Technical support
for the interoperability Issues Log Book

Implementation & Deployment Plan update
(Working document on issue Follow-up)
## Contents

0  Introduction ................................................................................................................. 5  
  0.1  Introduction to the project ......................................................................................... 5  
  0.2  Methodology ............................................................................................................. 6  

1  Project 1 – Issues 5, 6, 7, 11 ....................................................................................... 7  
  1.1  Issue 5: Train Composition - Working handbrake last wagon ................................ 7  
  1.2  Issue 6 (0601_GA) .................................................................................................... 9  
  1.3  Issue 7 (0701_GA) .................................................................................................. 12  
  1.4  Issue 11 (1101_GA) .............................................................................................. 13

2  Project 2 – Issue 13 (1301_GA) .................................................................................. 17  
  2.1  Introduction / Description of the Issue ................................................................. 17  
  2.2  Occurrence ........................................................................................................... 17  
  2.3  Problem drivers/Reasons ...................................................................................... 18  
  2.4  Impacts ................................................................................................................ 18  
  2.5  Solutions ............................................................................................................... 18

3  Project 3 - Issue 3 (0303_GA) ..................................................................................... 19  
  3.1  Introduction / Description of the Issue ................................................................. 19  
  3.2  Occurrence / Analysis ........................................................................................... 19  
  3.3  Solutions ............................................................................................................... 20

4  Project 4 – Issue 14 (1401_GA) .................................................................................. 21  
  4.1  Introduction / Description of the Issue ................................................................. 21  
  4.2  Occurrence ........................................................................................................... 24  
  4.3  Problem drivers/Reasons ...................................................................................... 24  
  4.4  Impacts ................................................................................................................ 24  
  4.5  Solutions ............................................................................................................... 24
0 Introduction

0.1 Introduction to the project

The Technical Operational Issues Log Book (ILB) is a Commission initiative to accelerate progress on interoperability by focussing on a limited number of priorities and by streamlining the work done at European, corridor and national level by public authorities (European Union Agency for Railways, European Commission, national authorities), infrastructure managers including Rail Freight Corridors, railway undertakings and rail sector associations. Through the Issues Log Book, major hindrances to cross-border rail traffic have been identified “bottom-up” by the sector. These hindrances are related to safety or are of a technical and operational nature.

The objective of this project, carried out by the Panteia Consortium, is to support and accelerate the achievement of rail breakthroughs as defined in the Technical and Operational Issues Log Book by providing to the Commission technical assistance and by alleviating resource and expertise constraints of public authorities and rail sector stakeholders. The main objective is to support the Commission and ERA to work with infrastructure managers and railway undertakings, public authorities, namely Ministries of Transport and National Safety Authorities, as well as the Rail Freight Corridors in removing operational, technical and administrative barriers to rail interoperability in cooperation with the European Union Agency for Railways.

Work carried out by the consortium during the first phase of the project included an update of the ILB structure and its information (available on the DG MOVE website). Also, a prioritization was identified of issues that qualify for technical assistance (support activities). Issues assigned low or medium priority are provided with administrative and/or technical assistance based on specific requests; this also goes for support activities under ILB Priority 1 (braking). Issues assigned high priority were further analysed and actively considered in order to initiate solution processes. These are found in the table below:

<table>
<thead>
<tr>
<th>Project</th>
<th>Related Issue(s)</th>
<th>Activity description</th>
<th>Time frame for activity</th>
<th>Priority for technical assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 (Train Composition - Working handbrake last wagon)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>6 (Train Composition - No push 6 axles wagons)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>7</td>
<td>7 (Train Composition – Buffer wagons)</td>
<td>Investigate geographical scope; work with ERA to develop specific TOs (in addition to TO for RO, BG)</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>11</td>
<td>11 (New train number)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>Project</td>
<td>Related Issue(s)</td>
<td>Activity description</td>
<td>Time frame for activity</td>
<td>Priority for technical assistance</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>13 (2 people cabin crew)</td>
<td>Base analysis, geographical mapping; where rules requested, explore by whom, reasons. Explore existing solutions and propose solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>3 (Tail lights vs. plates)</td>
<td>Analysis of MSs study on the use of reflective plates</td>
<td>Jan-Feb 2021</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>14 (Equipment of border stations with commutable electric power supply)</td>
<td>Analysis of the situation referring equipment of border stations with commutable electric power supply</td>
<td>Jan-Jun 2021</td>
<td>High</td>
</tr>
</tbody>
</table>

In this working document, the results of the support activities captured in the table above are described. Based on these activities – with different time frames – further support actions are expected to be defined later on.

### 0.2 Methodology

This report sets forth the results from the Panteia Consortium's inquiries in follow-up of the first update of the Issues Log Book (July 2020). For prioritized issues where no external projects or activities apply, the Consortium performs projects itself, as required by the Commission and included in the table above.

