



COVER DOCUMENT

System Pillar / EULYNX

Baseline Set 4 Release 3

Version: 3.3
Date: 13-12-2024



Revision History

Revision #	Revision Date	Description of Change	Author
1	20230630	Mirror Group approval of Release 2	Nico Huurman, Mirko Blazic
2	20231004	Error corrections Release 2	Nico Huurman
3	20240621	Mirror Group approval of Release 3	Nico Huurman, Mirko Blazic
3.1	20240822	Versions of Eu.Doc.38 and Eu.Doc.46 corrected	Nico Huurman
3.2	20241017	Error corrections Release 3	Nico Huurman
3.3	20241213	Additional error corrections Release 3	Nico Huurman

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 3. 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 3 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 incorporate remaining feedback from the industry and reach a stable maturity level, fully integrated 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 25 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 3, delivering additional 29 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.

Security specifications

This release does not provide an update of the specifications related to security. The EULYNX BL4R2 security specifications remain applicable. In future phases, the EULYNX security specifications will be integrated and replaced by harmonised specifications published by the EU-Rail System Pillar Security domain. Publication of the first set of harmonised specifications by the EU-Rail System Pillar Cyber Security domain is currently foreseen for January 2025. This first set will contain 4 specification documents:

- Security Program Requirements
- Secure Component Specification
- Secure Communication Specification
- Shared Security Services Specification

Planning next releases

With this release, the specification documents of Baseline Set 4 have reached a stable maturity level. The current baseline set is closed for changes in functionality or new functions. Individual specifications may receive further updates due to error corrections or change requests.

Further developments in EULYNX and EU-Rail System Pillar will be introduced as part of Baseline Set 5. A concrete timeline for the next baseline set has not yet been defined, its publication will not be earlier than June 2026.

Documents

The System Pillar / EULYNX Baseline Set 4 Release 3 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 (6.A)	4	06/2024
Eu.Doc.119	Generic interface and subsystem requirements for SCI	1.1 (0.A)	4	06/2024
Eu.Doc.120	Generic interface and subsystem requirements for SMI	1.1 (0.A)	4	06/2024
Eu.Doc.92	Interface definition SCI	4.3 (0.A)	5	06/2024
Eu.Doc.93	Interface specification SCI Generic	3.3 (0.A)	5	06/2024
Eu.Doc.77	Interface definition SDI	3.2 (0.A)	5	06/2024
Eu.Doc.94	Interface specification SDI Generic	4.2 (0.A)	5	06/2024
Eu.Doc.100	Specification of Point of Service - Signalling	2.2 (0.A)	4	06/2024
Eu.Doc.76	Interface definition and specification SMI	2.2 (0.A)	5	06/2024
Eu.Doc.32	Requirements specification for subsystem Light Signal	4.3 (0.A)	4	06/2024
Eu.Doc.33	Interface specification SCI-LS	4.3 (0.A)	5	06/2024
Eu.Doc.78	Interface specification SDI-LS	4.2 (0.A)	5	06/2024
Eu.Doc.36	Requirements specification for subsystem Point	4.4 (0.A)	4	06/2024
Eu.Doc.38	Interface specification SCI-P	4.2 (1.A)	5	06/2024
Eu.Doc.80	Interface specification SDI-P	4.2 (0.A)	5	06/2024
Eu.Doc.45	Requirements specification for subsystem Generic IO	4.3 (0.A)	4	06/2024
Eu.Doc.46	Interface specification SCI-IO	4.0 (3.A)	5	06/2024
Eu.Doc.82	Interface specification SDI-IO	4.2 (0.A)	5	06/2024
Eu.Doc.43	Requirements specification for subsystem TDS	4.2 (0.A)	4	06/2024
Eu.Doc.44	Interface specification SCI-TDS	4.1 (0.A)	5	06/2024
Eu.Doc.81	Interface specification SDI-TDS	4.2 (0.A)	5	06/2024
Eu.Doc.108	Requirements specification for subsystem Level Crossing	2.3 (0.A)	4	06/2024
Eu.Doc.109	Interface specification SCI-LC	2.2 (0.A)	5	06/2024
Eu.Doc.110	Interface specification SDI-LC	3.2 (0.A)	5	06/2024

Error corrections

The following table will list Change Requests that describe error corrections that shall be considered when applying the documents of EULYNX Baseline Set 4 Release 3.

<i>CR ID</i>	<i>CR Description</i>	<i>IDs of impacted documents</i>	<i>CR date</i>
EUP-576	Wrong transition condition in STM diagram F_Control_And_Observe_4W_PM	Eu.Doc.36	09/2024
EUIO-439	SDI-IO, correction of multiplicities for PhysicalChannelConnection	Eu.Doc.82	09/2024
EUAR-690	Alignment between RJ45 and SPF cage requirement	Eu.Doc.100	09/2024
EUAR-763	Correct missing Operation_State when leaving Data_Update	Eu.Doc.120	11/2024

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 R3 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

[EUP-576] Wrong transition condition in STM diagram**F Control And Observe 4W PM**

Created: 16.07.2024 Updated: 16.07.2024

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

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

Attachments:	<input type="checkbox"/> 20240710 Point STMs which were basis for BL4R2.pdf	<input type="checkbox"/> [EUP-576] Correct STM diagram.png
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Description**Current state**

BL4R3

Problem

The STM diagram F_Control_And_Observe_4W_PM (Eu.P.5823) contains an error. The 2nd transitions from MOVING_LEFT_PM / MOVING_RIGHT_PM to DETECTION contain `d12in_Required_PM_Position = "LEFT_REACHED" / d12in_Required_PM_Position = "RIGHT_REACHED"`. This condition can never be true, because the values "LEFT_REACHED" / "RIGHT_REACHED" are not used for the port `d12in_Required_PM_Position`.

Intended state

The correct transition must be `d27in_4W_PM_Position = "LEFT_REACHED" / d27in_4W_PM_Position = "RIGHT_REACHED"`.

The correct transitions are shown in the attached figure.

The latest version of the SubS Point simulator is correct, as it was based on a copied PTC model. See attached .pdf.

