



COVER DOCUMENT

System Pillar / EULYNX

Baseline Set 4 Release 2

Version: 2
Date: 04-10-2023



Introduction

Europe's Rail Joint Undertaking (EU-Rail) is established by Council Regulation (EU) 2021/2085 of 19 November 2021. It is the new European partnership on rail research and innovation established under the Horizon Europe programme (2020-2027) and the universal successor of the Shift2Rail Joint Undertaking. The vision of EU-Rail is to deliver, via an integrated system approach, a high capacity, flexible, multi-modal and reliable integrated European railway network by eliminating barriers to interoperability and providing solutions for full integration, for European citizens and cargo.

The EULYNX Consortium (EULYNX) is an initiative of 15 European infrastructure managers, started in 2014 with a common goal for standardisation of signalling systems. Aiming for defining and standardising CCS interfaces, the goal is a significant reduction of the lifecycle cost for signalling systems. EULYNX regularly publishes specification documents as Baseline Sets.

EU-Rail and EULYNX have published a common documentation release EULYNX Baseline Set 4 Release 2. This release has been prepared in close collaboration with the European rail control-command and signalling (CCS) sector under the organisation of EU-Rail System Pillar, bringing a part of the EULYNX development under technical authority of the EU-Rail System Pillar.

The EULYNX Baseline Set 4 Release 2 is a documentation update release within the EULYNX Baseline Set 4, continuing the development based on previous releases. The primary focus of this release is to address the feedback from the industry and integration into the EU-Rail System Pillar. All specifications related to trackside assets and transversal functions are applicable for both the current EULYNX architecture and the future rail target architecture, agreed in the framework of the EU-Rail System Pillar, therefore published as a single set of specifications under a common publication by EULYNX and EU-Rail, delivering in total 24 specification documents. The EU-Rail System Pillar takes the role of the technical authority for the documents of the common publication and will ensure their maintenance.

In addition to the common documentation release, EULYNX published also additional specifications and supporting documents for the current EULYNX architecture, which are integrated in the EULYNX part of Baseline Set 4 Release 2, delivering additional 30 documents.

All deliverables are available in PDF format. In addition to the PDF documents, the following supporting artefacts are delivered:

- For all deliverables originating from DOORS, the requirements interchange format ReqIF is available.
- For all model-based deliverables, the underlying models are available as an export from the EULYNX model.

- For all EULYNX field element subsystem specifications, the simulators developed by EULYNX for verification and validation of requirements are available.

Known limitations

A few of the specification documents of Baseline Set 4 Release 2 contain limitations of the specifications that could not be resolved before the publication of the release. Known limitations are present in the following documents:

- Requirements specification for subsystem Point [Eu.Doc.36]
 - The interpretation of the 4-wire patterns as defined in the tables in section 3.4.7.1 (Eu.P.6797) reflects the current state of discussion and may be further developed for a future release.
- Interface definition and specification SMI [Eu.Doc.76]
 - The specification of the service function Loading Procedure will be reviewed in respect to robustness, error handling, security, scalability and version management.
- Interface specifications SDI
 - The specification of the generic and specific diagnostic data points will be further refined in a future release.
- Interface specification SDI-TDS [Eu.Doc.81]
 - The specification of the diagnostic data points for the Subsystem TDS working with track circuits and train detection points needs to be extended.
- Interface specification SDI-LC [Eu.Doc.110]
 - The specification of the diagnostic data points for the Subsystem Level Crossing needs to be extended.
- Security specifications will serve as relevant input to the future revision of the TSI. For tender activities running until the TSI revision is complete, the EULYNX BL4R2 security specifications may be used. Applying the EULYNX security specifications requires an Infrastructure Manager to establish specific requirements, as indicated by column "valid for IM" in the respective security documents.

Next release

The next update of Baseline Set 4 in form of Release 3 is planned for publication in June 2024. The release will address known limitations and pending change requests.