The Consortium based the analyses on information previously acquired through initial desk research, interviews and stakeholder survey, as well as the study of additional documents and information from a series of in-depth interviews.
1 Project 1 – Issues 5, 6, 7, 11

<table>
<thead>
<tr>
<th>Project</th>
<th>Related Issue(s)</th>
<th>Activity description</th>
<th>Time frame for activity</th>
<th>Priority for technical assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 (Train Composition - Working handbrake last wagon)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>6 (Train Composition - No push 6 axles wagons)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>7</td>
<td>7 (Train Composition - Buffer wagons)</td>
<td>Investigate geographical scope; work with ERA to develop specific TOs (in addition to TO for RO, BG)</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
<tr>
<td>11</td>
<td>11 (New train number)</td>
<td>Base analysis, identification of stakeholders, further investigations, proposal for possible solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
</tbody>
</table>

1.1 Issue 5: Train Composition - Working handbrake last wagon

1.1.1 Introduction / Description of the Issue
In principle, all trains must have a continuous air pressure brake for all wagons, which must always be ready for operation during the train run and which guarantees the required braking performance of the train (brake weight, brake positions, see Issues 1 and 2).

Issue 5 however deals with preventing parked trains from unwanted movements. For this purpose, different technologies are available, being installed either on the wagon or on the track (mostly parking/hand brakes, brake shoes, track locks/derailers). The specific conditions for securing a parked train are specified in the respective national regulations.

A particular problem arises, if the national rule demands the last wagon(s) of a train to be equipped with a working hand brake. This leads to additional shunting operation at the border station, if the last wagon(s) of an international train that enters a country or network with such regulation does not fulfil this requirement.

1.1.2 Occurrence
As a result of a stakeholder survey, performed by the ILB consortium in May 2020, the “Working handbrake last wagon” issue has been geographically recognized on the following rail freight corridors:
- RFC 7, particularly in Romania at the borders Romania/Hungary (Curtici) and Romania/Bulgaria (Ruse);
- RFC 10, at the border Bulgaria/Serbia (Dimitrovgrad);
- RFC 3 (Italy),
- RFC 4 and 6 (Portugal).
As the stakeholder interviews show, Issue 5 particularly affects the Romanian borders of RFC 7 and RFC 9. According to national regulations, all trains in Romania must have an active handbrake at the last wagon. Moreover, the hand-braking performance of parked trains must be at least 10%; depending on the train weight this means that potentially more than one wagon has to be equipped with a handbrake. Explicitly mentioned was especially the HU/RO border in Curtici: in many cases, the last wagon of an international train arriving at Curtici is not equipped with a handbrake; in such cases shunting is required to position a wagon with a handbrake to the end of the train. Similar problems were reported for the RO/BG border in Ruse.

In addition, Serbia requires a minimum number/percentage of wagons with handbrake that causes additional shunting operations at the BG/RS border in Dimitrovgrad ZS.

In contrast, a working handbrake at the last wagon is not mandatory in Northern, Western and Middle Europe. Therefore, the Issue does not occur there. Issue 5 has also not been mentioned as a problem in the Xrail working groups.

In Italy, the problem does not occur despite being named in the survey. Even though it is recommended to have a working handbrake at the last wagon, it is not mandatory. Securing parked wagons can be performed by using brake shoes. The exact number of required brake shoes depends on the train composition (number of wagons, train length/weight, share of wagons with a hand brake) and also on the number positioning of empty wagons (empty wagons in a group / or mixed with loaded wagons). The brake shoes are stored on the locomotive. Some locomotives (like Vectron) have storage boxes outside the driver cabin. In other locomotives types, the brake shoes have to be stored in the driver cabin; this might lead to some inconvenience regarding storage space on the locomotive. Moreover, the brake shoes need to be handed over in case of locomotive change. However, these problems were reported to be of minor nature and therefore manageable.

Another topic, mentioned in the stakeholder interviews by Xrail, is the number and type of brake shoes to be used. Requirements are currently described in national rules, however harmonisation has been considered as beneficial for international freight train operations.

1.1.3 Problem drivers/Reasons
The consultants found no evidence that such national rule – as it is implemented in Romania – is required. The strong inclines on some of the Romanian corridor sections are no reason for demanding a parking brake, since wagons are parked in stations, for which the permitted gradient is considerably smaller than on the lines.

1.1.4 Impacts
The potential impacts from this Issue can be shown exemplarily for a service Schwandorf-Craiova. This train runs 2-3 times per week and is planned to be increased to a frequency of 4-5 trains per week. Some 50% of the trains entering Romania are affected with the problem that the last wagon is not equipped with a handbrake. As explained above, this means that shunting is required. Model calculations for such operations (assuming that one wagon with handbrake will be repositioned from the middle to the end of the train) show that such activity takes at least 30-45 minutes per train of pure shunting time. In practice, shunting operations can last even longer (e.g. according stakeholder interviews shunting at BG/RS border station Dimitrovgrad ZS takes about 2 hours).

In Curtici, this time loss is considerably extended in many cases, because the RU must engage an external shunting operator. If there is no shunting locomotive available, or the owner is not willing to provide it, typical waiting times for an available shunting locomotive take up to 12
hours, causing delays and significant costs to bring the locomotive to the border station. Moreover, such shunting service is generally not available during night shifts, which might cause further waiting time of 4-12 hours. Additionally, such shunting operations lead to capacity constraints at Curtici, where only a limited number of tracks are equipped with the HU safety system allowing operations between Lőköshaza and Curtici.