Impact

ReqSpec SubS P

Backwards compatibility analysis

Error correction for the following releases:

- BL4 R2

- BL4 R3

<Provide an answer to the following questions:

Question 1: Can an EfeS implementing the change (new EfeS) operate with an EIL NOT implementing the change (old EIL)?

Question 2: Can an EfeS NOT implementing the change (old EfeS) operate with an EIL implementing the change (new EIL)?

Question 3: Must the PDI version be increased because of this change?>

Generated at Tue Jul 16 10:04:45 CEST 2024 by Nico Hurman using Jira 9.4.23#940023-sha1:042081f26695d2c2012dd9251033ab6e5ed712b1.

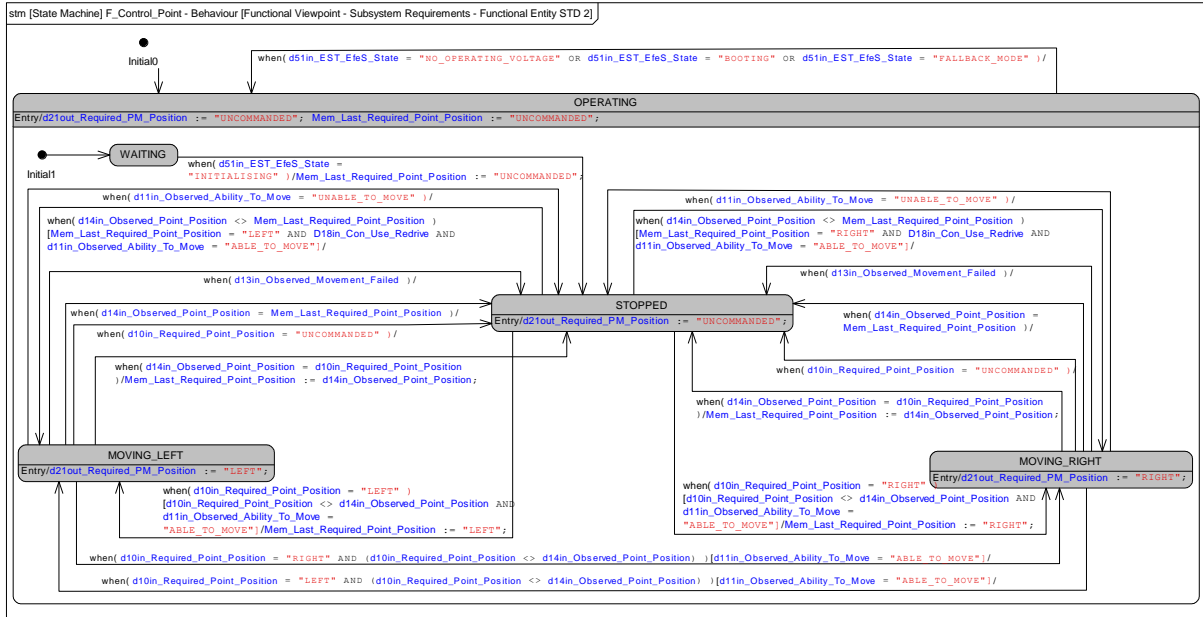
F_Control_4W_PM

stm [State Machine] F_Control_4W_PM - Behaviour [Technical Viewpoint - Subsystem Requirements - Technical Functional Entity STD 1]

