



EULYNX Initiative



Europe's Rail Joint Undertaking

Generic interface and subsystem requirements

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ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.1	Head	1 Introduction			
Eu.Gen.5	Head	1.1 Release information			
Eu.Gen.6	Info	[Eu.Doc.20] EULYNX Generic interface and subsystem requirements CENELEC Phase: 4 Version: 4.0 (7.A) Approval date: 02.06.2025			Object Text: [Eu.Doc.20] EULYNX Generic interface and subsystem requirements CENELEC Phase: 4 Version: 4.0 (6 7.A) Approval date: 29 <u>02.05</u> 06.2024 <u>2025</u>
Eu.Gen.7	Info	Version history			
Eu.Gen.4249	Info	version number: 4.0 (0.A) date: 16.05.2022 author: Dennis Kunz, Filip Giering generic profile version: 18 review: CCB changes: EUAR-508, EUAR-510, EUAR-523, EUAR-524, EUAR-526			
Eu.Gen.4251	Info	version number: 4.0 (1.A) date: 31.03.2023 author: Filip Giering generic profile version: 21 review: changes: EUAR-564, EUAR-572, EUAR-576			
Eu.Gen.4254	Info	version number: 4.0 (2.A) date: 11.05.2023 author: Filip Giering model version: 22 review: cluster changes: EUAR-589, EUAR-593			
Eu.Gen.4256	Info	version number: 4.0 (3.A) date: 27.06.2023 author: Filip Giering model version: 22 review: TACS Mirror Group changes: EUAR-594, EUAR-612, EUAR-613			
Eu.Gen.4257	Info	version number: 4.0 (4.A) date: 15.12.2023 author: Filip Giering model version: 25 review: M&T changes: EUAR-550, EUAR-660, EUAR-662, EUAR-663, EUAR-664, EUAR-665, EUAR-667, EUAR-675			
Eu.Gen.4262	Info	version number: 4.0 (5.A) date: 21.03.2024 author: Philipp Wolber model version: 26 review: cluster changes: EUAR-638			
Eu.Gen.4263	Info	version number: 4.0 (6.A) date: 18.06.2024 author: Philipp Wolber model version: 26 review: TACS Mirror Group changes: EUAR-681, EUAR-708, EUAR-740			
Eu.Gen.4264	Info	version number: 4.0 (7.A) date: 19.06.2025 author: Philipp Wolber model version: 29 review: TACS Mirror Group changes: EUAR-766			object created after baseline 4.0 (6.A)
Eu.Gen.14	Head	1.2 Impressum			
Eu.Gen.15	Info	Publishers: Europe’s Rail Joint Undertaking https://rail-research.europa.eu/ EULYNX Initiative https://eulynx.eu/			
Eu.Gen.16	Info	Responsible for this document: EU-Rail System Pillar Trackside Assets Control and Supervision domain			