In some cases, none of the wagons has a working handbrake (e.g. Schwandorf train). In that case, wagons without handbrake (e.g. 5 out of 25 wagons) have to be exchanged against wagons with handbrake; the discarded wagons have to be transported with another train that provides sufficient capacity for these additional wagons. Alternatively, a wagon with a handbrake needs to be attached; due to limitations of the train length in Romania, one wagon may have to be left at the border station. The stakeholders reported cases, where containers from such sorted out wagons had to be transported by truck to the customers, with respective extra planning efforts and costs.

1.1.5 Solutions
Eliminating the related national rule in Romania, would help solving the issue. The train operating companies (RUs) shall be in charge to choose the best way in securing a parking train, considering common technical standards. Since 2016, a leading RU has been trying to solve the issue with the national Romanian authorities but no solution has been reached until now. The European Commission and/or ERA could support this communication. In general, operational procedures rules shall be balanced between safety, economic and operational aspects. Changing or eliminating the Romanian national rule shall be accompanied with a risk evaluation.

In an intermediate step, a potential workaround could be established, using brake shoes instead of handbrakes within a field research with dedicated, limited scope (selected stations, operators, wagon types). The outcome of this test operation could serve as basis for risk evaluation of applying rules like Italy in regular operation.

A new version of a UIC technical leaflet for handbrakes / brake shoes is currently under preparation and might help to harmonise both the requirements regarding number and position of handbrakes as well as number, type and position of brake shoes.

The progress of solving the Issue is monitored in the following activities of the ILB Activity List:
- 0501_GA: ILB Consortium: "Analysis of the situation referring to requirement of working handbrakes in freight trains and proposal of solutions"; ongoing
- 0502_GA: ERA, DG Move: "Cleaning up of National Rules referring to requirement of working handbrakes in freight trains"; ongoing

1.2 Issue 6: Train Composition - No push 6 axles wagons

1.2.1 Introduction / Description of the Issue
One of the issues, which occur in just one country but have a Europe wide impact, nonetheless, is the prohibition to push 6-axle wagons. This is the case in Romania. Despite wagon manufacturer’s specifications, the infrastructure manager does not allow the use of a pushing locomotive for trains which have 6-axle wagons at a certain position.

The determination of the position where 6-axle wagons can or cannot be used in a train with a pushing locomotive is complex and includes train length, train weight and the distribution of weight within the train. Basically, the last 300t gross weight of the train must be without 6-axle wagon. Thus, the correct position for 6-axle wagons needs to be calculated for each individual
train. For trains with a low share of 6-axle wagons, which is often the case in single wagon load, this is not a problem. It is comparably easy to compose the train to that the 6-axle wagon will not be affected by the issue. For trains with a high share of 6-axle wagons, such as intermodal trains, the issue is more important, as they will often have to change the composition of the train temporarily in order to conform to the IM’s rules.

Temporary solutions to this issue include changing the train composition, splitting the train in two parts, or adding a second traction locomotive, instead of a pushing locomotive, or adding buffer wagons at the end of the train to adhere to the rules.

1.2.2 Occurrence
As stated above, the issue only occurs in Romania. Within Romania, there are certain lines and areas which are affected, as the use of pushing locomotives is not necessary on all lines. The most important line sections and areas which are affected are Predeal – Brasov, Fetesti – Cernavoda, Drobeta-Turnu Severin – Balota, and Vintu de Jos – Coslariu. The issue is especially relevant for transit traffic from/to Turkey, as this traffic predominantly consists of intermodal trains. Following the input received from several stakeholders during interviews, there are no other European countries where this issue occurs.

1.2.3 Problem drivers/Reasons
The driver behind this issue is a National Rule which should be removed. It is related to so-called rule no. 250 stating that 6-axle wagons are to be considered as exceptional transport in Romania, which leads to the fact that these wagons cannot be pushed on above-named lines. This is not related to the definition of exceptional transport which is given in the OPE TSI. As mentioned in the introduction, the rule includes train length, train weight and the distribution of weight within the train, which makes it complex for railway undertakings to correctly form the train.

Historically, the rule had been implemented as reaction to accidents in the past. However, the exact date and circumstances of these accidents were not known by the interview partners. Thus, the issue has a rather historical background and not a technical one. Nevertheless, the partially bad condition of infrastructure is most likely part of the reason why the rule is being kept today.

The stakeholders involved in this issue are the infrastructure manager CFR Infra, the Romanian Railway Agency and the Romanian Ministry of Transport.