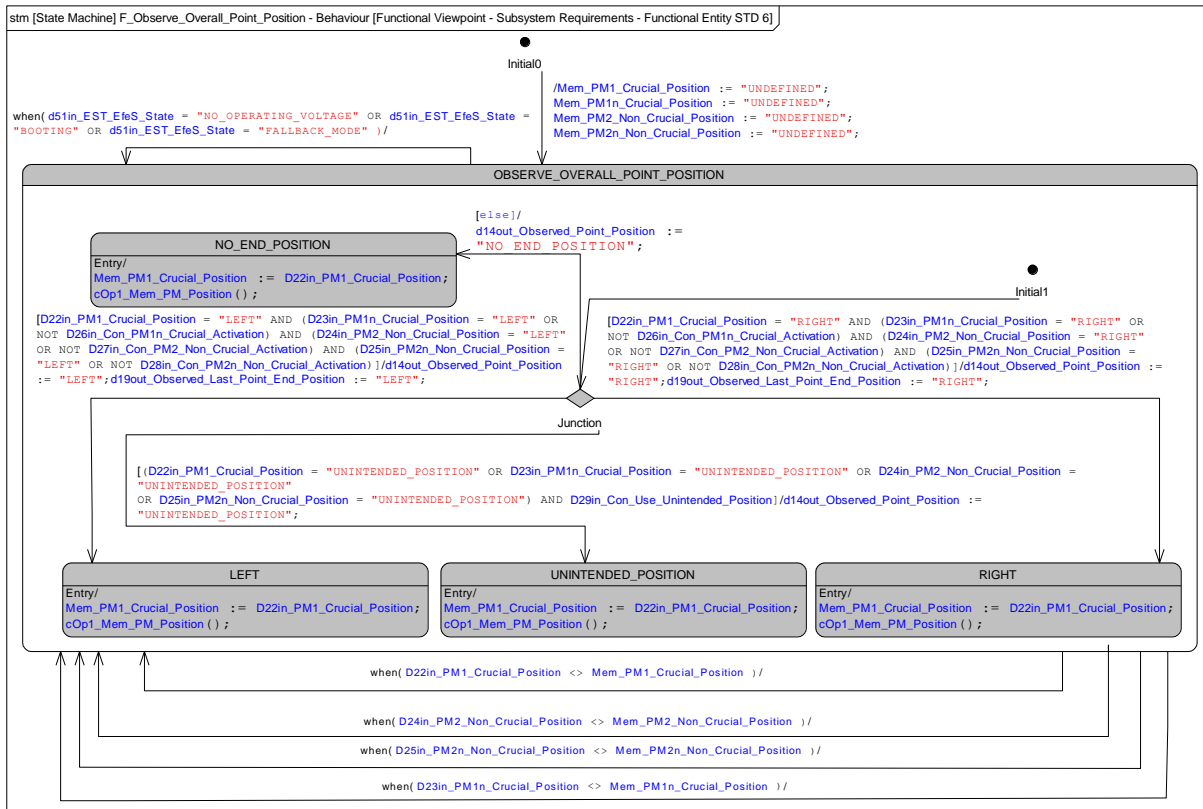


Point STMs which were basis for BL4R2/3 simulation

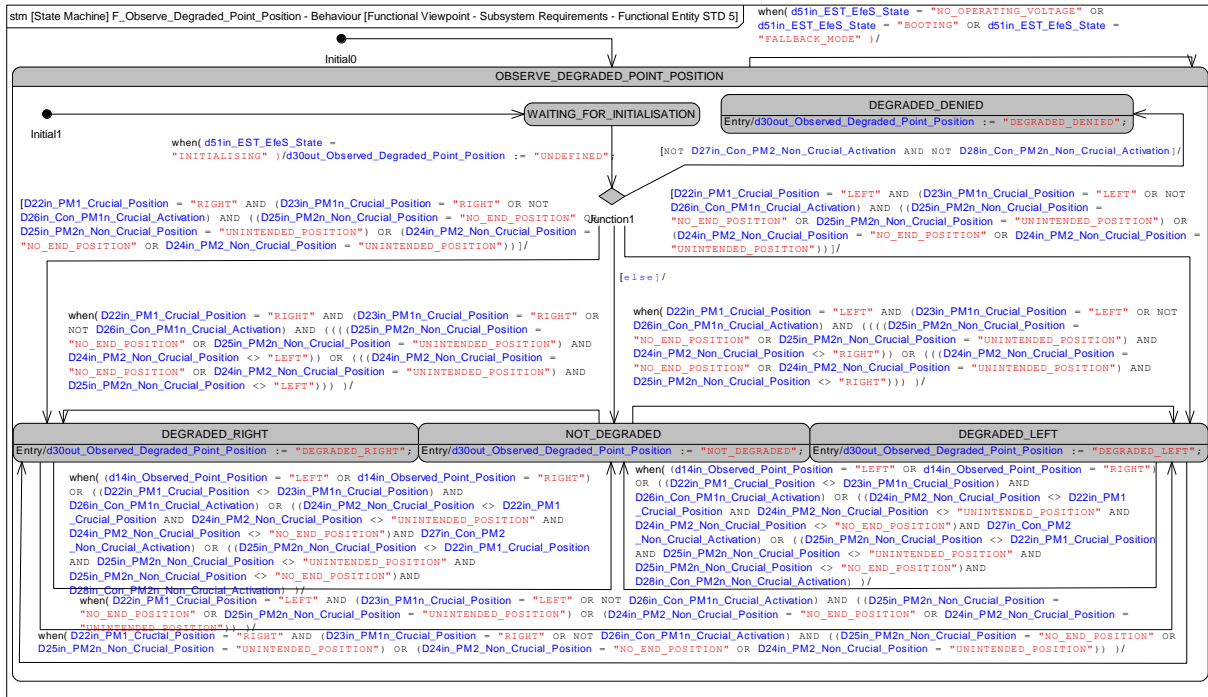
F_Control_Point



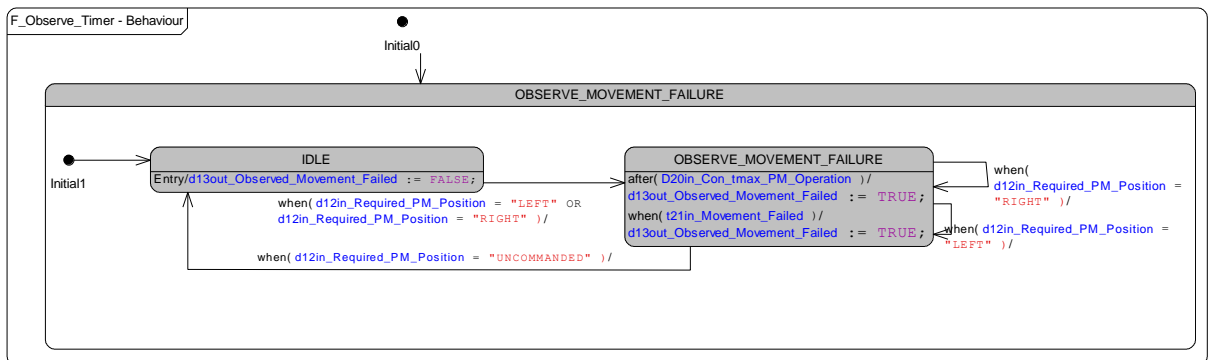
F_Observe_Overall_Point_Position



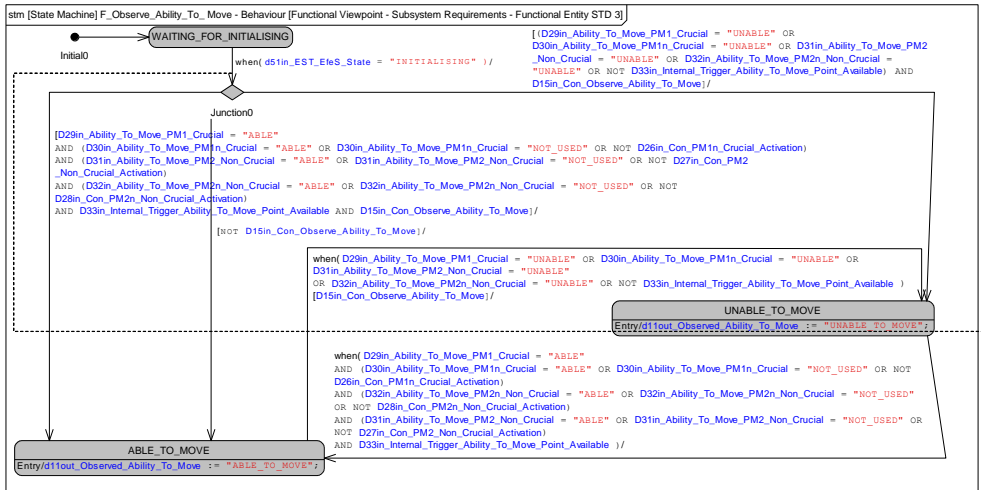
F_Observe_Degraded_Point_Position



F_Observe_Movement_Failed

