EULYNX Initiative

Europe's Rail Joint Undertaking

Interface specification SCI-IO

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Contents

ID	Type	Requirement	Func. Pkg.
Eu.SCI-IO.PDI.4	Head	**1 Introduction**	
Eu.SCI-IO.PDI.5	Head	**1.1 Release information**	
Eu.SCI-IO.PDI.6	Info	[Eu.Doc.46] Interface specification SCI-IO CENELEC Phase: 5 Version: 4.0 (2.A) Approval date: 15.06.2023	
Eu.SCI-IO.PDI.1	Info	**Version history**	
Eu.SCI-IO.PDI.231	Info	version number: 4.0 (0.A) date: 16.05.2022 author: Jorge Block review: CCB changes: EUIO-368, EUIO-372	
Eu.SCI-IO.PDI.232	Info	version number: 4.0 (1.A) date: 06.04.2023 author: Jorge Block, Philipp Wolber review: changes: EUIO-377, EUIO-379	
Eu.SCI-IO.PDI.233	Info	version number: 4.0 (2.A) date: 27.06.2023 author: Jorge Block review: TACS Mirror Group changes: EUIO-387, EUIO-389, EUIO-392, EUIO-395	
Eu.SCI-IO.PDI.7	Head	**1.2 Impressum**	
Eu.SCI-IO.PDI.8	Info	Publisher: **Europe's Rail Joint Undertaking** https://rail-research.europa.eu/ **EULYNX Initiative** A full list of the EULYNX Partners can be found on www.eulynx.eu/index.php/members	

ID	Type	Requirement	Func. Pkg.
Eu.SCI-IO.PDI.9	Info	Responsible for this document: EU-Rail System Pillar Trackside Assets Control and Supervision domain	
Eu.SCI-IO.PDI.201	Info	Copyright EULYNX Partners All information included or disclosed in this document is licensed under the European Union Public License EUPL, Version 1.2 or later.	
Eu.SCI-IO.PDI.10	Head	**1.3 Purpose**	
Eu.SCI-IO.PDI.11	Info	This document specifies the application layer of the standardised interface for safe communication between the Subsystem - Electronic Interlocking and Subsystem - Generic IO (SCI-IO).	
Eu.SCI-IO.PDI.12	Info	This application layer is designated as SCI-IO.PDI.	
Eu.SCI-IO.PDI.13	Info	This document contains the general requirements for communication and the technical specification (e.g. telegrams) of the SCI-IO.PDI.	
Eu.SCI-IO.PDI.14	Info	This specification does not define the detailed behaviour of the interfacing partners (Subsystem - Electronic Interlocking and Subsystem - Generic IO), nor the situations in which the defined telegrams are sent. This behaviour is the subject of the individual system specifications.	
Eu.SCI-IO.PDI.15	Info	Some items, referring to "interface-related" functionality of the communication partners, have been added to this specification as information, providing an overview only. In any case these are subject to appropriate systems (national) specification.	
Eu.SCI-IO.PDI.16	Info	This document is intended for the following users: • safety authorities • infrastructure managers • safety assessors • signalling system suppliers • validators	
Eu.SCI-IO.PDI.234	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.SCI-IO.PDI.18	Head	**1.4 Applicable standards and regulations**	