1.2.4 Impacts
Despite the limited geographical scope of this issue, the scope of its impact is a lot greater. The impacts can be grouped together into direct impacts and indirect impacts of the issue. As direct impacts, the issue causes time loss, cost for additional (shunting) services, additional energy costs and increased cost for overhead planning. The impact differs according to which interim solution the affected RU chooses or has to choose. The possible solutions and their impacts are summarised in the table below.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splitting the train in two parts</td>
<td>Time loss (low – medium)</td>
</tr>
<tr>
<td></td>
<td>Additional shunting costs (low)</td>
</tr>
<tr>
<td></td>
<td>Additional costs for loco rent or parking</td>
</tr>
<tr>
<td>Second traction loco instead of pushing loco</td>
<td>Time loss (low – medium)</td>
</tr>
<tr>
<td></td>
<td>Additional costs for loco rent or parking</td>
</tr>
<tr>
<td>Re-position 6-axle wagon in train</td>
<td>Time loss (medium – high)</td>
</tr>
<tr>
<td></td>
<td>Additional shunting costs (medium – high)</td>
</tr>
<tr>
<td></td>
<td>New wagon list must be prepared (overhead)</td>
</tr>
<tr>
<td>Adding buffer wagons</td>
<td>Time loss (low – medium)</td>
</tr>
<tr>
<td></td>
<td>Additional shunting costs (low – medium)</td>
</tr>
</tbody>
</table>
Small railway companies are usually more affected by this kind of issue, because it is less economical for them to have buffer wagons and additional traction locomotives available at the respective stations. Thus, they heavily rely on external shunting services which increases the cost and makes them dependant on the shunting operator’s availability.

The indirect impact of this and other issues located in Romania is the rerouting of trains. Especially for intermodal trains, this rule often makes it unprofitable to run those trains through Romania. The increased running time as well as the potentially necessary reduction of train weight due to this issue are the main factors influencing RU’s decisions. Especially intermodal trains to/from Turkey will often be rerouted via Serbia. This impact can already be observed today.

It is not known how many trains are affected. For a leading RU, 3 trains per day (to/from Turkey) are negatively affected by this issue. It is especially complex to estimate the share of trains which are being rerouted because of this issue, as multiple factors and issues influence the route choice.

1.2.5 Solutions
The symptomatic solutions have been described above. They are operational measures such as splitting the train or re-positioning of wagons. These measures cause additional waiting and process times and cannot solve the underlying problem.

The consultants found no evidence that 6-axle wagons pose a general risk when being pushed on Romanian railway infrastructure. Thus, it is proposed that the National Safety Authority should perform a risk analysis on the pushing of 6-axle wagons. If there is a legitimate risk on certain lines, this needs to be considered in the access conditions of those lines. However, the national rule of considering 6-axle wagons as exceptional transport, is most likely not necessary and should be removed.

The importance of this issue is clear, as Romania is positioned in the center of the corridor, so each bottleneck which can be removed there is fostering the smooth run of trains on the corridor. The situation has to be seen in a positive manner as the market potential is high. Thus, administrative bottlenecks have to be eliminated, in order to reach efficiency. 798.7 Million Euro (6 projects on rail) are currently invested in the development of infrastructure in Romania via the Connecting Europe Facility1. The market need has to be taken into consideration and the infrastructure development must be accompanied by a change of operational rules in order not to lose the traffic to alternative routes. Otherwise, the expensive infrastructure would not prove to be efficiently used.

1.2.6 Obstacles to the solution of removing national rule
Previously, efforts were made to solve this issue by removing this national rule. Workshops were organised with ERA, the Ministry of Transport and CFR Infra in March 2019 and October 2020 and ERA listed all outdated national rules and the rules of Romania that were considered not justified and need to be eliminated. Of course, the low level of quality of infrastructure in Romania, as well the low quality of the rolling stock makes those rules more relevant in Romania than in other countries. The authorities lack a market-oriented attitude and are not necessarily committed to change the rules.

An effective solution would require strong political support, as in the past two years and despite all evaluations (including the waiting times reduction proposed measures) a solution of the issue

---

was not taken into consideration. Mr. Mathieu Grosch - Coordinator of the Orient/ East–Med Corridor has also made a number of recommendations in the last published Work Plan and supports the RFC7 in their initiatives to reach the goals of reducing waiting times at border.

Support of ERA and Mr. Grosch together with bilateral meetings/communication initiatives of RFC7 is still not sufficient. A lot of letters were sent to the Romanian MoT and to the high level of management of the IM, but due to the frequent change of the management, continuation of actions is not met, and initiatives are restarted over and over again.

1.3 Issue 7: Train Composition - Buffer wagons

1.3.1 Introduction / Description of the Issue
The number of buffer wagons required between the locomotive and wagons carrying dangerous goods is different in certain Member States. This is a cause for unnecessary shunting and therefore additional costs, time loss and dead weight. Also, buffer wagons that are not needed have to be parked, unnecessarily using infrastructure capacity and increasing costs. Finally, buffer wagons may lead to exceeding the permissible train limit values (length, gross weight). The consequent decrease of economic efficiency constitutes a limitation on rail freight’s competitive position.

From a regulatory perspective, the only mandatory rule is found in RID par. 7.5.3: (a) at least 18 m, or (b) occupied by two 2-axle wagons or a wagon with 4 or more axles. Thus, MSs should clean-up any additional national rules in the process of implementing the Fourth Railway Package. On this subject, ERA has published specific TOs.

1.3.2 Occurrence
The stakeholder survey indicated that the issue occur in: BG, HU, RO, DE, AT, and IT, as well as RS (Serbia). Especially, the Ruse, Curtici and Dimitrovgrad border crossings were mentioned.

From follow-up inquiries, the following insights were obtained:
- HU has cleaned up national rules as per August 2020. This has led to positive experiences;
- BG requires only 1 buffer wagon (not specified);
- RO requires a minimum of 12 axles, or between 2 and 6 wagons. For complete petrol trains, no buffer wagons are required;
- RS also requires no buffer wagons for complete petrol trains;
- AT applies RID; no issues were found.

