



EULYNX

EULYNX Initiative



Europe's Rail Joint Undertaking

Maintenance and data management specification

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| ID | Type | Requirement |
|------------|------|---|
| Eu.MDM.8 | Head | 1 Introduction |
| Eu.MDM.9 | Head | 1.1 Release information |
| Eu.MDM.10 | Info | [Eu.Doc.18] Maintenance and data management specification CENELEC Phase: 4 Version: 4.0 (2.A) Approval date: 15.06.2023 |
| Eu.MDM.542 | Info | Version history |
| Eu.MDM.612 | Info | version number: 4.0 (0.A) date: 17.05.2022 author: Nico Huurman review: CCB changes: - |
| Eu.MDM.613 | Info | version number: 4.0 (1.A) date: 02.03.2023 author: Nico Huurman review: changes: EUAR-547, EUAR-564 |
| Eu.MDM.614 | Info | version number: 4.0 (2.A) date: 27.06.2023 author: Nico Huurman review: TCCS+TACS Mirror Group changes: EUAR-579, EUAR-584, EUAR-589, EUAR-594, EUAR-595, EUAR-598, EUAR-610, EUAR-612, EUAR-613 |
| Eu.MDM.11 | Head | 1.2 Impressum |
| Eu.MDM.12 | Info | Publishers: 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 |
|------------|------|--|
| Eu.MDM.13 | Info | Responsible for this document: EU-Rail System Pillar Transversal CCS Components domain |
| Eu.MDM.541 | Info | Copyright EULYNX Partners All information included or disclosed in this document is licensed under the European Union Public Licence EUPL, Version 1.2 or later. |
| Eu.MDM.14 | Head | 1.3 Purpose |
| Eu.MDM.16 | Info | This document describes the service functions related to maintenance and data management. It also describes the requirements for the Subsystem - Maintenance and Data Management (MDM). |
| Eu.MDM.15 | Info | This document specifies the Subsystem - MDM as per [EN 50126]. |
| Eu.MDM.18 | Info | This document is intended for the following users: <ul style="list-style-type: none"> • safety authorities • infrastructure managers • safety assessors • signalling system suppliers • validators |
| Eu.MDM.19 | Info | This document is the basis for the implementation by the supplier and for approval by the infrastructure manager. |
| Eu.MDM.615 | 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.MDM.20 | Head | 1.4 Applicable standards and regulations |
| Eu.MDM.21 | Info | A list of applicable standards and regulations used in EULYNX is listed in the EULYNX Reference Document List [Eu.Doc.12]. |
| Eu.MDM.41 | Head | 1.5 Applicable documents |
| Eu.MDM.42 | 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.MDM.69 | Head | 1.6 Terms and abbreviations |
| Eu.MDM.70 | Info | The terms and abbreviations are listed in the EULYNX Glossary [Eu.Doc.9]. |
| Eu.MDM.539 | Head | 1.7 Variability management |

| ID | Type | Requirement |
|------------|------|---|
| Eu.MDM.540 | Info | This document describes harmonised requirements. Variability management is not applicable. The specific applicability of requirements is captured in individual requirements specifications. |
| Eu.MDM.71 | Head | 1.8 Definition of object types |
| Eu.MDM.72 | Info | The following definition for object types is applied in this document: |
| Eu.MDM.73 | Info | <ul style="list-style-type: none"> • "Req" - This denotes a mandatory requirement. |
| Eu.MDM.76 | 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.MDM.77 | Info | <ul style="list-style-type: none"> • "Head" - This denotes chapter headings. |
| Eu.MDM.555 | Head | 2 Service functions |
| Eu.MDM.556 | Info | <p>Service functions are supportive functions of the EULYNX System related to maintenance and data management. Service functions may be realised in the Subsystem – Maintenance and Data Management or in a system defined by national requirements.</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.557 | Head | 2.1 Service function Loading procedure |
| Eu.MDM.117 | Req | The service function Loading procedure shall support the provision of engineering and configuration data for the following connected systems via the SMI-XX interface: |
| Eu.MDM.118 | Req | <ul style="list-style-type: none"> • EULYNX field element subsystems |
| Eu.MDM.120 | Info | <ul style="list-style-type: none"> • Electronic Interlocking (part of future development) |
| Eu.MDM.121 | Req | The service function Loading procedure shall support the provision of a software upgrade for the following connected systems via the SMI-XX interface: |
| Eu.MDM.122 | Req | <ul style="list-style-type: none"> • EULYNX field element subsystems |
| Eu.MDM.124 | Info | <ul style="list-style-type: none"> • Electronic Interlocking (part of future development) |
| Eu.MDM.559 | Req | The service function Loading procedure shall be realised in the Subsystem – Maintenance and Data Management. |