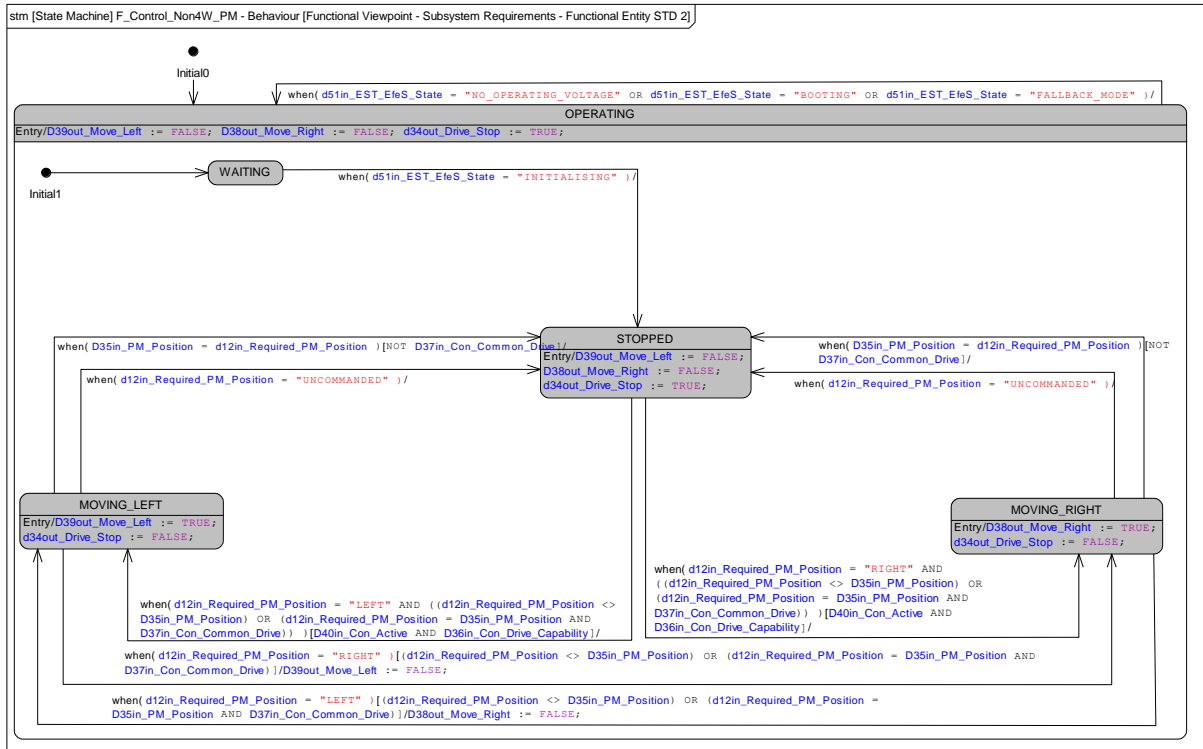


F_Observe_Ability_To_Move

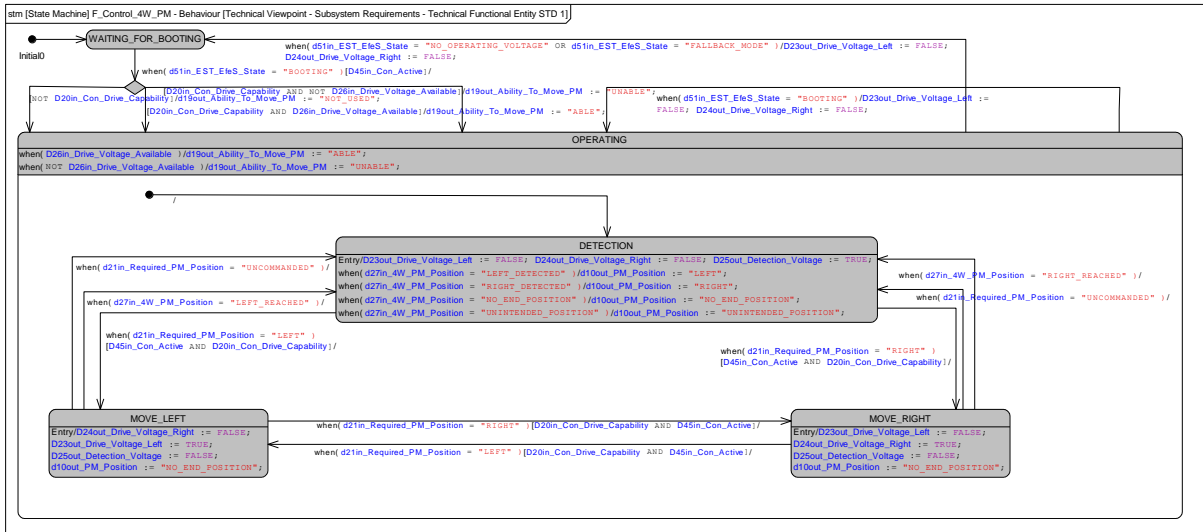


20220905 BFG: Hier muss noch geklärt werden, wann wieder in "WAITING_FOR_INITIALISING" zurück gegangen werden kann! Wenn all das hier nur in INITIALISING und OPERATIONAL stattfinden soll, fehlen die Rücktransitionen!