1.3.3 Problem drivers/Reasons
For some of the MS where the issue occurs, implementation of the Fourth Railway Package is still to be completed. Especially for Romania, however, hesitation on the side of the MS, its infrastructure manager and safety authority appears to be inspired by the relatively poor state of the infrastructure. For the Netherlands, the aforementioned covenant between the MS, IM and the sector is not a national rule as such, but is seen as a working procedure.

1.3.4 Impacts
Overall, the issue must be seen as a cause for unnecessary shunting and therefore additional costs, time loss and dead weight. Also, buffer wagons that are not needed have to be parked, unnecessarily using infrastructure capacity and increasing costs. Finally, buffer wagons may lead to exceeding the permissible train limit values (length, gross weight). The consequent decrease of economic efficiency constitutes a limitation on rail freight’s competitive position.
1.3.5 Solutions

It is highlighted that the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) do not foresee any buffer wagons in this configuration. The only mandatory rule is found in RID par. 7.5.3:

Protective distance. Every wagon, large container, portable tank or road vehicle containing substances or articles of Class 1 and bearing a placard conforming to models Nos. 1, 1.5 or 1.6, shall be separated on the same train from wagons, large containers, portable tanks, tank-containers, MEGCs or road vehicles bearing a placard conforming to models Nos. 2.1, 3, 4.1, 4.2, 4.3, 5.1 or 5.2 or road vehicles for which the transport document indicates that they are containing packages bearing a label conforming to models Nos. 2.1, 3, 4.1, 4.2, 4.3, 5.1 or 5.2 by a protective distance. The requirement for this protective distance is met if the space between the buffer head of a wagon or the end wall of a large container, portable tank or road vehicle and the buffer head of another wagon or the end wall of another large container, portable tank, tank-container, MEGC or road vehicle is: (a) at least 18 m, or (b) occupied by two 2-axle wagons or a wagon with 4 or more axles.

In an ERA analysis of national rules in BU, HU and RO with reference to required buffer wagons, it is established that TSI-OPE Appendix I lists the areas where national rules are allowed. Appendix I comes into effect in 2021; also, MSs should clean-up national rules in the process of implementing the Fourth Railway Package. When considering Appendix I, train composition is not an area for national rules. Therefore, national rules in excess of the RID should be cleaned-up as per the railway safety directive that defines the migration strategy from a rule based approach to a risk based one.

1.4 Issue 11: New train number

1.4.1 Introduction / Description of the Issue

As Issue 15 ("Real-time train running information"), Issue 11 also depends on the change of the train number. In contrast to Issue 15, Issue 11 concerns operational procedures that have to be performed, only due to assigning a new train number in cross-border operation. In these cases, the train is considered as a new train and thus subject to (all) train preparation procedures (such as full technical wagon check and brake test), although the train composition has not changed. This would be a time consuming process involving unnecessary costs, and therefore be potentially harmful to rail freight’s competitive position.

1.4.2 Occurrence

The stakeholder survey (performed in May 2020) revealed the following geographical occurrence of the "New train number" Issue:
- All FR/ES borders: Irún/Hendaye (RFC 4), Portbou/Cerbère (RFC 6), Perpignan (RFC 6)
- Hungary, Italy, Portugal, Romania.

Based on these initial results, dedicated interviews were conducted. The interviews revealed that in the survey, Issue 11 had been mixed up with Issue 15. In fact, in most countries Issue 11 is not known. The only countries actually affected are Romania, Slovakia and particularly Hungary. Moreover, the problem might occur, if the track gauge changes at the border (e.g. France/Spain).

In contrast, Issue 11 does not appear in Northern, Western and Middle Europe; it has also not been mentioned as a problem in the Xrail working groups.
1.4.3 Problem drivers/Reasons

For Hungary, the RFC 7 provided the following explanation: "In Hungary, the delay threshold is +/- 24h before the train path expires; thus a train number has to be changed as well. When a corridor train runs on the corridor (on a PaP) and for some reasons it has to be blocked (e.g. due to technical/operational problems, change of the staff, miss-management of the related resources, or there is a huge traffic congestion, etc.) and it reaches 24 hours delay, the train number expires. The train PaP is cancelled, and a new number is assigned, so the train can continue its run based on a so-called "operational train PaP", a national path which does not have the same service level any more as a train which run on the corridor PaP. We call it in most of the cases "ad-hoc" trains, and they have to wait until the national traffic management is able to put the train again into the traffic flow (re-integrate). All concerned measures are defined and described in the National Network Statement, so RUs have to follow these instructions. Certainly, it takes time and money. Therefore, a train number change has a negative effect on the smooth run, because it generates additional delays of the delivery of the same goods from point "A" to point "B". (Same train, same goods, but totally different PaP parameters.) Each country has different national rules for this delay's rate, so along the corridor RUs might meet very different measures when the train number has to be changed." The main problem is, that trains with changing train numbers are considered as a new train, requiring additional checking procedures.