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.17	Info	<p>This document is drafted by and belongs to EU Rail.</p> <p>EU Rail encourages the distribution and re-use of this document, the technical specifications and the information it contains. EU Rail holds several intellectual property rights, such as copyright and trade mark rights, which need to be considered when this document is used.</p> <p>EU Rail authorizes you to re-publish, re-use, copy and store this document without changing it, provided that you indicate its source and include the following mention [EU Rail trade mark, title of the document, year of publication, version of document].</p> <p>EU Rail makes no representation or warranty as to the accuracy or completeness of the information contained within these documents. EU Rail shall have no liability to any party as a result of the use of the information contained herein. EU Rail will have no liability whatsoever for any indirect or consequential loss or damage, and any such liability is expressly excluded.</p> <p>You may study, research, implement, adapt, improve and otherwise use the information, the content and the models in this document for your own purposes. If you decide to publish or disclose any adapted, modified or improved version of this document, any amended implementation or derivative work, then you must indicate that you have modified this document, with a reference to the document name and the terms of use of this document. You may not use EU Rail's trade marks or name in any way that may state or suggest, directly or indirectly, that EU Rail is the author of your adaptations. EU Rail cannot be held responsible for your product, even if you have used this document and its content. It is your responsibility to verify the quality, completeness and the accuracy of the information you use, for your own purposes.</p>			
Eu.Gen.3	Head	1.3 Purpose			
Eu.Gen.4	Info	The purpose of the document is the specification of generic requirements.			
Eu.Gen.2	Info	<p>This document describes:</p> <ul style="list-style-type: none">generic functional requirements for a EULYNX field element Subsystem			
Eu.Gen.18	Info	<p>This document is intended for the following users:</p> <ul style="list-style-type: none">safety authoritiesinfrastructure managerssafety assessorssignalling system suppliersvalidators			
Eu.Gen.19	Info	This document is the basis for the implementation by the supplier and for approval by the infrastructure manager.			
Eu.Gen.4255	Info	This document is applicable for both the EU-Rail System Pillar target architecture and the EULYNX architecture. The document is delivered as a single specification fitting both the System Pillar documentation sets and the EULYNX documentation sets. EU-Rail System Pillar is the technical authority for this document.			
Eu.Gen.20	Head	1.4 Applicable standards and regulations			
Eu.Gen.21	Info	A list of applicable standards and regulations used in EULYNX is listed in the EULYNX Reference Document List [Eu.Doc.12].			
Eu.Gen.22	Head	1.5 Applicable documents			
Eu.Gen.23	Info	The current versions of documents used as input or related to this document are listed in the EULYNX Documentation Plan [Eu.Doc.11]. The relationships between the documents are displayed in the Appendix A1 Documentation plan and structure [Eu.Doc.11_A1].			
Eu.Gen.24	Head	1.6 Terms and abbreviations			
Eu.Gen.25	Info	The terms and abbreviations are listed in the EULYNX Glossary [Eu.Doc.9].			
Eu.Gen.376	Head	1.7 Variability management			
Eu.Gen.377	Info	This document describes harmonised requirements. Variability management is not applicable. The specific applicability of requirements is captured in individual interface specifications.			
Eu.Gen.26	Head	1.8 Definition of object types			
Eu.Gen.27	Info	The following definition for object types is applied in this document:			
Eu.Gen.28	Info	<ul style="list-style-type: none">"Req" - This denotes a mandatory requirement.			
Eu.Gen.4259	Info	<ul style="list-style-type: none">"Def" - This denotes referenceable model elements that are used in the model-based creation of requirements			
Eu.Gen.29	Info	<ul style="list-style-type: none">"Info" - This denotes additional information to help understand the specification. These objects do not specify any additional requirements.			
Eu.Gen.30	Info	<ul style="list-style-type: none">"Head" - This denotes chapter headings.			
Eu.Gen.31	Head	1.9 Modelling			
Eu.Gen.32	Info	The section "Generic requirements for subsystems" follows a model based systems engineering process using Systems Modelling Language (SysML) and defines the functional system requirements for the EULYNX field element Subsystem in stimulus-response form.			
Eu.Gen.33	Info	The diagrams presented in this document are modelled in SysML [SysML].			
Eu.Gen.34	Info	The rules for the interpretation of the model based parts of specification are defined in [Eu.Doc.29].			
Eu.Gen.35	Info	In chapter 3 "Generic requirements for subsystems" the functional system requirements, defined in the form of a SysML model in the PTC Integrity Modeler are depicted as a surrogate of this model in the form of DOORS-objects.			
Eu.Gen.36	Info	A requirement thereby consists of the respective SysML model element, for instance a SysML diagram, and if necessary an additional extension of the requirement.			
Eu.Gen.37	Info	In the column "Requirement Part 1" the particular SysML model element is depicted and in the column "Requirement Part 2" the corresponding extension of the definition is given. The stated object type normally applies both to "Requirement Part 1" and to "Requirement Part 2".			
Eu.Gen.38	Info	There are requirements with type "Req" given, where the column "Requirement Part 2" or a part of it is provided with the heading "Information". In this case, the defined type only applies to the column "Requirement Part 1" and the part of "Requirement Part 2", which is not labelled as "Information".			
Eu.Gen.4258	Info	State machines or several state machines linked together in a Functional Architecture define the totality of all functional requirements of an SUS or an SIUS in a coherent and consistent manner. State diagrams of a corresponding state machine are marked with the object type "Req". For the later design and implementation, it is not the description language SysML that is binding, but the domain-specific meaning expressed by it. The specified behaviour can be converted into a vendor specific language but must retain the domain specific meaning describing the functional requirements. The specific model elements are additionally specified and defined by object type "Def" to allow for traceability to supplier designs or test cases. The compliance of products to the specifications must be demonstrated by testing against EULYNX test cases, which are derived from the functionality specified by the models.			
Eu.Gen.48	Head	2 Conditions of use			
Eu.Gen.369	Info	The specifications defined in this document shall follow the requirements of the EULYNX System Architecture Specification [Eu.Doc.16].			