ID	Type	Requirement	Func. Pkg.
Eu.SCI-IO.PDI.19	Info	The applicable standards and regulations used in EULYNX are listed in the EULYNX Reference Document List [Eu.Doc.12].	
Eu.SCI-IO.PDI.198	Info	The applicability of each reference of this specification is provided by the column “applicability” in the EULYNX Reference Document [Eu.Doc.12], when the value “SCI-IO” is stated.	
Eu.SCI-IO.PDI.20	Head	**1.5 Applicable documents**	
Eu.SCI-IO.PDI.21	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.SCI-IO.PDI.24	Head	**1.6 Appendices**	
Eu.SCI-IO.PDI.25	Info	*- intentionally left blank -*	
Eu.SCI-IO.PDI.150	Head	**1.7 Terms and abbreviations**	
Eu.SCI-IO.PDI.151	Info	The terms and abbreviations are listed in the EULYNX Glossary [Eu.Doc.9].	
Eu.SCI-IO.PDI.152	Head	**1.8 Variability management**	
Eu.SCI-IO.PDI.153	Info	This document describes harmonised requirements. Variability management is not applicable.	
Eu.SCI-IO.PDI.26	Head	**1.9 Definition of object types**	
Eu.SCI-IO.PDI.27	Info	The following definition for object types is applied in this document:	
Eu.SCI-IO.PDI.28	Info	• "Req" - This denotes a mandatory requirement.	
Eu.SCI-IO.PDI.31	Info	• "Info" - This denotes additional information to help understand the specification. These objects do not specify any additional requirements.	
Eu.SCI-IO.PDI.32	Info	• "Head" - This denotes chapter headings.	
Eu.SCI-IO.PDI.33	Head	**2 General requirements**	
Eu.SCI-IO.PDI.228	Req	All references to Eu.Doc.45 refer to Requirements specification for subsystem Generic IO 4.2 (0.A).	
Eu.SCI-IO.PDI.221	Req	All references to Eu.Doc.93 refer to Interface specification SCI Generic version 3.2 (0.A).	

ID	Type	Requirement	Func. Pkg.
Eu.SCI-IO.PDI.42	Head	**2.1 Version handling**	
Eu.SCI-IO.PDI.212	Info	The Version handling is described in Eu.Doc.93.	
Eu.SCI-IO.PDI.222	Req	The PDI-version of the SCI-IO as described in this document is 0x03.	
Eu.SCI-IO.PDI.49	Head	**2.2 Communication requirements**	
Eu.SCI-IO.PDI.50	Info	The Communication requirements are described in Eu.Doc.93.	
Eu.SCI-IO.PDI.229	Head	**2.3 Functional requirements**	
Eu.SCI-IO.PDI.230	Info	The functional requirements for SCI-IO are described in Eu.Doc.45.	
Eu.SCI-IO.PDI.54	Head	**3 Telegrams SCI-IO.PDI**	
Eu.SCI-IO.PDI.55	Info	This chapter defines the SCI-IO.PDI telegrams.	Basic IO
Eu.SCI-IO.PDI.56	Head	**3.1 Telegram structure**	
Eu.SCI-IO.PDI.213	Info	The telegram structure is specified in Eu.Doc.93.	Basic IO
Eu.SCI-IO.PDI.64	Head	**3.2 Sender and Receiver Identifier**	
Eu.SCI-IO.PDI.214	Info	The identification of communications partners is specified in Eu.Doc.93.	Basic IO
Eu.SCI-IO.PDI.70	Head	**3.3 Message and command type overview**	
Eu.SCI-IO.PDI.71	Info	The following table shows permitted subsystem specific message types for the SCI-IO.PDI. The permitted generic message types are specified in Eu.Doc.93.	Basic IO