In Romania, inbound trains with a considerable delay will receive a new train path with a new train number. In fact, some 80% of all trains are renumbered from international train number to local number (starting with "2" instead of "4"). In this case, a complete train check is required before leaving the border station towards the Romanian network. This is no big problem, as the trains have waiting times at the border station anyway due to traction change (Electric – Diesel). In case that no traction change is required, this could be a problem as it would extend the necessary stopping time.

1.4.4 Impacts

Impacts arising from Issue 11 are twofold:

1. If the PaP is changed from "corridor" to "operational train" level, this means waiting time until the train receives a new train path for the national rail network. Moreover, the train will lose priorities assigned to corridor trains, which might lead to additional time loss in case of conflicts with other trains.

2. Additional technical train checks mean further time loss and costs for the operational staff. A model calculation based on experience values for a 600m train, consisting of 30 four-axle-wagons would require 2 hours for one wagon inspector to perform a complete wagon check and complete brake test. This waiting time may further exceed, if the operational staff is not available when needed.
1.4.5 Solutions
Approaches for solution can be allocated to the following three action fields:

1. Reducing train delays at border stations (particularly Curtici/RO): This will lead to less re-renumbering of trains and less “operational train PPs”, even under current regulatory framework. Most relevant improvement activities concern optimising border handling processes and improved ETA information, exchanged between relevant transport chain actors. Such measures are tackled in Issue 8.

2. Ensuring consistent train numbers: Even in case of re-numbering trains due to missing train paths, they should maintain a corridor train number with the associated priorities. In such cases, they would not have to be regarded as “new” train. This action field is also connected with Issue 15 (matching of trains in RNE TIS) and the proposed solutions thereunder (“Train ID”).

3. Cleaning up national rules: Train checks must be performed to the benefit of safe operation and must thus be coupled to operational needs (change of train configuration, potential standing time, train run performance etc.), but not to pure formal reasons (only change of train number).
2 Project 2 – Issue 13: 2-people cabin crew

<table>
<thead>
<tr>
<th>Project</th>
<th>Related Issue(s)</th>
<th>Activity description</th>
<th>Time frame for activity</th>
<th>Priority for technical assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>13 (2 people cabin crew)</td>
<td>Base analysis, geographical mapping; where rules requested, explore by whom, reasons. Explore existing solutions and propose solutions</td>
<td>Sept-Dec 2020 (first results)</td>
<td>High</td>
</tr>
</tbody>
</table>

2.1 Introduction / Description of the Issue

This issue relates to the number of train drivers operating locomotives and trains and other crew members performing safety-related tasks on the locomotive, which is in the certain countries higher than in the majority of European countries. More specifically, the number of drivers/size of cabin crew is required to be 2 in some cases and in some Member States, irrespectively of the condition of the infrastructure, rolling stock operated or safety systems installed. In some cases, 2 drivers are required, in other cases 1 driver plus 1 additional staff are required.

2.2 Occurrence

In the stakeholder survey and the subsequent interviews, the geographical spread of this issue could be limited to Bulgaria, Romania, and Italy. The issue differs slightly in the three affected countries and will be described separately for each country.

Bulgaria

In Bulgaria, it is required to operate locomotives on railway lines with two qualified drivers. This is the case for some lines on the network but not all. These lines would be specified in national regulations. Exceptions are made for trains with two locomotives, including either pushing locomotives at the end of a train or a second locomotive in double traction. The additional locomotive can be operated by only one driver. In these cases, 3 drivers are required in total: two drivers for the leading locomotive and one driver for the second locomotive (either in double traction or pushing at the end of the train). The operation of a single locomotive can also be done with only one driver. Up until now, only railway operators have been interviewed on this issue. Thus, the specific lines and the reason for the requirement of two drivers could not yet be identified.

Romania

For Romania, the issue is very similar to the issue in Bulgaria. A two-people cabin crew is required in some specific cases. Unlike in Bulgaria, the second person in the cabin does not necessarily need to be a driver but must be able to stop the train. Nevertheless, a second driver is often preferred by the RUs, in order to utilise the second person for shunting and other tasks. The regulations requiring a second person in the cabin are given in Regulation no. 005, issued by the Ministry of Transport, Construction and Tourism. This regulation was amended in 2019 when some of the conditions for the trains which must be serviced by at least two agents (driver and e.g. assistant driver) were eliminated if certain requirements regarding the type of train and the safety
and vigilance equipment can be met. In those cases, trains can also be operated by only one driver without additional staff.

**Italy**
The case of Italy differs slightly from Bulgaria and Romania. All three countries have in common that two people on one locomotive are only required on certain lines or line sections. The reason for this, however, is not part of the railway regulations but rather part of the health & safety regulations. The second person should assist the driver in his tasks and must be able to intervene in case of unexpected events, including health issues of the driver. In practice, the second person is not necessary in most cases.

**Other countries**
Similar issues exist in other European countries as well. Since they relate to passenger services and not to freight services, they are less relevant for this analysis. The countries where a two-people cabin crew is be necessary in some cases include Poland, France, and Spain. This is mostly the case for trains operating on high speeds with low level of protection from train protection systems, such as on lines without ERTMS.

2.3 **Problem drivers/Reasons**
As mentioned in the previous chapter, the rules regulating this issue differ between the countries. Whereas they are related to train control & signalling systems in Bulgaria and Romania, they are related to worker’s health & safety in Italy.