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.49	Head	3 Generic requirements for subsystems			
Eu.Gen.113	Head	3.1 EULYNX field element Subsystem			
Eu.Gen.162	Head	3.1.1 EULYNX field element Subsystem - General Infos and Assumptions			
Eu.Gen.4198	Head	3.1.1.1 EULYNX field element Subsystem - Internal Information Flows			
Eu.Gen.4199	Def	<div><div>[Package] EULYNX field element Subsystem - Internal Information Flows [Subsystem Requirements - Direction of Information Objects]</div><div><div><div><div>bdd [Package] EULYNX field element Subsystem - Internal Information Flows [Subsystem Requirements - Direction of Information Objects]</div></div><div><div><div><div>«information flow» EST_SCI_GEN</div><div>prov «signal» Ready_For_PDI_Connection prov «signal» NotReady_For_PDI_Connection reqd «signal» PDI_Connection_Established reqd «signal» PDI_Connection_Closed reqd «signal» PDI_Released_For_Maintenance reqd «signal» PDI_Connection_Started</div></div><div><div><div><div>«information flow» EST_SMI_GEN</div><div>reqd «signal» EST_Ready_For_Maintenance prov «signal» Data_Update_Finished prov «signal» MDM_Commanded_Maintenance prov «signal» Reboot_Required prov «signal» MDM_Triggered_Reset reqd «signal» Data_Update_Stop</div></div></div></div></div></div></div></div></div>			
Eu.Gen.4236	Def	Data_Update_Finished			
Eu.Gen.4237	Def	Data_Update_Stop			
Eu.Gen.4238	Def	EST_Ready_For_Maintenance			
Eu.Gen.4239	Def	MDM_Commanded_Maintenance			
Eu.Gen.4240	Def	MDM_Triggered_Reset			
Eu.Gen.4241	Def	NotReady_For_PDI_Connection			
Eu.Gen.4242	Def	PDI_Connection_Closed			
Eu.Gen.4243	Def	PDI_Connection_Established			
Eu.Gen.4244	Def	PDI_Connection_Started			
Eu.Gen.4245	Def	PDI_Released_For_Maintenance			
Eu.Gen.4246	Def	Ready_For_PDI_Connection			
Eu.Gen.4247	Def	Reboot_Required			
Eu.Gen.3625	Head	3.1.2 EULYNX field element Subsystem - Functional Viewpoint			
Eu.Gen.3272	Head	3.1.2.1 Definition of time values			
Eu.Gen.4250	Def	Con_tmax_No_Maintenance	If a EULYNX field element Subsystem does not use the Subsystem MDM and it receives a maintenance release request from the Subsystem - Electronic Interlocking, it becomes ready again for a PDI connection only after this configured time period. Note: A non-zero waiting time is needed to avoid fast looping in the interaction between EIL and EfeS.		
Eu.Gen.3287	Head	3.1.2.2 EULYNX field element Subsystem - Functional Partitioning			