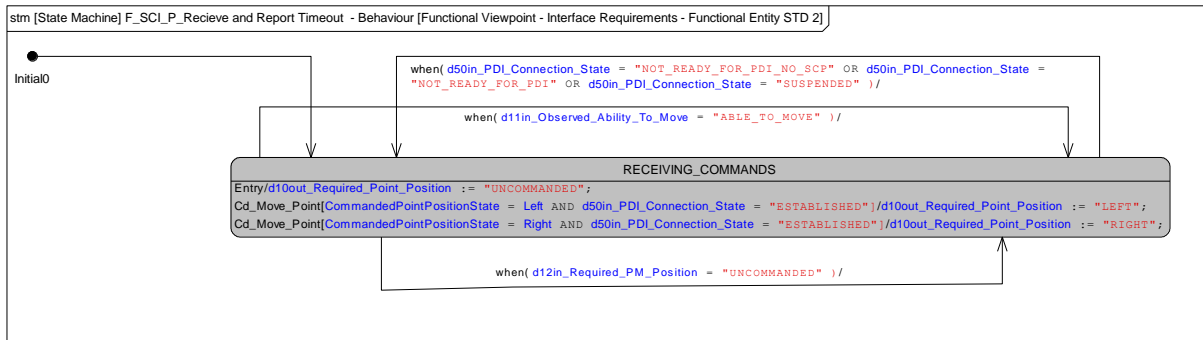
F_Control_Non4W_PM



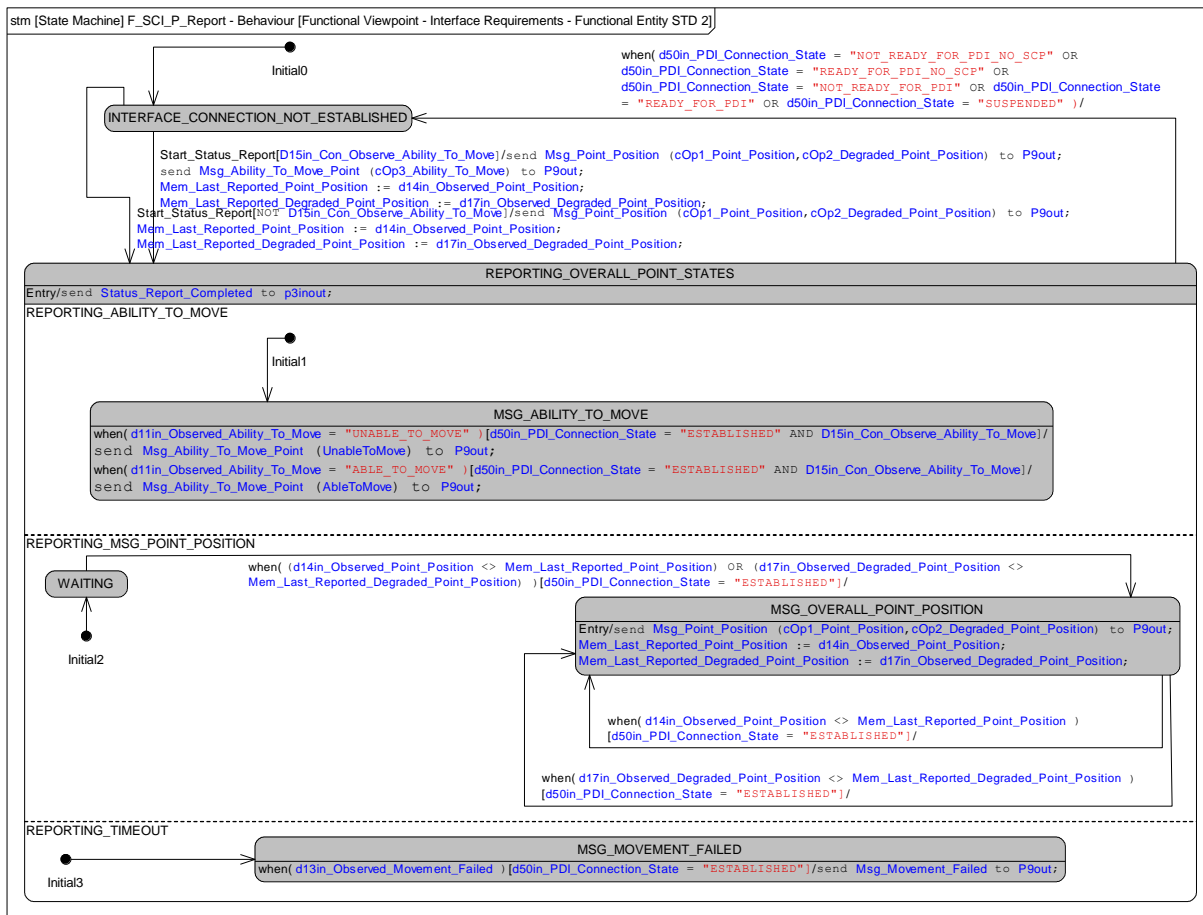
F_Control_4W_PM



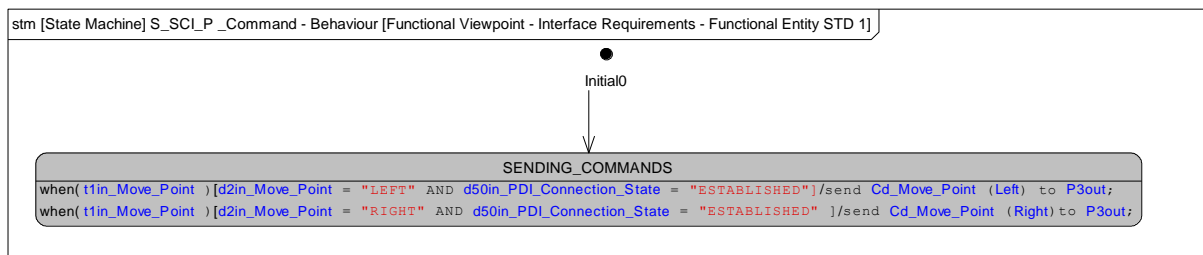
F_SCI_P_Recieve



F_SCI_P_Report



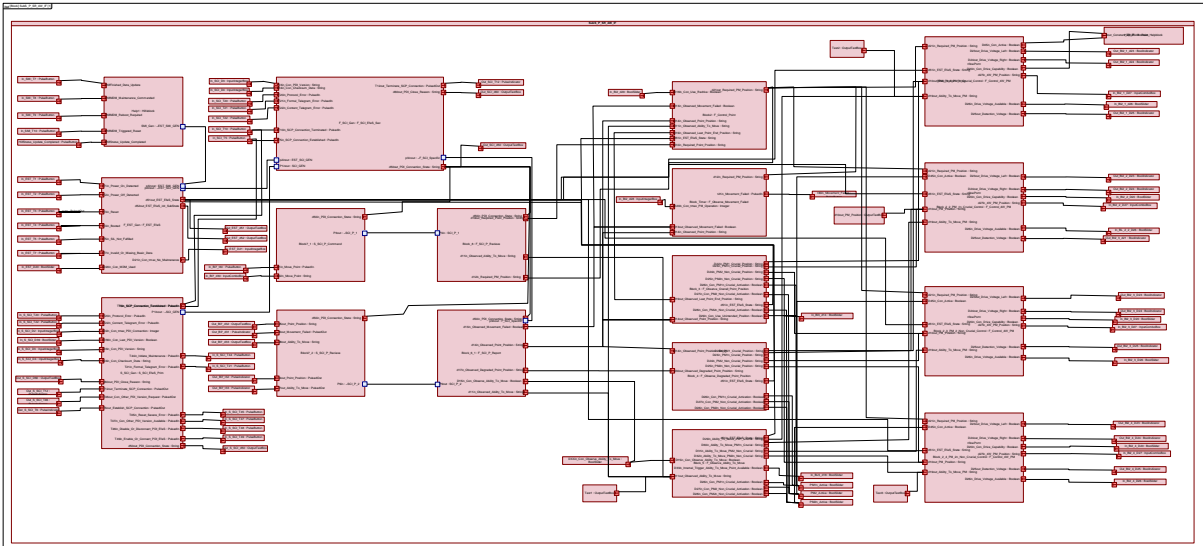
S_SCI_P_Command



S_SCI_P_Recieve



Simulator



[EUIO-439] [SDI-IO, correction of multiplicities for PhysicalChannelConnection](#) Created: 26.07.2024 Updated: 26.07.2024

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

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