2.4 **Impacts**
The impacts and consequences are the same in all three countries, though the number of trains affected is different. Additional staff implies greater planning effort, additional resources (personnel, training, certification, transport, equipment etc.) followed by increased cost for operations (personnel, admin). Remuneration of the drivers in the western countries is different than the ones in the Eastern European countries. There are also certain differences in the approach to training; for example, the balance between classroom training and on-the-job training is different from country to country, with more on-the-job training in Italy, Romania and Bulgaria.

Taking into consideration the increase of demand for rail transport as well as the increase in the number of companies operating in more than one Member State and to higher demand for drivers sometimes additional staff is hard to accommodate. In the long run, this might lead to increased HR costs for drivers or even to RUs rejecting traffic, as they might not have sufficient numbers of train drivers.

2.5 **Solutions**
This issue is one that is highly relevant for the safety of train operations. The regulations are in place to allow for safe train operations and avoid accidents which are related to errors in the driver’s behaviour or other incidents. This issue is mostly based on history, as prior to the use of sufficient safety systems, all trains had to be operated with two drivers. However, most European countries have implemented driver vigilance devices and train safety systems to allow for safe operations with only one driver. Further, all member states are required to have arrangements to automatically stop a train as soon as the driver is no longer fit to drive (due to medical conditions e.g.). With the introduction of ETCS, a European wide solution can be found.

Nevertheless in Italy, this is not an issue related to railway legislation. Legislation on health and safety as well as workers’ trade unions are involved in this issue. Up until now, the unions have
not yet been willing to find a solution for this issue. Any possible solution would require high political support from the area of health and safety in Italy in order to be successful.

3 Project 3 - Issue 3: Tail lights vs. plates

<table>
<thead>
<tr>
<th>Project</th>
<th>Related Issue(s)</th>
<th>Activity description</th>
<th>Time frame for activity</th>
<th>Priority for technical assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3 (Tail lights vs. plates)</td>
<td>Analysis of MSs study on the use of reflective plates</td>
<td>Jan-Feb 2021</td>
<td>High</td>
</tr>
</tbody>
</table>

Project 3 was planned for completion by end of M14; however, preliminary results have been included in the present report.

3.1 Introduction / Description of the Issue

Different kinds of rear end signals in national requirements lead to interruptions at border crossings. E.g. if a train is originally only equipped with plates and is travelling to a country where tail lights are compulsory, that train needs double equipment and has to stop and change the equipment at the border (even if locomotive is ERTMS equipped). Lights are allowed in countries with plates, which means that there is no need to stop at the border when the compliance is done at the start of the train.

The problem is worse for small RUs that do not have the staff to do the equipment change. Sometimes, big RUs do it for the small ones, but this is very expensive (the staff of the big RUs must be paid 24h/day). Both the NSAs and IMs say each the other should do the work.

3.2 Occurrence / Analysis

Provisions regarding rear end signals are already covered in the OPE TSI 773/2019 (4.2.2.1.3.2) and its predecessor TSI 995/2015. However, RUs still have to stop at borders to comply with the different legislations.

Those Member States requiring lamps are not differentiating between differently equipped lines. It would be a great step forward, if they allowed the use of the plate on defined lines (preferably on border stretches), based on a risk analysis confirming that safety levels are not reduced. The issue is also linked to permissive driving and the possibility to have two trains on the same block. At this stage, the last Member States requiring lamps on freight trains are not keen on accepting plates for safety reason. Previous studies on the link between safety, permissive driving and the use of tail plates/lamps were not fully conclusive.

In March 2019, the RFC 1 Rhine-Alpine performed an analysis about the situation on the corridor showing the following results:

- NL/DE border (both directions): Tail plates are required, Tail lights are also accepted.
- BE/DE border
  - BE --> DE: Tail plates are required, Tail lights are also accepted.
  - DE --> BE: Tail plates are only allowed for freight trains during daytime between the loading area and the first station, or in harbour areas and shunting yards. Otherwise, tail lights are required.
- CH/DE border (both directions): Tail plates are required, Tail lights are also accepted.
- CH/IT border:
  - CH --> IT (Chiasso): only Tail lights are accepted.
• IT --> CH (Chiasso): Tail plates are required, Tail lights are also accepted.
• CH <--> IT (Luino, Domodossola): On dedicated lines, Tail plates are accepted, otherwise only Tail lights are required

Additionally, the issue has been recognized for the borders between Austria and Italy (due to national regulations in Italy) and between France and Luxembourg.

### 3.3 Solutions

As stated above, the OPE TSI 773/2919, adopted in May 2019, already covers the issue of harmonising rules regarding rear end signals. Chapter 4.2.2.1.3.2 of this TSI sets up clear deadlines and procedures for tail lights to be followed by Member States in the transition period until January 2026, as follows:

1. **16 June 2019:** the target system = reflective plates + head lights TSI Loc&Pas compliant, with following deadlines:
   a. January 2022 vehicles with plates only are allowed to travel along all Rail Freight Corridors of the Union rail network; Plates & Lights and lights only are accepted everywhere
   b. January 2026 vehicles with plates only are allowed to travel EVERYWHERE in the European Union rail network

2. **30 September 2020:** Member States’ concerns deliver a report to COM on use of reflective plates on their network;

3. **30 June 2021:** COM review the specification based on ERA report and MS findings, if necessary.