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Eu.Gen.4197	Def	<div><div>[Package] EULYNX field element Subsystem - Functional Partitioning [Functional Viewpoint - Subsystem Requirements]</div><div><div>bdd [Package] EULYNX field element Subsystem - Functional Partitioning [Functional Viewpoint - Subsystem Requirements]</div><div><div><div>EULYNX field element Subsystem - Functional Architecture</div><div><div>«logical structural entity» EULYNX field element Subsystem</div><div><div>1</div><div>1</div><div>1</div></div></div><div><div>EULYNX field element Subsystem - Functional Entities</div><div><div>«functional entity» F_EST_EfeS</div><div>EST EfeS</div></div></div><div><div>SCI-XX EfeS - Functional Entities</div><div><div>«functional entity» F_SCI_EfeS_Sec</div><div>SCI-XX EfeS Sec</div></div></div><div><div>SMI-XX EfeS - Functional Entities</div><div><div>«functional entity» F_SMI_EfeS</div><div>SMI-XX EfeS</div></div></div></div></div></div></div>			
Eu.Gen.3278	Head	3.1.2.3 EULYNX field element Subsystem - Functional Architecture			
Eu.Gen.4153	Info	EULYNX field element Subsystem			
Eu.Gen.4154	Def	<div><div>[Block] EULYNX field element Subsystem [Functional Viewpoint - Subsystem Requirements - Functional Architecture]</div><div><div>ibd [Block] EULYNX field element Subsystem [Functional Viewpoint - Subsystem Requirements - Functional Architecture]</div><div><div><div>«logical structural entity» EULYNX field element Subsystem</div><div><div><div>SMI_XX</div><div><div>T1in_Maintaining_finished</div><div>T2in_Preload_item_i_started</div><div>p3inout : ~EST_SMI_GEN</div><div>T3in_Preload_item_i_finished</div><div>T4in_Activating_item_i</div><div>T5in_Data_installation_item_i_finished</div><div>T6in_Update_process_aborted</div><div>T10out_Operation_State</div><div>d52in_EST_EfeS_init_SubState : String</div><div>D10out_State</div><div>D26in_Con_tmax_DataInstallation</div><div>T9out_Activation_State</div><div>«functional entity»</div><div>D9out_State : F_SMI_EfeS</div><div>T8out_Preload_State</div><div>D28in_Direct_Reboot_necessary</div><div>D8out_State</div><div>T17out_Start_SMI_Connection</div><div>T19in_Start_async_preload</div><div>T23in_SMI_Connection_closed</div><div>T30in_MDM_Request_Reset</div><div>D2in_Con_tmax_Response_MDM</div><div>T32in_Registrations_Ready</div><div>D3in_Con_tmax_SMI_Connection</div><div>T33out_Initialisation_done</div><div>D22in_item_i_activation_readiness</div><div>T36in_MDM_Safe_Maintenance</div><div>D25in_Con_tmax_DataTransmission</div></div></div><div><div>D21in_Con_tmax_No_Maintenance : Integer</div><div>p2inout : ~EST_SCI_GEN</div><div>p3inout : EST_SMI_GEN</div><div>d52out_EST_EfeS_init_SubState</div><div>«functional entity» EST EfeS : F_EST_EfeS</div><div>d51out_EST_EfeS_State</div><div>T1in_Power_On_Detected</div><div>T2in_Power_Off_Detected</div><div>T3in_Reset</div><div>T4in_Booted</div><div>T5in_SIL_Not_Fulfilled</div><div>T7in_Invalid_Or_Missing_Basic_Data</div><div>D20in_Con_MDM_Used</div></div><div><div>EfeSX : SCI-XX EfeS EfeS</div><div>P1inout : SCI_GEN</div><div>P1inout : SCI_GEN</div><div>p3inout : ~F_SCI_Specific</div><div>D3in_Con_PDI_Version</div><div>D4in_Con_Checksum_Data</div><div>d50out_PDI_Connection_State</div><div>«functional entity» : F_SCI_EfeS_Sec</div><div>T10in_SCP_Connection_Terminated</div><div>T12out_Terminate_SCP_Connection</div><div>T20in_Protocol_Error</div><div>T21in_Formal_Telegram_Error</div><div>T22in_Content_Telegram_Error</div><div>T5in_SCP_Connection_Established</div></div></div></div></div></div></div>			
Eu.Gen.4155	Def	EfeSX			
Eu.Gen.4156	Def	SMI_XX			
Eu.Gen.3623	Head	3.1.2.4 EULYNX field element Subsystem - Functional Entities			
Eu.Gen.3288	Info	F_EST_EfeS			

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.3333	Req	<div>[Block] F_EST_EfeS [Functional Viewpoint - Subsystem Requirements - Functional Entity]</div> <div><div>ibd [Block] F_EST_EfeS [Functional Viewpoint - Subsystem Requirements - Functional Entity]</div><div><div><div>«functional entity» F_EST_EfeS</div><div>Operation</div><div>«Operation» cOp1_init ()</div></div><div><div><div>T1in_Power_On_Detected : PulsedIn</div><div>T2in_Power_Off_Detected : PulsedIn</div><div>T3in_Reset : PulsedIn</div><div>T4in_Booted : PulsedIn</div><div>T5in_SIL_Not_Fulfilled : PulsedIn</div><div>T7in_Invalid_Or_Missing_Basic_Data : PulsedIn</div><div>D20in_Con_MDM_Used : Boolean</div><div>D21in_Con_tmax_No_Maintenance : Integer</div></div><div><div>p2inout : ~EST_SCI_GEN</div><div>p3inout : EST_SMI_GEN</div><div>d51out_EST_EfeS_State : String</div><div>d52out_EST_EfeS_init_SubState : String</div></div></div></div></div>			
Eu.Gen.3289	Def	<div>/* cOp1_init */</div> <div>d52out_EST_EfeS_init_SubState := "unknown";</div>	cOp1_init		
Eu.Gen.3341	Def	T1in_Power_On_Detected	The port T1in_Power_On_Detected indicates that the voltage reaches the permitted range for operation.		
Eu.Gen.3344	Def	T2in_Power_Off_Detected	The port T2in_Power_Off_Detected indicates that voltage leaves the permitted range for operation.		
Eu.Gen.3345	Def	T3in_Reset	The port T3in_Reset represents the receiving of the request Local_Reset from Maintainer.		
Eu.Gen.3346	Def	T4in_Booted	<div>The port T4in_Booted indicates that the booting process was completed successfully.</div> <div>T4in_Booted shall be trigged under the following conditions:<ul style="list-style-type: none">- all conditions for the required Safety Integrity Level are fulfilled- the basic data is valid and complete- the safe communication protocol connection is disconnected- the time synchronisation was initiated</div>		
Eu.Gen.3347	Def	T5in_SIL_Not_Fulfilled	The port T5in_SIL_Not_Fulfilled indicates that at least one condition for the needed Safety Integrity Level is not fulfilled.		
Eu.Gen.3348	Def	T7in_Invalid_Or_Missing_Basic_Data	The port T7in_Invalid_Or_Missing_Basic_Data indicates a failed validity check of Basic Data on the system data interface to Basic Data identifier.		
Eu.Gen.3290	Def	D20in_Con_MDM_Used	The port D20in_Con_MDM_Used provides configuration values whether the MDM is used during initialisation.		