Documents

The System Pillar / EULYNX Baseline Set 4 Release 2 includes the following documents:

Document ID	Document Name	Document Version	CENELEC Phase	Release
Eu.Doc.18	Maintenance and data management specification	4.0 (2.A)	4	06/2023
Eu.Doc.20	Generic interface and subsystem requirements	4.0 (3.A)	4	06/2023
Eu.Doc.119	Generic interface and subsystem requirements for SCI	1.0 (3.A)	4	06/2023
Eu.Doc.120	Generic interface and subsystem requirements for SMI	1.0 (3.A)	4	06/2023
Eu.Doc.92	Interface definition SCI	4.2 (0.A)	5	06/2023
Eu.Doc.93	Interface specification SCI Generic	3.2 (0.A)	5	06/2023
Eu.Doc.77	Interface definition SDI	3.0 (1.A)	5	06/2023
Eu.Doc.94	Interface specification SDI Generic	4.0 (0.A)	5	06/2023
Eu.Doc.76	Interface definition and specification SMI	2.0 (1.A)	5	06/2023
Eu.Doc.32	Requirements specification for subsystem Light Signal	4.2 (0.A)	4	06/2023
Eu.Doc.33	Interface specification SCI-LS	4.2 (0.A)	5	06/2023
Eu.Doc.78	Interface specification SDI-LS	4.0 (0.A)	5	06/2023
Eu.Doc.36	Requirements specification for subsystem Point	4.3 (0.A)	4	06/2023
Eu.Doc.38	Interface specification SCI-P	4.2 (0.A)	5	06/2023
Eu.Doc.80	Interface specification SDI-P	4.0 (0.A)	5	06/2023
Eu.Doc.45	Requirements specification for subsystem Generic IO	4.2 (0.A)	4	06/2023
Eu.Doc.46	Interface specification SCI-IO	4.0 (2.A)	5	06/2023
Eu.Doc.82	Interface specification SDI-IO	4.0 (0.A)	5	06/2023
Eu.Doc.43	Requirements specification for subsystem TDS	4.1 (0.A)	4	06/2023
Eu.Doc.44	Interface specification SCI-TDS	4.0 (2.A)	5	06/2023
Eu.Doc.81	Interface specification SDI-TDS	4.0 (0.A)	5	06/2023
Eu.Doc.108	Requirements specification for subsystem Level Crossing	2.2 (0.A)	4	06/2023
Eu.Doc.109	Interface specification SCI-LC	2.1 (0.A)	5	06/2023
Eu.Doc.110	Interface specification SDI-LC	3.0 (0.A)	5	06/2023

Error corrections

The following Change Requests describe error corrections that shall be considered when applying the documents of Baseline Set 4 Release 2:

<i>CR ID</i>	<i>CR Description</i>	<i>IDs of impacted documents</i>	<i>CR date</i>
EULX-565	Req. Spec. LC Missing Types	Eu.Doc.108	07/2023
EUP-516	Req. Spec. P: Incorrect IO Flow on SD 2.1.2.4.9 (Eu.P.5804) and 2.1.2.4.10 (Eu.P.5374)	Eu.Doc.36	08/2023
EULS-427	Req spec; Correct Signal Aspect reporting after booted again	Eu.Doc.32	09/2023

The listed Change Requests can be found in Annex 1.

Functional packages

Documents related to the EULYNX field element subsystems (Light Signal, Generic IO, Point, TDS, Level Crossing) are divided into functional packages. These packages define coherent blocks of capabilities that can be implemented in a product. The packages can be used to delimit the required scope of the functionality of a product, either in the context of tenders for specific implementation projects or in the context of generic product testing and/or certification.

There are two types of packages related to the product capabilities:

- 'Basic packages': One or more packages, at least one of them must be implemented. It is optionally allowed to combine and implement more than one 'basic package' in a product.
- 'Optional package': One or more packages that can be optionally implemented in addition to (one of) the basic package(s).

Backwards compatibility

The specifications documents of Baseline Set 4 do not include automatic backwards compatibility. Products developed according to the EULYNX specifications of BL4 can't communicate with products developed according to earlier baselines of the EULYNX specifications. Products that must support communication with other products of both BL4 and the previous EULYNX baseline, e.g. because of migration scenarios, must be developed according to a superset of specification documents from different baselines.

