies the processing is shared between OCS, WS and OBS.					





[REQ\_6.5.1-4]

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**FCN 6.5.2 – Manage the interface with the train HMI**

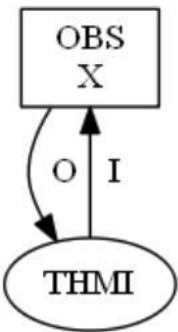
{GOA1: M; GOA2: M; GOA3: O; GOA4: O}

[REQ\_6.5.2-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide cab signal information (e.g. maximum allowed speed, driving mode and door opening authorization) and receive commands (e.g. driving mode selection) to/from the external train HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			THMI I	THMI O

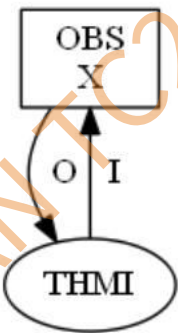


[REQ\_6.5.2-2]

{GOA1: M; GOA2: M; GOA3: O; GOA4: O}

UGTMS shall provide a safe data exchange from/to the interface with the external train HMI in order to ensure provision of safety-related commands (M for GOA1, M for GOA2, O for GOA3, O for GOA4).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X			THMI I	THMI O



**FCN 6.6 – Provide interface with the communication system for passengers and staff**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

**Mandatory: all GOAs if UGTMS is interfaced to an external voice communication system**

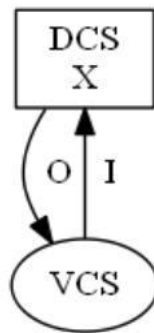
[REQ\_6.6-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall transport bidirectional voice communication between interfaces with onboard and wayside communication devices and interfaces with communication devices at the OCC or other locations as determined by transport authority.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	DCS X			VCS I	VCS O

NOTE The requirement is processed by the DCS, which forwards the data flow coming from or going to the external equipment related to communication systems.



[REQ\_6.6-2]

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**FCN 6.7 – Provide interface with the passenger information system**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

***Mandatory: all GOAs if UGTMS is interfaced to an external passenger information system***

[REQ\_6.7-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

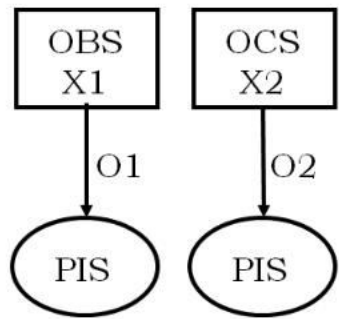
UGTMS shall interface with the external passenger information system to trigger information such as train arrival, next station information.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X1				PIS O1
	OCS X2				PIS O2

NOTE The processing can be done in the OBS and in the OCS.

The processing that can be done onboard is to permit the direct interface between the OBS and the onboard part of the PIS.

The processing done in the OCS is to permit the interface between the OCS and the PIS. The PIS manages the information with its different parts (the wayside part, and if required, the onboard part).



**FCN 6.8 – Provide interface with passenger surveillance system**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

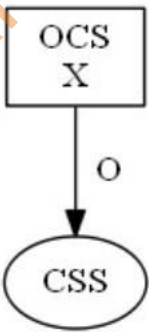
**Mandatory: all GOAs if UGTMS is interfaced to an external passenger surveillance system**

**[REQ\_6.8-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide information to the interface with external video surveillance systems in order to activate specific cameras in accordance with a reported event (e.g. location of intrusion detection in platform).

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				CSS O
NOTE OCS is processing the command to external video surveillance systems.					

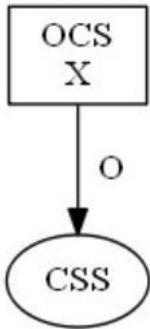


**[REQ\_6.8-2]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide commands to the interface with external video surveillance systems in order to activate specific cameras as result of a command provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				CSS O
NOTE The input from OHMI is provided either by REQ_6.5.1-2 or REQ_6.5.1-3. OCS is processing the command to external video surveillance systems.					