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
			The following values are permitted: - true: MDM is used - false: MDM is not used		
Eu.Gen.4230	Def	D21in_Con_tmax_No_Maintenance	The port D21in_Con_tmax_No_Maintenance refines the time value Con_tmax_No_Maintenance.		
Eu.Gen.3292	Def	d51out_EST_EfeS_State	The port d51out_EST_EfeS_State indicates the current essential state of the EULYNX field element Subsystem. This Operation_State is displayed at the local status display for the Maintainer.		
Eu.Gen.4171	Def	d52out_EST_EfeS_init_SubState	The port d52out_EST_EfeS_init_SubState indicates the current substate within the essential state INITIALISING of the EULYNX field element Subsystem.		
Eu.Gen.4195	Def	p2inout			
Eu.Gen.4196	Def	p3inout			
Eu.Gen.3293	Info	F_EST_EfeS - Behaviour			

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.3294	Req	<div>Functional Viewpoint - Subsystem Requirements - Functional Entity</div> <div>stm [State Machine] F_EST_EfeS - Behaviour [Functional Viewpoint - Subsystem Requirements - Functional Entity]</div> <div><p>The diagram illustrates the state machine for F_EST_EfeS - Behaviour. It starts with an initial state 'Initial0' leading to the 'NO_OPERATING_VOLTAGE' state. A transition 'when(T1in_Power_On_Detected) /' leads to the 'OPERATING_VOLTAGE_SUPPLIED' state. From there, 'Initial1' leads to the 'BOOTING' state. Transitions from 'BOOTING' include 'when(T3in_Reset) /' leading to 'FALLBACK_MODE', 'when(T5in_SIL_Not_Fulfilled) /' leading to 'FALLBACK_MODE', 'when(T7in_Invalid_Or_Missing_Basic_Data) /' leading to 'FALLBACK_MODE', and 'MDM_Triggered_Reset /' leading to 'FALLBACK_MODE'. 'FALLBACK_MODE' has an entry action 'Entry/d51out_EST_EfeS_State := "FALLBACK_MODE";' and transitions back to 'BOOTING' on 'when(T3in_Reset) /' and to 'INITIALISING' on 'when(T5in_SIL_Not_Fulfilled) /'. 'INITIALISING' has an entry action 'Entry/d51out_EST_EfeS_State := "INITIALISING";' and leads to a junction 'Junction0' with guard '[D20in_Con_MDM_Used] /'. 'Junction0' leads to 'WAITING_FOR_PDI_OR_MAINTENANCE' with guard '[NOT D20in_Con_MDM_Used] /'. 'WAITING_FOR_PDI_OR_MAINTENANCE' has an entry action 'Entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_PDI_OR_MAINTENANCE";' and transitions to 'WAITING_FOR_NO_MAINTENANCE_TIMEOUT' on 'PDI_Connection_Closed /', to 'WAITING_FOR_PDI' on 'PDI_Connection_Started /', and to 'WAITING_FOR_DATA_UPDATE' on 'Data_Update_Finished / send Ready_For_PDI_Connection to p2inout;'. 'WAITING_FOR_NO_MAINTENANCE_TIMEOUT' has an entry action 'Entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_NO_MAINTENANCE_TIMEOUT"; send NotReady_For_PDI_Connection to p2inout;' and transitions to 'WAITING_FOR_PDI' on 'PDI_Released_For_Maintenance [NOT D20in_Con_MDM_Used] /' and to 'WAITING_FOR_DATA_UPDATE' on 'PDI_Released_For_Maintenance [NOT D20in_Con_MDM_Used] /'. 'WAITING_FOR_PDI' has an entry action 'Entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_PDI";' and transitions to 'OPERATIONAL' on 'PDI_Connection_Established /'. 'WAITING_FOR_DATA_UPDATE' has an entry action 'Entry/send EST_Ready_For_Maintenance to p3inout; send NotReady_For_PDI_Connection to p2inout; d52out_EST_EfeS_init_SubState := "WAITING_FOR_DATA_UPDATE";' and transitions to 'OPERATIONAL' on 'PDI_Released_For_Maintenance[D20in_Con_MDM_Used] /'. 'OPERATIONAL' has an entry action 'Entry/d51out_EST_EfeS_State := "OPERATIONAL";' and transitions back to 'BOOTING' on 'when(T3in_Reset) / send NotReady_For_PDI_Connection to p2inout;' and back to 'FALLBACK_MODE' on 'when(T5in_SIL_Not_Fulfilled) / send NotReady_For_PDI_Connection to p2inout;'. There is also a transition from 'NO_OPERATING_VOLTAGE' to 'FALLBACK_MODE' on 'when(T2in_Power_Off_Detected) / send NotReady_For_PDI_Connection to p2inout; send Data_Update_Stop to p3inout;'.</p></div>	<p>This state machine diagram describes the requirements for the following functionalities:</p> <ul style="list-style-type: none">- basic behaviour for each EfeS based on "external/internal triggers" like<ul style="list-style-type: none">* establishment and closure of PDI connection* loss of SIL* Reset of the EfeS <p>Note: The state machine describes the lifecycle of an EfeS through its operational states.</p>		