The specification documents of Baseline Set 4 are structured in such a way that in a future release it is possible to release a new version of the specification documents related to SCI, SDI, SMI or SSI without the need to publish a new version of the specification document related to the other interfaces. In this way, compatibility of different versions of the four EULYNX interfaces can be managed independent from each other.

Even when the specifications for the interfaces SCI, SDI, SMI and SSI are managed independently in separate documents, there can be technical reasons that create interdependencies between them. This can e.g. be the introduction of a new functionality that requires an update on both SCI and SMI. The new functionality can only be used if a EULYNX product implements the newer version of both SCI and SMI.

To manage this, EULYNX will maintain a compatibility matrix for every subsystem/interface. Every time a new version is released of the defining specification document of one of the 4 interfaces, the compatibility matrix will list all defined versions of the other interfaces with which this new interface version can be combined. The compatibility matrices are listed in the document EULYNX BL4 R2 Compatibility matrices.

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Further information

Further information is available from EU-Rail System Pillar unit or the EULYNX Consortium Office.

EU-Rail System Pillar can be contacted through <https://rail-research.europa.eu/about-europes-rail/contact>

EULYNX Consortium office can be contacted through eulynx.eu and consortium@eulynx.eu.

Annex 1: Error correction CRs

[EULX-565] [Req. Spec. LC Missing Types](#) Created: 10.07.2023 Updated: 10.08.2023

Status:	In Development
Project:	EULYNX CP SCI-LX
Component/s:	None

Type:	Editorial	Priority:	None
Reporter:	Philipp Wolber	Assignee:	Unassigned
Resolution:	Unresolved		
Remaining Estimate:	Not Specified		
Time Spent:	Not Specified		
Original Estimate:	Not Specified		

Sprint:	SCI-LX BL4R2+ topics
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Description

Problem

For some IDs on BL4R2 Req. Spec. SCI-LC the Type Column is empty.

Intended state

Add Type:

Eu.LC.3865 (Info)

Eu.LC.3833 (Req)

Eu.LC.3834 (Req)

Eu.LC.3831 (Info)

Eu.LC.3832 (Req)

Eu.LC.3836 (Req)

Eu.LC.3837 (Req)

Eu.LC.3835 (Info)

Eu.LC.3838 (Req)

Eu.LC.3839 (Info)

Eu.LC.3840 (Req)

Eu.LC.3830 (Info)

Eu.LC.3816 (Info)

Eu.LC.3817 (Info)

Eu.LC.3818 (Info)

Eu.LC.3819 (Info)

Impact

Req. Spec. LC

Comments

Comment by [Philipp Wolber](#) [24.07.2023]





ticket implemented in current version of Req. Spec. LC in Doors, no baseline yet

Generated at Fri Sep 29 08:55:35 CEST 2023 by Nico Hurman using Jira 9.4.4#940004-sha1:26f64053da9e8780329c4d14d752a94327e2e61d.

[EUP-516] [Req. Spec. P: Incorrect IO Flow on SD 2.1.2.4.9 \(Eu.P.5804\) and 2.1.2.4.10 \(Eu.P.5374\)](#) Created: 10.08.2023 Updated: 10.08.2023

Status:	Einarbeitung qualitätsgesichert
Project:	EULYNX CP SCI-P
Component/s:	None

Type:	Editorial	Priority:	None
Reporter:	Philipp Wolber	Assignee:	Unassigned
Resolution:	Unresolved		
Remaining Estimate:	Not Specified		
Time Spent:	Not Specified		
Original Estimate:	Not Specified		

Attachments:	   
Sprint:	SCI-P BL4R2+ topics

Description

Problem

On SD 2.1.2.4.9 (Eu.P.5804) and 2.1.2.4.10 (Eu.P.5374) in on Step 2 a incorrect IO Flow is used (Msg_Point_Position).

Intended state

Msg_Ability_To_Move_Point should be used.

Impact

Req. Spec. P

Comments

Comment by [Philipp Wolber](#) [10.08.2023]

Corrected in PTC. Sync, Ticketed marking needed.