**FCN 6.9 – Support maintenance**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

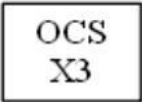
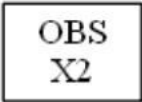
**Mandatory: all GOAs if UGTMS is interfaced to an external maintenance system**

[REQ\_6.9-1]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall identify any failed UGTMS replaceable unit.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	WS X1 OBS X2 OCS X3 DCS X4 SPTS X5				
NOTE If SPTS is designed only with passive elements, the SPTS has no processing to do.					



[REQ\_6.9-2]

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide failure and status information of UGTMS equipment and interfaced non-UGTMS equipment to the external maintenance system.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	WS X1 OBS X2 OCS X3 DCS X4 SPTS X5				MS O1 O2 O3 O4 O5
B	OCS X6				MS O6

The requirement can be implemented in two ways (the options defined for the allocation of this requirement are not design options decided for UGTMS, but result from the design of the external environment and how it is connected to UGTMS):

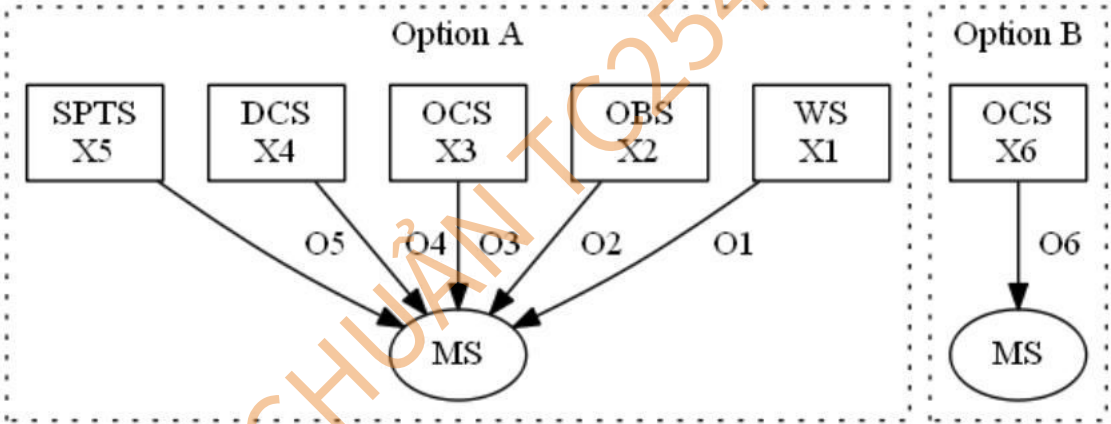
Option A: MS is connected on DCS and interfaced to each UGTMS subsystem

NOTE 1 , NOTE 2 , NOTE 3 , NOTE 4 , NOTE 5 Each UGTMS equipment is sending failure and status information to the external maintenance system.

The information related to non-UGTMS equipment is provided by REQ\_6.3.2-8 and REQ\_6.3.2-9.

Option B: MS is connected to OCS

NOTE 6 OCS has already collected information related to UGTMS equipment and non-UGTMS equipment (see REQ\_6.3.2-2, -4, -8 and -9), and it provides information to the external maintenance system.



[REQ\_6.9-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

All onboard related data shall include information related to the train location at the time the event took place. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X				



OBS  
X

**[REQ\_6.9-4]**

{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

UGTMS shall calculate the number of run kilometres travelled by a train or receive it from the train, and provide it to the external maintenance system. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
A	OCS X1				
B	OCS X2				

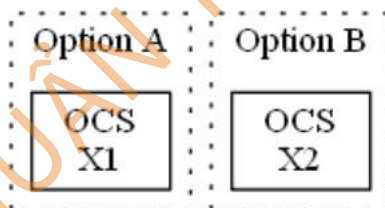
The requirement can be implemented in two ways (the options defined for the allocation of this requirement are not design options decided for UGTMS, but result from the design of the external environment and how it is connected to UGTMS):

Option A: Kilometrage elaborated by the train

NOTE 1 Train is providing the information to the OCS via the OBS (REQ\_6.3.2-8), then OCS is providing the information to the external maintenance system (REQ\_6.9-2).