The ILB consortium will analyse and summary the MS reports (to be provided by the Commission) and further monitor the issue.
4 Project 4 – Issue 14: Commutable power supply in border stations

<table>
<thead>
<tr>
<th>Project</th>
<th>Related Issue(s)</th>
<th>Activity description</th>
<th>Time frame for activity</th>
<th>Priority for technical assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>14 (Equipment of border stations with commutable electric power supply)</td>
<td>Analysis of the situation referring equipment of border stations with commutable electric power supply</td>
<td>Jan-Jun 2021</td>
<td>High</td>
</tr>
</tbody>
</table>

Project 4 was scheduled to start only in January, but some interviews have been performed already. The stakeholders were contacted for all issues which are applicable for them to avoid contacting them multiple times for similar topics. Thus, first information about issue 14, equipment of border stations with commutable electric power supply, could be collected already.

4.1 Introduction / Description of the Issue

At border stations with system separation points, two power systems of 15 kV – 25 kV come together. Due to the different power systems, trains that want to travel from one country to another can only overcome this problem with great difficulty. This often requires shunting movements or the purchase of expensive multi-system locomotives.

The four European electricity systems of the main lines are:

- Direct current 1.5 kV,
- Direct current 3 kV,
- Single phase alternating current 16 2/3 Hz, 15 kV,
- Single phase alternating current 50 Hz, 25 kV.

In cross-border freight transport, a voltage change from one electricity system to another is most often and sensibly handled by two or more system locomotives, since freight trains do not usually run only through the neighbouring country, but often through several countries with different electricity systems. However, there are still many RUs which only use single system locomotives and need to change them at the border stations. This leads to capacity consumption within the border station, increased dwelling and thus delivery times for the RU and increased planning effort.

There are different possibilities to design the change of power supply within the stations. The system separation points can basically be distinguished in two ways:

1. **System separation point is located on the open track**

   When changing the voltage on the open track, it is necessary to use multi-system locomotives, because a locomotive change would hardly be possible. The multi-system locomotives are designed for operation with two or more electricity systems. They are equipped with several pantographs of different widths, as some countries in Europe have different standards for pantograph head width. According to the European decision (EU 1302/2014), a standardisation of the pantograph collector rockers is to be expected, but there is not yet a fixed date by when the project must be implemented. The four-system design is used for all four power systems mentioned above. These allow unrestricted European traffic. There is no necessity for RUs to stop at the border for technical reasons. However, the purchase of new vehicles and the retrofitting of existing vehicles is very costly and the associated downtime is another reason...
why multi-system locomotives cannot be used everywhere and immediately. Further, some RUs might – due to different reasons – prefer operating strategies with single system locomotives which are made impossible by locating the system separation point at the open track.

1. **System separation point on the open track**

   ![Diagram of system separation point on the open track](image1)

   *Example based on Emmerich-Zevenaar (DE-NL)*

   **Figure 4-1: System separation point on the open track**

2. **System separation point is located in the station**

   Another good practice to switch from one electricity system to another is to move the interfaces between electricity systems from the open track to border stations. In such stations the overhead lines on some tracks will be switchable from the national system to the electricity system of the neighbouring country. This makes it possible to change locomotives for cross-border journeys at the border station by switching the necessary current for the locomotive in question.

   With the separation point in the station, there are two options. In the first option, the tracks within the border station are not switchable. With this option, shunting is needed within the station to change the locomotives (see Figure 4-2). In the second option, the tracks within the borders have a switchable power supply. This simplifies the change of locomotives even further (see Figure 4-3).
2. System separation point with non-switchable station tracks

Figure 4-2: System separation point with non-switchable station tracks

3. System change through switchable station tracks

Figure 4-3: System separation point with non-switchable station tracks
Different railway undertakings with different models of operations and different locomotives will prefer different layout of the system separation points. However, the general opinion is that the smooth operation can be done even if the change is done on the station, allowing for a change of locomotives or attachment of extra wagons.

4.2 Occurrence
The issue has been reported on the Dutch – German borders of Roosendaal-Essen and Oldenzaal – Bad Bentheim in both directions. On RFC 7, the issue exists on the cross-border points between Hungary and Slovakia. Further analysis will be performed in the first half of 2021.

4.3 Problem drivers/Reasons
The problem driver are changes in the infrastructure design. Some infrastructure managers upgrade the border stations without considering all operating models and improve the situation only for the use of multi-system locomotives. Moving the separation points from the border stations to the open track has further the advantage for IMs that this option is often cheaper and reduces capacity consumption within the border stations. For RUs, this solution increases costs, as multi-system locomotives are more expensive, both in investment cost and operating cost.

4.4 Impacts
With separation points on the open track, problems are caused for small railway undertaking which might not be able to use multi-system locomotives. Rerouting or loss of traffic might be the result for them. It might also have an impact on train length and train weight in some cases. When the separation point is located within the border stations, more staff and time are needed to change from one power supply to the other. Further research will be conducted in the first half of 2021.

4.5 Solutions
Possible solutions for this issue will be developed in the first half of 2021.