Generated at Fri Sep 29 08:56:02 CEST 2023 by Nico Huurman using Jira 9.4.4#940004-sha1:26f64053da9e8780329c4d14d752a94327e2e61d.

Eu.P.5374_Msg_Able_To_Move used.png

P_UC2.12.4:Irregularities

Alternative Scenario: Handle and report restoring of Ability to move point with n-th point machine [P SD 2.1.2.4.10]

Precondition:

The Subsystem - Point is in the state OPERATIONAL.

The Subsystem - Point is configured with a non-4-wire interface to the Point machine.

The Subsystem - Point is configured to observe the Ability to move point.

The Subsystem - Point is Unable to move point.

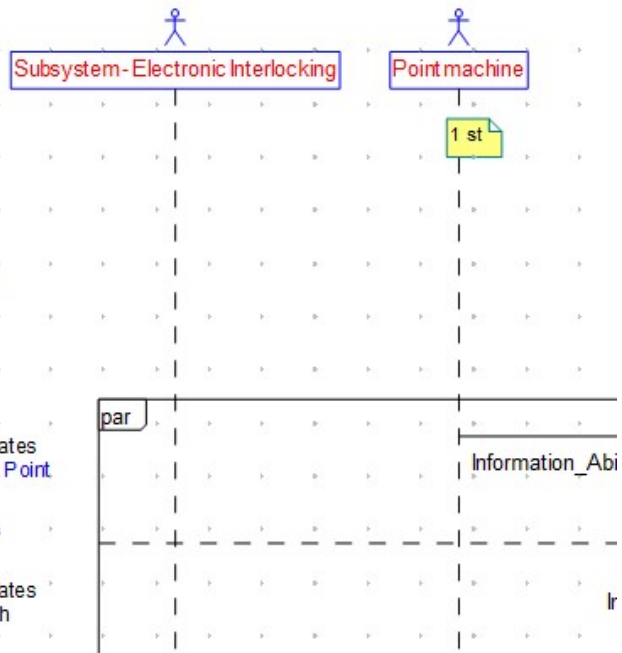
Interaction 2.1.2.4.10.A:

par [The 1st Point machine is Able to move point]

- 1.a1 - The Subsystem - Point detects from the switch states of the Interface P3 to the 1st Point machine that the 1st Point machine has regained Ability to move point.

also par [The n-th Point machine is Able to move point and is configured with full functionality]