Attachments:	 Figure SDI-IO multiplicity corrections.png
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Description

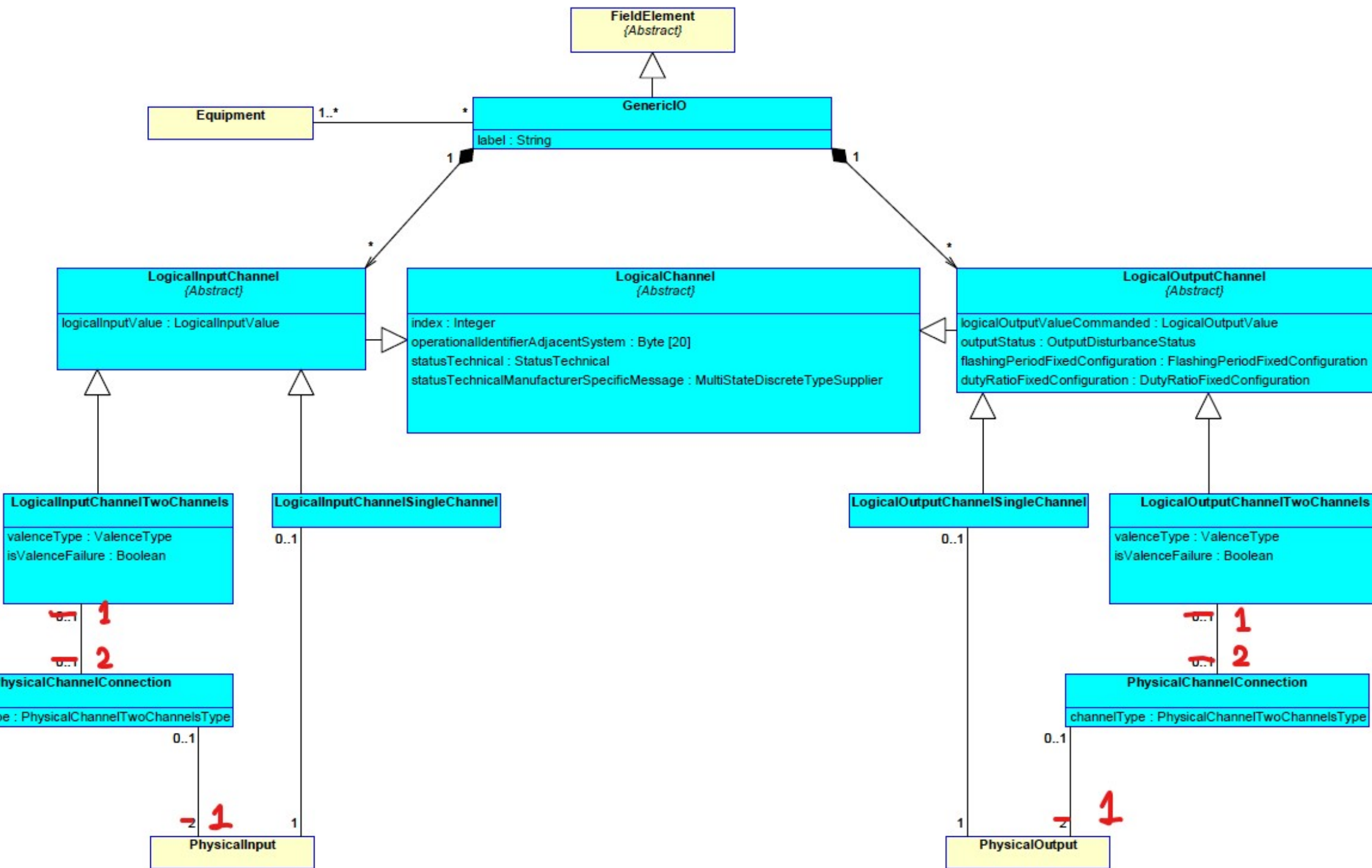
Current state
BL4R3

Problem
The multiplicities between LogicalInputChannelTwoChannels, PhysicalChannelConnection and PhysicalInput are incorrect.
Also valid for the multiplicities between LogicalOutputChannelTwoChannels, PhysicalChannelConnection and PhysicalOutput.

Intended state
See figure.

Impact
SDI-IO, only diagram.

Backwards compatibility analysis
Error correction for BL4R3.