Option B: Kilometrage elaborated by the OCS

NOTE 2 OCS calculates and maintains the distance travelled by each train and provides the information to the maintenance system. The transmission of information to the maintenance system is covered by REQ\_6.9-2.

**FCN 6.10 – Manage train and staff resources****FCN 6.10.1 – Assign train to operation needs**

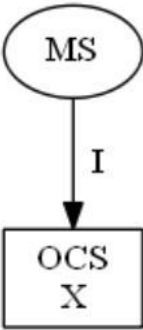
{GOA1: O; GOA2: O; GOA3: O; GOA4: O}

**[REQ\_6.10.1-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: M}

UGTMS shall provide a list of trains which are available for mission assignment during a given period of operation taking into account the needs of maintenance for each train.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			MS I	



**FCN 6.10.2 – Assign or reassign train staff**

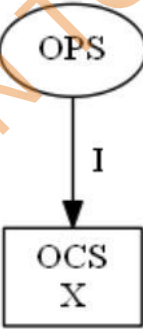
{GOA1: O; GOA2: O; GOA3: O; GOA4: n/a}

**[REQ\_6.10.2-1]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: n/a}

UGTMS shall import planned duty roster data to create associations between train staff and missions.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X			OPS I	



**[REQ\_6.10.2-2]**

{GOA1: M; GOA2: M; GOA3: M; GOA4: n/a}

In order to meet current operational needs, UGTMS shall provide knowledge about available train staff, and assign train staff (using train staff identification) to trains or modify the planned duty roster by commands provided via the interface with the external operations control HMI.

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				

NOTE The input from/output to OHMI is provided either by REQ\_6.5.1-2 or REQ\_6.5.1-3.

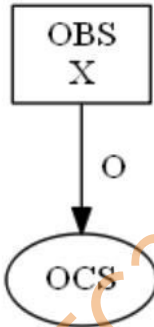


[REQ\_6.10.2-3]

{GOA1: O; GOA2: O; GOA3: O; GOA4: n/a}

UGTMS shall receive the unique train staff identification from the external train HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OBS X		OCS O		
NOTE The input from THMI is provided either by REQ_6.5.2-1 or REQ_6.5.2-2.					



[REQ\_6.10.2-4]

{GOA1: O; GOA2: O; GOA3: O; GOA4: n/a}

In case of discrepancy between the staff identity entered on the external train HMI and the staff identity of the duty roster, an alarm shall be sent to the interface with the external operations control HMI. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				
NOTE The output to OHMI is provided by REQ_6.5.1-2.					

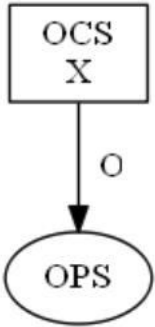


[REQ\_6.10.2-5]

{GOA1: O; GOA2: O; GOA3: O; GOA4: n/a}

UGTMS shall transmit modifications of crewing arrangements to the duty roster system. (O)

Option	Processing	Internal inputs	Internal outputs	External inputs	External outputs
	OCS X				OPS O



**6.2 Summary of allocated functions and subfunctions from IEC 62290-2**

Subclause 6.2 summarizes the allocations done in 6.1.2, see Table 1.

It shows for each function and subfunction from IEC 62290-2 how many allocations of requirements have been made to each UGTMS subsystem. If options for allocation have been defined for some requirements, then it means that these numbers can be higher than the total number of requirements of the function or subfunction.

The letter 'C' indicates that all requirements of the considered function or subfunction have been allocated to the UGTMS subsystem.