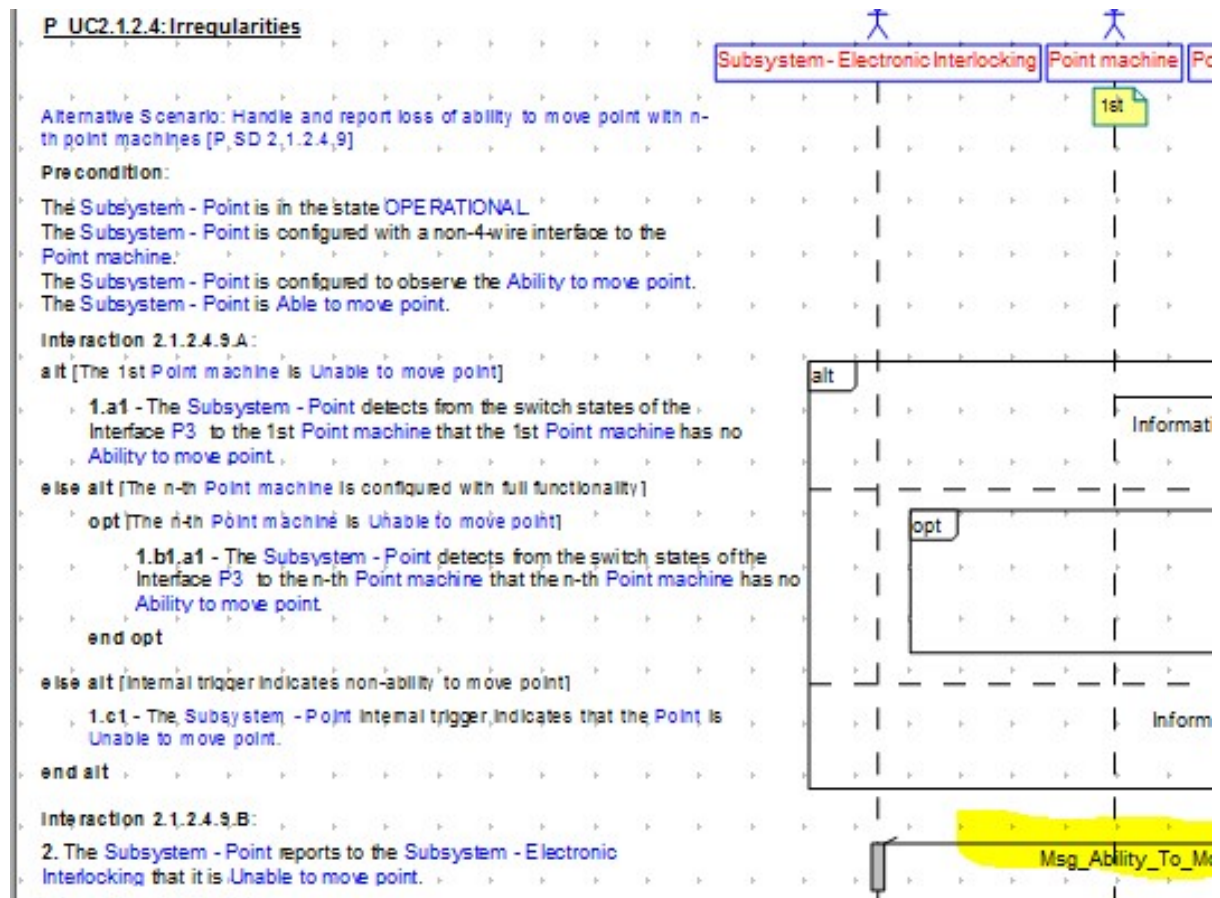
- 1.b1 - The Subsystem - Point detects from the switch states of the Interface P3 to the n-th Point machine that the n-th Point machine has regained Ability to move point.