[EUAR-690] [Alignment between RJ45 and SPF cage requirement](#) Created:
16.02.2024 Updated: 19.07.2024

Status:	Open
Project:	EULYNX CP Reference Architecture
Component/s:	None

Type:	Clarification	Priority:	None
Reporter:	Nico Huurman	Assignee:	Unassigned
Resolution:	Unresolved		
Remaining Estimate:	Not Specified		
Time Spent:	Not Specified		
Original Estimate:	Not Specified		

Sprint:	Postponed to later BL4 release
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Description

Current state

BL4R3 draft

Follow-up of [EUAR-607](#)

Problem

Review comment raised by ProRail (EvG).

Is it wise to have two different bandwidth specifications (100BASE-T (or more) vs. 1000BASE-T) for the same RJ45 hardware interface?

This was seemingly the intention of [EUAR-607](#) as agreed.

The original proposal was to define 1000Base-T also for the RJ45 variant, but this was contested by industry. SBB found out that 100Base-T is sufficient for the traffic of single EfeS, so the proposal was scaled down.

The consistency with the requirements for the SFP cage variant was not discussed.

Intended state

To be discussed and confirmed in RA WG.

[Proposal RefArch 20240304](#)

Change Eu.PoS.1203 to:

- [100BASE-T \(bandwidth of 100 Mbit/s\) or 1000BASE-T \(bandwidth of 1000 Mbit/s\)](#) (RJ45 [IEC 60603-7], copper dual twisted pair, reach of 100 m, as specified by [\[IEEE 802.3u\]](#) or [\[IEEE 802.3ab\]](#))

[Note: The bandwidth must be chosen such that the QoS-Parameter are met.](#)

Correct reference in Eu.PoS.1217:

If the physical implementation with RJ45 is used, the interface shall implement BASE-T

(RJ45, copper dual twisted pair, reach of 100 m, as specified by [IEEE [802.3u](#) or [802.3ab](#)]) with a bandwidth of 100mbit/s (100Base-T) or more.

Impact

POS

Backwards compatibility analysis

Same as [EUAR-607](#)

Comments

Comment by [Nico Hurman](#) [19.07.2024]

Not implemented in BL4R3! To be implemented as error correction?

Comment by [Nico Hurman](#) [02.04.2024]

Approved by TACS MG/CCB on 20240320 for implementation in BL4R3

Generated at Fri Jul 19 14:29:11 CEST 2024 by Nico Hurman using Jira 9.4.23#940023-sha1:042081f26695d2c2012dd9251033ab6e5ed712b1.

SPT2TACS-950

SPT2TACS-8740 - Correct missing Operation_State when leaving Data_Update

Type: Change Request	Assignee(s):	Initial Estimate:
Change Type: Error	Owner(s):	Time Spent:
Local ID: EUAR-763	Owning Group: SPT2TACS-552 - Reference Architecture-Board-EWG	Due Date:
Severity: Normal	To be Derived by Team:	Due Date:
Blocker:	Priority: Medium [50.0]	
Requires CCB: No	Status: Created	
Author: Nico Huurman	Planned In:	
Project: SPT2-Trackside Assets CS	Resolution:	
Categories:		

Custom Fields

Notes:

Current State: BL4R3

Problem Description: PILZ raised that the reaction D10out_Operation_State = "NotMaintenance" is missing at the transitions going out of Data_Update. This means that the value of D10out_Operation_State is not defined in the state SMI_CONNECTION_ESTABLISHED, it can be either "NotMaintenance" or "Maintenance". This unclarity is not intended, the value must be "NotMaintenance".

With this correction, the value of D10out_Operation_State will always be "NotMaintenance" in case the state DATA_UPDATE is entered because of the trigger T19in_Start_async_preload. This fact can be used as condition to allow Activation of a configuration item (only allowed in "Maintenance". In this way, the reference to the EST_EfeS_init_SubState is no longer needed.

Proposed Solution: Add D10out_Operation_State = "NotMaintenance" in 3 transitions going out of the state DATA_UPDATE.

In the transition from MDM_INTERACTION_FOR_ITEM_I to ACTIVATING, delete the condition d52in_EST_EfeS_init_SubState = "WAITING_FOR_DATA_UPDATE" and replace it with D10out_Operation_State = "Maintenance". The port d52in is no longer needed.

Risk:

Potential Side Effects:

Architecture Changes:

Affected Architecture Elements:

Affected Functions:

Affected Interfaces:

Affected Features:

Affected Specifications: Gen-SMI [Eu.Doc.120]

Backwards Compatability: Error correction

Changed/New Requirements:

Change of Safety Relevant Areas:

Affected Domains:

Affected Subsystems:

Estimated Effort:

Estimated Schedule:


Economic Impact:

Linked Work Items

Suspect	Role	Title	Project	Revision	Status	Assignee(s)
	has parent	SPT2TACS-950 - Reference Architecture-Board	SPT2-Trackside Assets CS			