Empty lines mean that there is nothing to consider, as this corresponds to headlines of IEC 62290-2 functional tree, with no associated requirements.

Table 1 – Summary of allocated functions and subfunctions from IEC 62290-2:2024

Reference of the function or subfunction from IEC 62290-2: 2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
5	Functions for train operation							
5.1	Ensure safe movement of trains							
5.1.1	Ensure safe route							
5.1.1.1	Set and protect route							
5.1.1.1.1	Set route	9	0		C			
5.1.1.1.2	Supervise route	3	0		C			
5.1.1.1.3	Lock route by train	3	0		C			
5.1.1.2	Release route	5	0	1	5			
5.1.2	Ensure safe separation of trains							
5.1.2.1	Locate UGTMS reporting trains							
5.1.2.1.1	Initialise UGTMS reporting trains location	6	0	C				
5.1.2.1.2	Determine train orientation	1	0	C				
5.1.2.1.3	Determine actual train travel direction	2	0	C				
5.1.2.1.4	Determine train location	7	0	6	1			
5.1.2.2	Locate non-reporting trains	2	0		C			
5.1.3	Determine permitted speed							
5.1.3.1	Determine static speed profile	2	0	2	2			
5.1.3.2	Determine temporary infrastructure speed restrictions	7	1		8	1		
5.1.3.3	Determine maximum speed by train type	1	0	C				
5.1.3.4	Determine temporary train speed restrictions	2	0	C				



Reference of the function or subfunction from IEC 62290-2: 2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
5.1.4	Authorize train movement							
5.1.4.1	Determine movement authority limit	3	1	2	3			
5.1.4.2	Determine train protection profile	5	0	C				
5.1.4.3	Authorize train movement by wayside signals	3	0		C			
5.1.4.4	Determine a zone of protection	8	2	3	10			
5.1.4.5	Deleted							
5.1.4.6	Authorize the entry of non-operative UGTMS trains into UGTMS territory	3	1		C			
5.1.5	Supervise train movement							
5.1.5.1	Determine actual train speed	4	0	C				
5.1.5.2	Supervise safe train speed	11	0	C				
5.1.5.3	Inhibit train stops	1	1	1	1			
5.1.5.4	Deleted							
5.1.5.5	Supervise train rollaway	6	0	C				
5.1.5.6	React to unauthorized movements of non-operative UGTMS trains	3	0	0	C			
5.1.6	Provide interface with external interlocking	5	3		7	5		
5.2	Drive train							
5.2.1	Determine operating speed profile	6	3	9		4		
5.2.2	Control train movement in accordance with train operating speed profile	3	0	C				
5.2.3	Stop train in station							
5.2.3.1	Stop train at next station	8	0	C				
5.2.3.2	Hold train at station	7	0	5	1	3		



Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2:2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
5.2.3.3	Skip station stop	3	0	2		1		
5.3	Supervise guideway							
5.3.1	Prevent collision with obstacles							
5.3.1.1	Supervise wayside obstacle detection device	4	0		C			
5.3.1.2	Supervise onboard obstacle detection device	5	0	C				
5.3.2	Prevent collisions with persons on tracks							
5.3.2.1	Warn passengers to stay away from the platform edge	1	0			C		
5.3.2.2	React to emergency stop request from platforms	5	2			2		
5.3.2.3	Supervise platform doors	3	1		3	1		
5.3.2.4	Supervise platform tracks	4	1		4	1		
5.3.2.5	Supervise border between platform tracks and other tracks	4	1		4	1		
5.3.2.6	Supervise platform end doors	5	0		C			
5.3.2.7	Supervise emergency exits from guideway	3	0		C			
5.3.3	Protect staff on track by work zone	8	0	1	7			
5.4	Supervise passenger transfer							
5.4.1	Control train and platform doors							
5.4.1.1	Authorize door opening	6	3	8	3			
5.4.1.2	Command door opening	6	3	9	3			
5.4.1.3	Request door closing	4	1	5	2			
5.4.1.4	Supervise door closing	3	3	6	3			
5.4.2	Prevent injuries to persons between cars or between platform and train							