<table>
<tr><th>ID</th><th>Type</th><th>Requirement</th><th>Func. Pkg.</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Message Type</th><th>Value</th><th>Sender</th><th>Receiver</th><th>Purpose</th></tr>
<tr><td>command
Set Output Channels</td><td>0x0001</td><td>Subsystem – Electronic Interlocking</td><td>Subsystem – Generic IO</td><td>Switching command to set states at the Output Channels</td></tr>
<tr><td>message
State Output Channels</td><td>0x0002</td><td>Subsystem – Generic IO</td><td>Subsystem – Electronic Interlocking</td><td>The current state of disturbance of the Output Channels</td></tr>
<tr><td>message
State Input Channels</td><td>0x0003</td><td>Subsystem – Generic IO</td><td>Subsystem – Electronic Interlocking</td><td>The current state of the Input Channels</td></tr>
</table>
</td><td></td></tr>
<tr><td>Eu.SCI-IO.PDI.72</td><td>Head</td><td><h2>3.4 Telegram definitions</h2></td><td></td></tr>
<tr><td>Eu.SCI-IO.PDI.73</td><td>Info</td><td>In this chapter, specific telegrams for SCI-IO.PDI are defined. The generic telegrams are defined in Eu.Doc.93.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.158</td><td>Head</td><td><h3>3.4.1 Command "Set Output Channels"</h3></td><td></td></tr>
<tr><td>Eu.SCI-IO.PDI.159</td><td>Info</td><td>With this telegram the Subsystem - Electronic Interlocking commands the Subsystem - Generic IO to set a given state at the Output Channels.
This telegram refines the InformationFlow "Cd_Set_Output_Channels" specified in the requirements specification (ID Eu.IO.7962).</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.161</td><td>Info</td><td>Telegram definition for command "Set Output Channels"
<table>
<tr><th>Byte-Nr.</th><th>Content</th></tr>
<tr><td>00</td><td>Protocol Type: 0x90 (1 Byte binary)</td></tr>
<tr><td>01..02</td><td>Message Type: 0x0001 (2 Bytes binary)</td></tr>
<tr><td>03..22</td><td>Sender Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr>
<tr><td>23..42</td><td>Receiver Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr>
<tr><td>43</td><td>Number k of following channels (1 Byte binary)</td></tr>
<tr><td>44.. 44+k-1</td><td>State of channel n (each 1 Byte binary)
(1 <= n <= k)</td></tr>
</table>
</td><td>Basic IO</td></tr>
</table>

ID	Type	Requirement	Func. Pkg.
Eu.SCI-IO.PDI.160	Req	Permitted values for command "Set Output Channels":	Basic IO
Eu.SCI-IO.PDI.162	Req	**Message Type** The message bytes 1 - 2 shall be set to 0x0001.	Basic IO
Eu.SCI-IO.PDI.163	Req	**Sender Identifier** The message bytes 3 - 22 shall contain the technical identifier of the Subsystem - Electronic Interlocking according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.	Basic IO
Eu.SCI-IO.PDI.165	Req	**Receiver Identifier** The message bytes 23 - 42 shall contain the operational identifier of the Adjacent IO System according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.	Basic IO
Eu.SCI-IO.PDI.164	Req	**Number k of following channels** The message byte 43 contains the number k of below-given statuses for Output Channels, transmitted in single bytes. Maximum, 51 Output Channels can be commanded, therefore, the highest permitted value for byte 43 is 0x33.	Basic IO
Eu.SCI-IO.PDI.166	Req	**State of channel n** The message bytes 44..44+k-1 (1 <= n <= k) contain the target states of the particular Output Channel n. Permitted values: Value --- meaning --- ---	Basic IO
Eu.SCI-IO.PDI.168	Req	0x01 Channel Switched Off	Basic IO
Eu.SCI-IO.PDI.169	Req	0x02 Channel Switched On	Basic IO
Eu.SCI-IO.PDI.227	Req	0x03 Channel Flashing	Option flashing
Eu.SCI-IO.PDI.170	Head	**3.4.2 Message "State Of Output Channels"**	
Eu.SCI-IO.PDI.172	Info	With this telegram the Subsystem - Generic IO reports the status related to disturbance of the Output Channels to the Subsystem - Electronic Interlocking. This telegram refines the InformationFlow "Msg_State_Of_Output_Channels" specified in the requirements specification (ID Eu.IO.7964).	Basic IO

<table>
<tr><th>ID</th><th>Type</th><th>Requirement</th><th>Func. Pkg.</th></tr>
<tr><td>Eu.SCI-IO.PDI.173</td><td>Info</td><td>Telegram definition for message "State Of Output Channels"