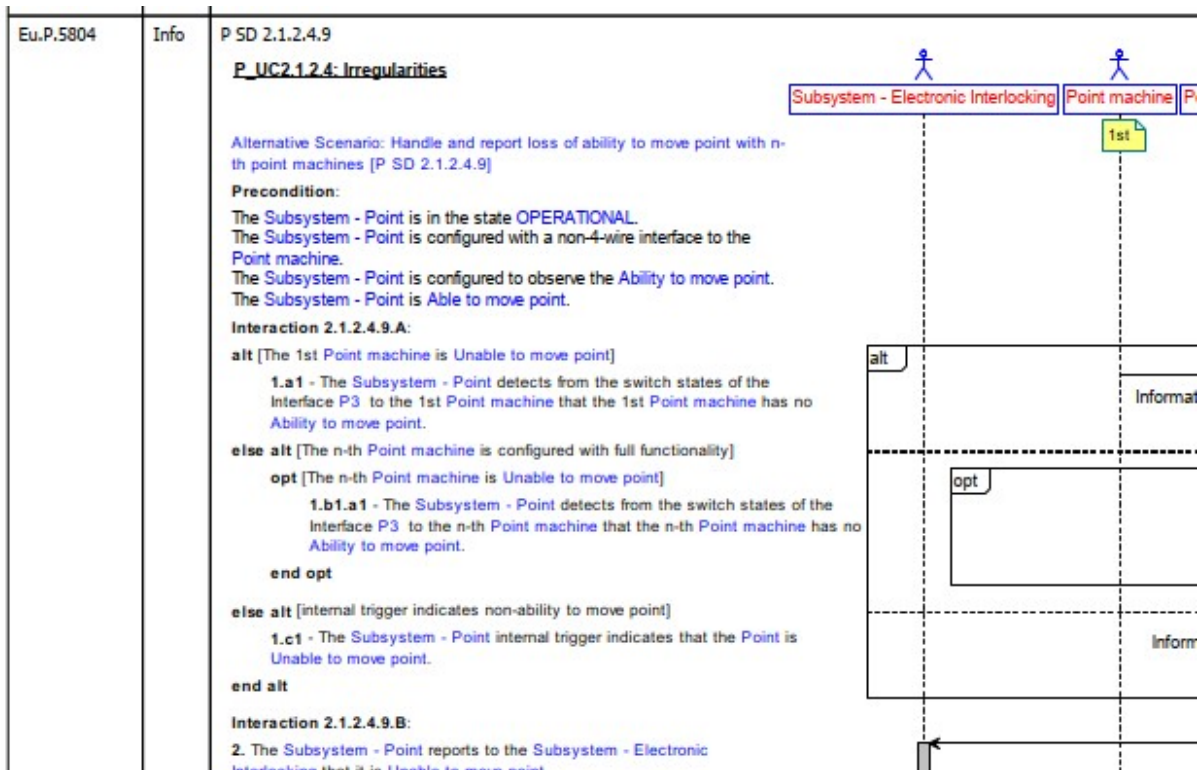
Eu.P.5374_Msg_Point_Position.png

Eu.P.5374	Info	<p>P SD 2.1.2.4.10</p> <p><u>P_UC2.12.4: Irregularities</u></p> <p>Alternative Scenario: Handle and report restoring of Ability to move point with n-th point machine [P SD 2.1.2.4.10]</p> <p>Precondition:</p> <p>The Subsystem - Point is in the state OPERATIONAL.</p> <p>The Subsystem - Point is configured with a non-4-wire interface to the Point machine.</p> <p>The Subsystem - Point is configured to observe the Ability to move point.</p> <p>The Subsystem - Point is Unable to move point.</p> <p>Interaction 2.1.2.4.10.A:</p> <p>par [The 1st Point machine is Able to move point]</p> <ul style="list-style-type: none"> 1.a1 - The Subsystem - Point detects from the switch states of the Interface P3 to the 1st Point machine that the 1st Point machine has regained Ability to move point. <p>also par [The n-th Point machine is Able to move point and is configured with full functionality]</p> <ul style="list-style-type: none"> 1.b1 - The Subsystem - Point detects from the switch states of the Interface P3 to the n-th Point machine that the n-th 	<pre> sequenceDiagram actor Actor1 as Subsystem - Electronic Interlocking actor Actor2 as Point machine Note over Actor2: 1 st par Actor2->>Actor1: Informa and Actor1->>Actor2: end </pre>
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Msg_Ability_To_Move_Point used (corrected).png



Msg_point_position used.png




[EULS-427] [Req spec: Correct Signal Aspect reporting after booted again](#)

Created: 15.08.2023 Updated: 22.09.2023

Status:	Open
Project:	EULYNX CP SCI-LS
Component/s:	None

Type:	Error	Priority:	None
Reporter:	Filip Giering	Assignee:	Unassigned
Resolution:	Unresolved		
Remaining Estimate:	Not Specified		
Time Spent:	Not Specified		
Original Estimate:	Not Specified		

Attachments:	 image-2023-08-15-13-44-53-576.png
Sprint:	LS: Postponed to later release

Description**Current state**

When the LS will be set from OPERATIONAL (while indicating "most restrict Aspect" back to BOOTING and then back to OPERATIONAL the controller is not able to report the newly set Aspect to the interlocking.

Problem

This is caused due to a deadlock in the observing block as it reacts just on the change trigger of D17 and can therefore not leave the state WAITING.

Intended state

The STM for observe Signal Aspect shall be extended with transitions made of purely guard conditions (reacting on current state and not change trigger) as in attached pic shown. The four marked transitions/elements should be added to correct the described behaviour above.

**Impact**

Req spec of BL4R2(1)

Comments

Comment by [Nico Huurman](#) [22.09.2023]

LS 20230920: Agreed to implement in BL4R3

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image-2023-08-15-13-44-53-576.png