Reference of the function or subfunction from IEC 62290-2: 2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
5.4.2.1	Control gap fillers, movable train steps and similar devices	4	0	3	2			
5.4.2.2	Supervise detection of persons between cars or between platform and train	3	3	4	3			
5.4.3	Ensure train departure							
5.4.3.1	Authorize train departure (safety-related conditions)	4	1	4	3			
5.4.3.2	Authorize train departure (operational conditions)	6	0	6	1			
5.4.3.3	Command train departure	2	0	C				
5.5	Operate a train							
5.5.1	Put in or take out of operation							
5.5.1.1	Awake trains	2	0	C				
5.5.1.2	Set trains to sleep	2	0	C				
5.5.2	Manage driving modes	9	0	9	1			
5.5.3	Manage movement of trains after unexpected stops	4	0	C				
5.5.4	Manage stabling	2	0			C		
5.5.5	Deleted							
5.5.6	Restrict train entry to station	3	0	C				
5.5.7	Change the travel direction	1	0	C				
5.5.8	Couple and uncouple a train	3	2	5	1	1		
5.5.8.1	Couple trains automatically	4	0	C				
5.5.8.2	Uncouple trains automatically	4	0	C				
5.5.9	Supervise the status of UGTMS							

Reference of the function or subfunction from IEC 62290-2: 2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
5.5.9.1	Supervise UGTMS equipment status prior to entering service	6	0	5	4	3		3
5.5.9.2	Supervise UGTMS equipment status during operation	3	0	3	1	1		1
5.5.9.3	Test emergency braking performance	4	0	C				
5.5.9.4	React to detected train equipment failure	3	0	C				
5.5.10	Manage traction power supply on train	2	0	C				
5.5.11	Manage train washing	6	0	4	6			
5.5.12	Manage non-stopping areas	2	0	C				
5.6	Ensure detection and management of emergency situations							
5.6.1	React to detected onboard fire/smoke	5	0	C				
5.6.2	React to detected derailment	4	0	3	1			
5.6.3	React to detected or suspected broken rail							
5.6.3.1	React to detected broken rail	2	0			C		
5.6.3.2	React to suspected broken rail	3	0		C			
5.6.4	Manage passenger requests							
5.6.4.1	Deleted							
5.6.4.2	React to passenger alarm device activation	5	0	C				
5.6.4.3	React to emergency release of train doors	5	0	C				
5.6.5	React to loss of train integrity	4	1	3	2	1		
5.6.6	React to the loss of train doors closed and locked status	7	1	5	2	1		
6	Functions for operation management and supervision							

Reference of the function or subfunction from IEC 62290-2: 2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024	Number of requirements in the function or subfunction of IEC 62290-2: 2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
6.1	Manage the daily timetable							
6.1.1	Import timetables	2	0			C		
6.1.2	Select the timetable	1	0			C		
6.1.3	Modify the operational timetable	3	0			C		
6.2	Manage the train service							
6.2.1	Manage train missions	9	0	3		6		
6.2.2	Set routes automatically	7	0			C		
6.2.3	Regulate trains	6	0			C		
6.2.4	Deleted							
6.2.5	Manage operational disturbances	4	0			C		
6.2.6	Dispatch trains for energy saving	2	0			C		
6.3	Supervise train operations							
6.3.1	Supervise train tracking	4	0	1		3		
6.3.2	Supervise trains and wayside equipment	7	3	5	1	6	1	
6.3.3	Supervise passengers							
6.3.3.1	Supervise passengers on platforms	1	0				C	
6.3.3.2	Supervise passengers in trains	2	0				C	
6.3.4	Perform progressive shutdown	3	0		C			
6.4	Control traction power							
6.4.1	Monitor traction power supply	4	2	1	2	3		
6.4.2	Command traction power supply	1	1		1	1		
6.4.3	Control regenerative braking	2	1	3	3	1		
6.5	Manage the interface with the HMI							

Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function or subfunction from IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2:2024	Number of requirements in the function or subfunction of IEC 62290-2:2024 for which some allocation options exist	Number of allocations made to OBS, including options	Number of allocations made to WS, including options	Number of allocations made to OCS, including options	Number of allocations made to DCS, including options	Number of allocations made to SPTS, including options
6.5.1	Manage the interface with the operations control HMI	2	0	1	1	2		
6.5.2	Manage the interface with the train HMI	2	0	C				
6.6	Provide interface with the communication system for passengers and staff	1	0				C	
6.7	Provide interface with the passenger information system	1	0	1		1		
6.8	Provide interface with passenger surveillance system	2	0			C		
6.9	Support maintenance	4	2	3	2	5	2	2
6.10	Manage train and staff resources							
6.10.1	Assign train to operation needs	1	0			C		
6.10.2	Assign or reassign train staff	5	0	1		4		

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**6.3 Identification of interfaces for the UGTMS subsystems**

**6.3.1 General**

Subclause 6.3 describes the interfaces that have been identified between UGTMS subsystems, and the ones between UGTMS subsystems and UGTMS environment.

**6.3.2 Identification of interfaces between UGTMS subsystems**

Table 2 reflects the identification of interfaces between UGTMS subsystems involved in each function or subfunction of IEC 62290-2 (empty cells indicate no such interface is involved in the considered function).

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Table 2 – Identification of interfaces between UGTMS subsystems

Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function of subfunction from IEC 62290-2:2024	OCS-WS	OBS-WS	OBS-SPTS	OBS-OCS	DCS-OBS	DCS-OCS	OCS-SPTS	DCS-WS	SPTS-WS
5	Functions for train operation									
5.1	Ensure safe movement of trains									
5.1.1	Ensure safe route									
5.1.1.1	Set and protect route									
5.1.1.1.1	Set route	X								
5.1.1.1.2	Supervise route	X								
5.1.1.1.3	Lock route by train									
5.1.1.2	Release route	X	X							
5.1.2	Ensure safe separation of trains									
5.1.2.1	Locate UGTMS reporting trains									
5.1.2.1.1	Initialise UGTMS reporting trains location			X						
5.1.2.1.2	Determine train orientation			X						
5.1.2.1.3	Determine actual train travel direction			X	X					
5.1.2.1.4	Determine train location		X	X	X					
5.1.2.2	Locate non-reporting trains									
5.1.3	Determine permitted speed									
5.1.3.1	Determine static speed profile									
5.1.3.2	Determine temporary infrastructure speed restrictions	X	X		X					
5.1.3.3	Determine maximum speed by train type									
5.1.3.4	Determine temporary train speed restrictions									
5.1.4	Authorize train movement									
5.1.4.1	Determine movement authority limit		X							
5.1.4.2	Determine train protection profile		X							
5.1.4.3	Authorize train movement by wayside signals	X	X							



Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function of subfunction from IEC 62290-2:2024	OCS-WS	OBS-WS	OBS-SPTS	OBS-OCS	DCS-OBS	DCS-OCS	OCS-SPTS	DCS-WS	SPTS-WS
5.3.2.2	React to emergency stop request from platforms	X								
5.3.2.3	Supervise platform doors	X								
5.3.2.4	Supervise platform tracks	X								
5.3.2.5	Supervise border between platform tracks and other tracks	X								
5.3.2.6	Supervise platform end doors	X								
5.3.2.7	Supervise emergency exits from guideway	X								
5.3.3	Protect staff on track by work zone	X	X							
5.4	Supervise passenger transfer									
5.4.1	Control train and platform doors									
5.4.1.1	Authorize door opening	X	X		X					
5.4.1.2	Command door opening		X							
5.4.1.3	Request door closing		X		X					
5.4.1.4	Supervise door closing	X	X		X					
5.4.2	Prevent injuries to persons between cars or between platform and train									
5.4.2.1	Control gap fillers, movable train steps and similar devices	X	X		X					
5.4.2.2	Supervise detection of persons between cars or between platform and train	X	X		X					
5.4.3	Ensure train departure									
5.4.3.1	Authorize train departure (safety-related conditions)		X		X					
5.4.3.2	Authorize train departure (operational conditions)		X		X					
5.4.3.3	Command train departure									
5.5	Operate a train									
5.5.1	Put in or take out of operation									
5.5.1.1	Awake trains				X					
5.5.1.2	Set trains to sleep				X					
5.5.2	Manage driving modes	X	X		X					

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Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function of subfunction from IEC 62290-2:2024	OCS-WS	OBS-WS	OBS-SPTS	OBS-OCS	DCS-OBS	DCS-OCS	OCS-SPTS	DCS-WS	SPTS-WS
5.5.3	Manage movement of trains after unexpected stops		X		X					
5.5.4	Manage stabling				X					
5.5.5	Deleted									
5.5.6	Restrict train entry to station									
5.5.7	Change the travel direction									
5.5.8	Couple and uncouple a train		X		X					
5.5.8.1	Couple trains automatically				X					
5.5.8.2	Uncouple trains automatically				X					
5.5.9	Supervise the status of UGTMS									
5.5.9.1	Supervise UGTMS equipment status prior to entering service	X		X	X					
5.5.9.2	Supervise UGTMS equipment status during operation			X	X					
5.5.9.3	Test emergency braking performance				X					
5.5.9.4	React to detected train equipment failure				X					
5.5.10	Manage traction power supply on train				X					
5.5.11	Manage train washing	X	X		X					
5.5.12	Manage non-stopping areas									
5.6	Ensure detection and management of emergency situations									
5.6.1	React to detected onboard fire/smoke				X					
5.6.2	React to detected derailment		X		X					
5.6.3	React to detected or suspected broken rail									
5.6.3.1	React to detected broken rail	X								
5.6.3.2	React to suspected broken rail	X	X							
5.6.4	Manage passenger requests									
5.6.4.1	Deleted									
5.6.4.2	React to passenger alarm device activation				X					
5.6.4.3	React to emergency release of train doors				X					





Reference of the function or subfunction from IEC 62290-2:2024	Headline of the function of subfunction from IEC 62290-2:2024	OCS-WS	OBS-WS	OBS-SPTS	OBS-OCS	DCS-OBS	DCS-OCS	OCS-SPTS	DCS-WS	SPTS-WS
6.5.1	Manage the interface with the operations control HMI	X			X					
6.5.2	Manage the interface with the train HMI									
6.6	Provide interface with the communication system for passengers and staff									
6.7	Provide interface with the passenger information system									
6.8	Provide interface with passenger surveillance system									
6.9	Support maintenance									
6.10	Manage train and staff resources									
6.10.1	Assign train to operation needs									
6.10.2	Assign or reassign train staff				X					



### 6.3.3 Interfaces between UGTMS subsystems and the environment

Table 3 reflects the identification of interfaces between UGTMS subsystems and the external equipment of UGTMS environment.

Empty cells indicate that no such interface exists.

**Table 3 – Interfaces between UGTMS subsystems and the environment**

External System	WS	OBS	OCS	DCS	SPTS
TSE	X		X		
TR		X	X		
SE	X	X	X		
INF	X		X		
EIXL	X		X		
TPCS	X		X		
VCS	X	X	X	X	
CSS		X	X	X	
THMI		X			
OPS			X		
OHMI			X		
PIS		X	X		
MS	X	X	X	X	X

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JIS E 3801-2:2010, *Train control system using radio communication – Part 2: System requirement*

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