<table><tr><th>Byte-Nr.</th><th>Content</th></tr><tr><td>00</td><td>Protocol Type: 0x90 (1 Byte binary)</td></tr><tr><td>01..02</td><td>Message Type: 0x0002 (2 Bytes binary)</td></tr><tr><td>03..22</td><td>Sender Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr><tr><td>23..42</td><td>Receiver Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr><tr><td>43</td><td>Number k of following channels (1 Byte binary)</td></tr><tr><td>44.. 44+k-1</td><td>Disturbance of channel n (each 1 Byte binary)
(1 <= n <= k)</td></tr></table></td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.171</td><td>Req</td><td>Permitted values for message "State Of Output Channels":</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.175</td><td>Req</td><td>Message Type
The message bytes 1 - 2 shall be set to 0x0002.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.176</td><td>Req</td><td>Sender Identifier
The message bytes 3 - 22 shall contain the operational identifier of the Adjacent IO System according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.177</td><td>Req</td><td>Receiver Identifier
The message bytes 23 - 42 shall contain the technical identifier of the Subsystem - Electronic Interlocking according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.178</td><td>Req</td><td>Number k of following channels
The message byte 43 contains the number k of below-given statuses for Output Channels, transmitted in single bytes. Maximum, 51 Output Channels can be commanded, therefore, the highest permitted value for byte 43 is 0x33.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.179</td><td>Req</td><td>Disturbance of channel n
The message bytes 44..44+k-1 (1 <= n <= k) contain the current states of disturbance of the particular Output Channel n.
Permitted values:

Value meaning
--------- -----------</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.180</td><td>Req</td><td>0x01 Channel Not Physically Disturbed</td><td>Basic IO</td></tr>
</table>

<table>
<tr><th>ID</th><th>Type</th><th>Requirement</th><th>Func. Pkg.</th></tr>
<tr><td>Eu.SCI-IO.PDI.181</td><td>Req</td><td>0x02 Channel Physically Disturbed</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.184</td><td>Head</td><td>3.4.3 Message "State Of Input Channels"</td><td></td></tr>
<tr><td>Eu.SCI-IO.PDI.186</td><td>Info</td><td>With this telegram the Subsystem - Generic IO reports the current state of the Input Channels to the Subsystem - Electronic Interlocking.
This telegram refines the InformationFlow "Msg_State_Of_Input_Channels" specified in the requirements specification (ID Eu.IO.7963).</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.187</td><td>Info</td><td>Telegram definition for message "State Of Input Channels"
<table><tr><th>Byte-Nr.</th><th>Content</th></tr><tr><td>00</td><td>Protocol Type: 0x90 (1 Byte binary)</td></tr><tr><td>01..02</td><td>Message Type: 0x0003 (2 Bytes binary)</td></tr><tr><td>03..22</td><td>Sender Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr><tr><td>23..42</td><td>Receiver Identifier (20 Bytes ISO IEC 8859-1:1998)</td></tr><tr><td>43</td><td>Number k of following channels (1 Byte binary)</td></tr><tr><td>44.. 44+k-1</td><td>State of channel n (each 1 Byte binary)
(1 <= n <= k)</td></tr></table></td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.188</td><td>Req</td><td>Permitted values for message "State Of Input Channels":</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.189</td><td>Req</td><td>Message Type
The message bytes 1 - 2 shall be set to 0x0003.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.190</td><td>Req</td><td>Sender Identifier
The message bytes 3 - 22 have to contain the operational identifier of the Adjacent IO System according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.191</td><td>Req</td><td>Receiver Identifier
The message bytes 23 - 42 shall contain the technical identifier of the Subsystem - Electronic Interlocking according to ID Eu.SCI-XX.PDI.59 in ISO IEC 8859-1:1998 format.</td><td>Basic IO</td></tr>
<tr><td>Eu.SCI-IO.PDI.192</td><td>Req</td><td>Number k of following channels
The message byte 43 contains the number k of below-given statuses for Input Channels, transmitted in single bytes.
Maximum, 51 Input Channels can be supervised, therefore, the highest permitted value for byte 43 is 0x33.</td><td>Basic IO</td></tr>
</table>

ID	Type	Requirement		Func. Pkg.
Eu.SCI-IO.PDI.193	Req	**State of channel n** The message bytes 44..44+k-1 (1 <= n <= k) contain the current states of the particular Input Channel n. Permitted values: Value ---------	meaning ----------	Basic IO
Eu.SCI-IO.PDI.195	Req	0x01	Channel Switched Off	Basic IO
Eu.SCI-IO.PDI.196	Req	0x02	Channel Switched On	Basic IO
Eu.SCI-IO.PDI.197	Req	0x03	Channel Disturbed	Basic IO