This state machine diagram describes the requirements for the following functionalities:

- basic behaviour for each EfeS based on "external/internal triggers" like
 - * establishment and closure of PDI connection
 - * loss of SIL
 - * Reset of the EfeS

Note: The state machine describes the lifecycle of an EfeS through its operational states.

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.3295	Def	Initial0			
Eu.Gen.3296	Def	/cOp1_init();{Initial0 - NO_OPERATING_VOLTAGE}			
Eu.Gen.3297	Def	NO_OPERATING_VOLTAGE			
Eu.Gen.3299	Def	when(T1in_Power_On_Detected)/{NO_OPERATING_VOLTAGE - OPERATING_VOLTAGE_SUPPLIED}			
Eu.Gen.4172	Def	entry/d51out_EST_EfeS_State := "NO_OPERATING_VOLTAGE";{State-internal in NO_OPERATING_VOLTAGE}			
Eu.Gen.3300	Def	OPERATING_VOLTAGE_SUPPLIED			
Eu.Gen.3301	Def	BOOTING			
Eu.Gen.3304	Def	when(T4in_Booted)/{BOOTING - INITIALISING}			
Eu.Gen.3305	Def	when(T5in_SIL_Not_Fulfilled)/{BOOTING - FALLBACK_MODE}			
Eu.Gen.3306	Def	when(T7in_Invalid_Or_Missing_Basic_Data)/{BOOTING - FALLBACK_MODE}			
Eu.Gen.4173	Def	entry/d51out_EST_EfeS_State := "BOOTING";{State-internal in BOOTING}			
Eu.Gen.3307	Def	FALLBACK_MODE			
Eu.Gen.3309	Def	when(T3in_Reset)/{FALLBACK_MODE - BOOTING}			
Eu.Gen.4174	Def	MDM_Triggered_Reset/{FALLBACK_MODE - BOOTING}			
Eu.Gen.4175	Def	entry/d51out_EST_EfeS_State := "FALLBACK_MODE";{State-internal in FALLBACK_MODE}			
Eu.Gen.3310	Def	Initial1			
Eu.Gen.3311	Def	/{Initial1 - BOOTING}			
Eu.Gen.3327	Def	OPERATIONAL			
Eu.Gen.3330	Def	when(T3in_Reset)/ send NotReady_For_PDI_Connection to p2inout;{OPERATIONAL - BOOTING}			
Eu.Gen.3331	Def	when(T5in_SIL_Not_Fulfilled)/ send NotReady_For_PDI_Connection to p2inout;{OPERATIONAL - FALLBACK_MODE}			
Eu.Gen.3325	Def	PDI_Connection_Closed/{OPERATIONAL - WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.4194	Def	entry/d51out_EST_EfeS_State := "OPERATIONAL";{State-internal in OPERATIONAL}			
Eu.Gen.4229	Def	PDI_Released_For_Maintenance[D20in_Con_MDM_Used]/{OPERATIONAL - WAITING_FOR_DATA_UPDATE}			
Eu.Gen.4235	Def	PDI_Released_For_Maintenance[NOT D20in_Con_MDM_Used]/{OPERATIONAL - WAITING_FOR_NO_MAINTENANCE_TIMEOUT}			
Eu.Gen.3332	Def	when(T2in_Power_Off_Detected)/ send NotReady_For_PDI_Connection to p2inout; send Data_Update_Stop to p3inout;{OPERATING_VOLTAGE_SUPPLIED - NO_OPERATING_VOLTAGE}			
Eu.Gen.4176	Def	INITIALISING			
Eu.Gen.4177	Def	Initial2			
Eu.Gen.4178	Def	/{Initial2 - Junction0}			
Eu.Gen.4179	Def	Reboot_Required[D20in_Con_MDM_Used]/ send NotReady_For_PDI_Connection to p2inout;{INITIALISING - BOOTING}			
Eu.Gen.4180	Def	entry/d51out_EST_EfeS_State := "INITIALISING";{State-internal in INITIALISING}			
Eu.Gen.4181	Def	WAITING_FOR_DATA_UPDATE			
Eu.Gen.4182	Def	Data_Update_Finished/ send Ready_For_PDI_Connection to p2inout;{WAITING_FOR_DATA_UPDATE - WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.4183	Def	entry/send EST_Ready_For_Maintenance to p3inout; send NotReady_For_PDI_Connection to p2inout; d52out_EST_EfeS_init_SubState := "WAITING_FOR_DATA_UPDATE";{State-internal in WAITING_FOR_DATA_UPDATE}			
Eu.Gen.4184	Def	WAITING_FOR_PDI			
Eu.Gen.4185	Def	PDI_Connection_Closed/{WAITING_FOR_PDI - WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.3320	Def	PDI_Connection_Established/{WAITING_FOR_PDI - OPERATIONAL}			
Eu.Gen.4186	Def	PDI_Released_For_Maintenance[D20in_Con_MDM_Used]/{WAITING_FOR_PDI - WAITING_FOR_DATA_UPDATE}			
Eu.Gen.4187	Def	entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_PDI";{State-internal in WAITING_FOR_PDI}			
Eu.Gen.4234	Def	PDI_Released_For_Maintenance[NOT D20in_Con_MDM_Used]/{WAITING_FOR_PDI - WAITING_FOR_NO_MAINTENANCE_TIMEOUT}			
Eu.Gen.4188	Def	WAITING_FOR_PDI_OR_MAINTENANCE			
Eu.Gen.4189	Def	MDM_Commanded_Maintenance[D20in_Con_MDM_Used]/{WAITING_FOR_PDI_OR_MAINTENANCE - WAITING_FOR_DATA_UPDATE}			
Eu.Gen.4190	Def	PDI_Connection_Started/{WAITING_FOR_PDI_OR_MAINTENANCE - WAITING_FOR_PDI}			
Eu.Gen.4191	Def	entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_PDI_OR_MAINTENANCE";{State-internal in WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.3318	Def	when(T3in_Reset)/ send NotReady_For_PDI_Connection to p2inout; send Data_Update_Stop to p3inout;{INITIALISING - BOOTING}			

ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.3319	Def	when(T5in_SIL_Not_Fulfilled)/ send NotReady_For_PDI_Connection to p2inout; send Data_Update_Stop to p3inout;{INITIALISING - FALLBACK_MODE}			
Eu.Gen.3321	Def	Junction0			
Eu.Gen.3322	Def	[NOT D20in_Con_MDM_Used]/ send Ready_For_PDI_Connection to p2inout;{Junction0 - WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.3323	Def	[D20in_Con_MDM_Used]/{Junction0 - WAITING_FOR_DATA_UPDATE}			
Eu.Gen.4231	Def	WAITING_FOR_NO_MAINTENANCE_TIMEOUT			
Eu.Gen.4232	Def	after(D21in_Con_tmax_No_Maintenance)/ send Ready_For_PDI_Connection to p2inout;{WAITING_FOR_NO_MAINTENANCE_TIMEOUT - WAITING_FOR_PDI_OR_MAINTENANCE}			
Eu.Gen.4233	Def	entry/d52out_EST_EfeS_init_SubState := "WAITING_FOR_NO_MAINTENANCE_TIMEOUT"; send NotReady_For_PDI_Connection to p2inout;{State-internal in WAITING_FOR_NO_MAINTENANCE_TIMEOUT}			
Eu.Gen.4215	Head	3.1.3 EULYNX field element Subsystem - Interfaces			
Eu.Gen.115	Head	3.1.3.1 Interface to Basic Data Identifier			
Eu.Gen.114	Head	3.1.3.1.1 Basic Data Identifier Interface - Information Flows			
Eu.Gen.116	Info	Basic_Data_Identifier	Definition of the InformationFlow (by FlowSpecification) for the interface to <u>Basic Data identifier</u> .		
Eu.Gen.117	Def	Basic_Data	The Basic_Data are the basis for booting the EULYNX field element Subsystem. The Basic_Data enables the EULYNX field element Subsystem to become operational.		
Eu.Gen.3613	Head	3.1.3.2 Interface to Maintainer			
Eu.Gen.3614	Head	3.1.3.2.1 Maintainer Interface - Information Flows			
Eu.Gen.3615	Info	Maintainer			
Eu.Gen.3616	Def	Ethernet_Connection_ETH1	Display of the status of the Ethernet_Connection_ETH1 of the EULYNX field element Subsystem at the local status display.		
Eu.Gen.3617	Def	Ethernet_Connection_ETH2	Display of the status of the Ethernet_Connection_ETH2 of the EULYNX field element Subsystem at the local status display.		
Eu.Gen.3618	Def	Local_Reset	Local request to reset the EULYNX field element Subsystem.		
Eu.Gen.3619	Def	Operation_State	Display of the status of the operation state of the EULYNX field element Subsystem at the local status display.		
Eu.Gen.3886	Head	4 RAMSS requirements			
Eu.Gen.3888	Info	The requirements for reliability, availability, maintainability and safety shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.		EUAR-766	Object Text: The requirements for reliability, availability, maintainability, safety and security <u>safety</u> shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications. a_JIRA_BL4R4: EUAR-766
Eu.Gen.4265	Info	The requirements for security are defined in [SP-SEC-CompSpec].		EUAR-766	object created after baseline 4.0 (6.A)
Eu.Gen.3887	Head	5 Technical requirements			