Attachments

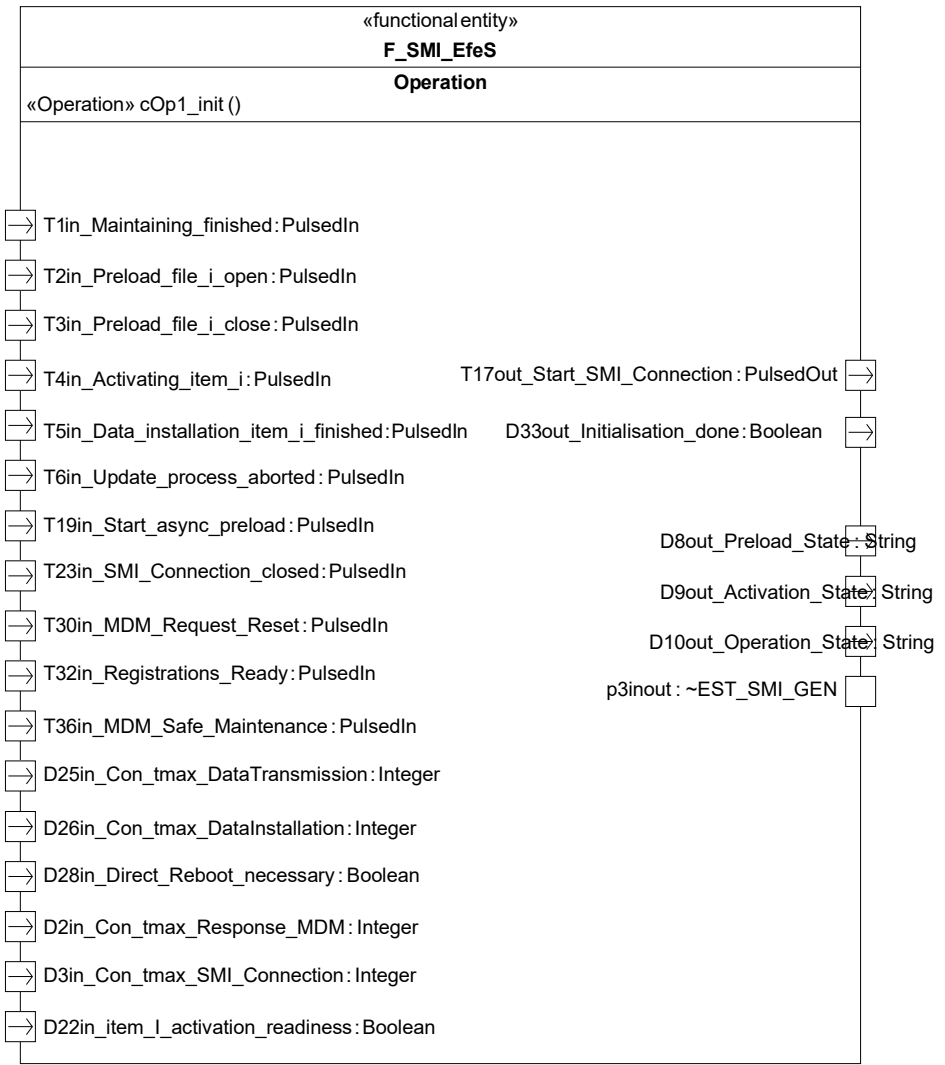
+

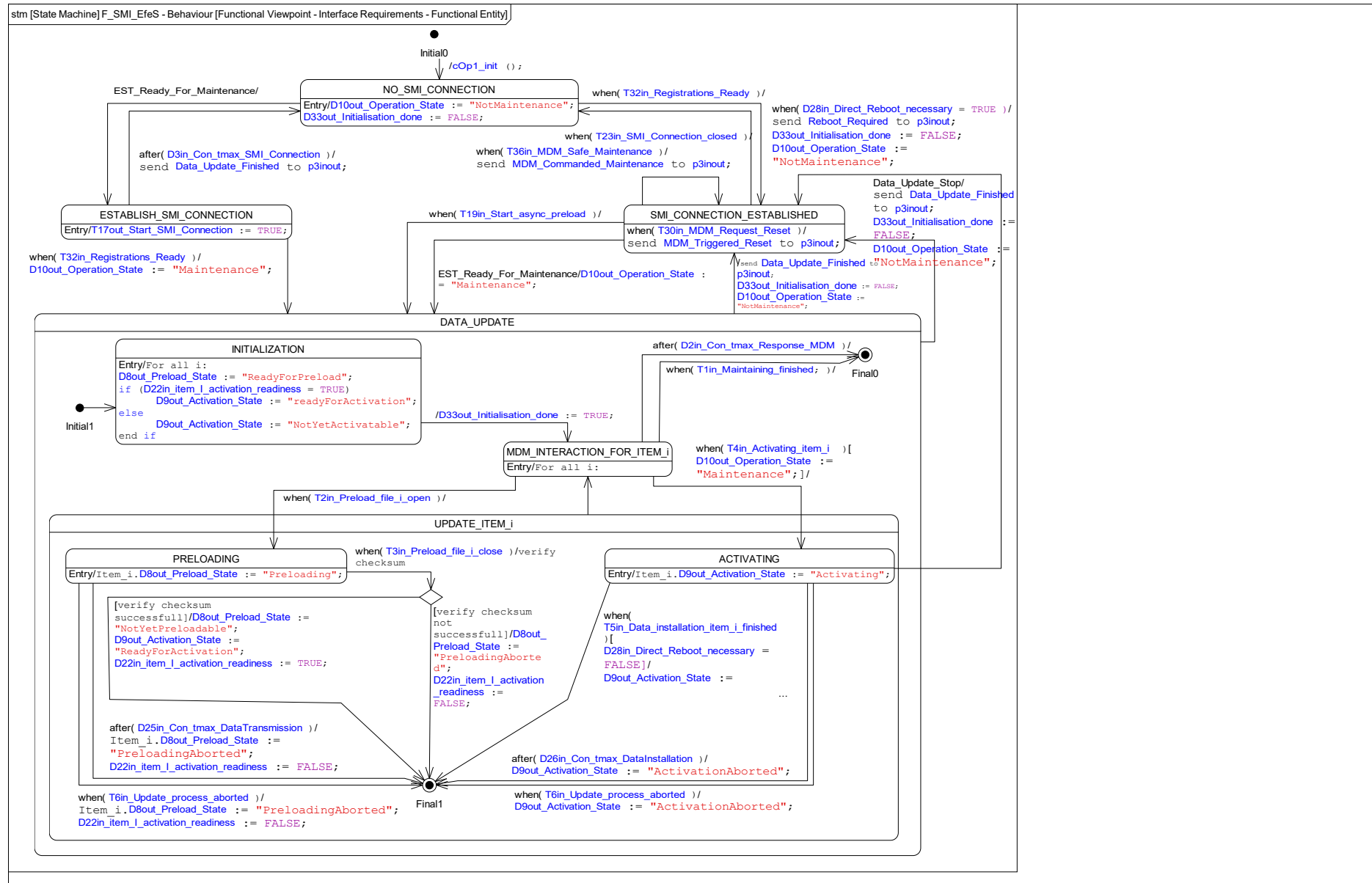


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State Diagram - Functional Viewpoint - Interface Requirements - Functional Entity
 EULYNX System - BL4
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