Generic interface and subsystem requirements					
ID	Type	Requirement Part 1	Requirement Part 2	JIRA	V 4.0 (7.A) > V 4.0 (6.A)
Eu.Gen.3889	Info	Additional technical requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			
Eu.Gen.3890	Head	5.1 Generic technical interface requirements			
Eu.Gen.3891	Head	5.1.1 Interface to the Point of Service – Signalling (PoS-Signalling)			
Eu.Gen.3892	Req	The EULYNX field element Subsystem shall meet the requirements of the PoS-Signalling as defined in [Eu.Doc.100].			
Eu.Gen.3904	Head	5.1.1.1 QoS			
Eu.Gen.3905	Req	The EULYNX field element Subsystem shall meet or expect the QoS requirements as defined in Eu.PoS.1 (see [Eu.Doc.100]).			
Eu.Gen.3913	Head	5.1.2 Interface to the Point of Power – Output (PoP-O)			
Eu.Gen.3914	Info	These requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			
Eu.Gen.3915	Head	5.1.3 Interface to Basic Data identifier			
Eu.Gen.3918	Req	The basic data of the EULYNX field element subsystem shall be stored on a data carrier (Basic Data identifier).			
Eu.Gen.3919	Req	The Basic Data identifier shall be permanently assigned to the slot of the component of the EULYNX field element Subsystem (subsystem controller). To avoid erroneous assignments, the Basic Data identifier shall be attached to the subsystem in a manner that it remains assigned to that subsystem when a subsystem controller is replaced. Note: The implementation of the Basic Data identifier is left to the suppliers. This is not specified by EULYNX.			
Eu.Gen.3916	Head	5.1.4 Local status display interface			
Eu.Gen.3917	Info	These requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			
Eu.Gen.3920	Head	5.2 Electrical subsystem requirements			
Eu.Gen.3921	Info	These requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			
Eu.Gen.3922	Head	5.3 Constructive subsystem requirements			
Eu.Gen.3923	Info	These requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			
Eu.Gen.3924	Head	5.4 Configuration and engineering data			
Eu.Gen.3925	Head	5.4.1 Generic data			
Eu.Gen.3926	Req	The configuration and engineering data for the EULYNX field element Subsystem shall as a minimum contain the information specified in Eu.SAS.1755.			
Eu.Gen.3929	Req	The PDI connection from the EULYNX field element Subsystem to the Subsystem - Electronic Interlocking shall be assigned to exactly one safe communication by configuration.			
Eu.Gen.4260	Head	5.4.2 Value configuration			
Eu.Gen.4261	Req	Con_tmax_No_Maintenance The time value shall be configured in accordance with: Configurable resolution: steps of 1s Configurable range: from 1s up to 30s with a default value of 10s. Con_tmax_No_Maintenance is defined in Eu.Gen.4250. Note: A non-zero waiting time is needed to avoid fast looping in the interaction between EIL and EfeS.			
Eu.Gen.4252	Head	5.5 Time behaviour			
Eu.Gen.4253	Info	All functions of the state "BOOTING" shall be completed by the subsystem within a defined time after the detection of the operating voltage at the Point of Power - Output (PoP-O). This time shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.			