| ID | Type | Requirement |
|------------|------|--|
| Eu.MDM.560 | Info | <p>If the MDM is not implemented as part of a EULYNX System, the procedure to provide configuration and engineering data to the EULYNX field element subsystems shall be defined by national specifications.</p> <p>Note 1: These national procedures are not to be understood as being the service function Loading procedure.</p> <p>Note 2: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.597 | Req | The data of the SMI-XX interface shall be exchanged as specified in the Interface definition and specification SMI [Eu.Doc.76]. |
| Eu.MDM.558 | Head | 2.2 Service function Diagnostics collector |
| Eu.MDM.136 | Req | The service function Diagnostics collector shall be capable of collecting and processing event-based and preventive diagnostic data of the following connected systems via the SDI-XX interface: |
| Eu.MDM.137 | Req | <ul style="list-style-type: none"> • EULYNX field element subsystems |
| Eu.MDM.139 | Info | <ul style="list-style-type: none"> • Electronic Interlocking (part of future development) |
| Eu.MDM.142 | Info | The protocols that are permitted in the service function Diagnostics collector for the transfer of diagnostic messages from the connected systems are defined in the SDI-XX interface specifications. At present, the following protocol is supported: |
| Eu.MDM.144 | Info | <ul style="list-style-type: none"> • OPC UA |
| Eu.MDM.561 | Info | <p>The service function Diagnostics collector may be realised in the Subsystem – Maintenance and Data Management or in a system defined by national specifications.</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.598 | Req | The data of the SDI-XX interface shall be exchanged as specified in the Interface definition SDI [Eu.Doc.77]. |
| Eu.MDM.562 | Head | 2.3 Service function Time synchronisation |
| Eu.MDM.164 | Req | If configured as using the diagnostics interface, the service function Time synchronisation shall provide a uniform time base for all EULYNX System subsystems and adjacent systems via the SDI-XX interface. |
| Eu.MDM.563 | Info | <p>If configured as using the diagnostics interface, the service function Time synchronisation may be realised in the Subsystem – Maintenance and Data Management or in a system defined by national specifications.</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.600 | Req | The data of the SDI-XX interface shall be exchanged as specified in the Interface definition SDI [Eu.Doc.77]. |
| Eu.MDM.565 | Head | 2.4 Service function Logging |

| ID | Type | Requirement |
|------------|------|---|
| Eu.MDM.566 | Req | The service function Logging shall log the data traffic on SCI-XX. |
| Eu.MDM.567 | Req | The service function Logging shall be realised in the Subsystem – Maintenance and Data Management. |
| Eu.MDM.568 | Info | <p>If the MDM is not implemented as part of a EULYNX system, the procedure to log traffic on the Process data interface shall be defined by national specifications.</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.86 | Head | 3 Basic principles of the Subsystem - Maintenance and Data Management |
| Eu.MDM.87 | Head | 3.1 Overview |
| Eu.MDM.88 | Info | The Subsystem - Maintenance and Data Management is a system that provides service functions for other subsystems of the EULYNX System environment. Service functions can also be provided for particular adjacent systems associated with the EULYNX System. |
| Eu.MDM.89 | Info | The subsystem MDM contains an MDM Core function and provides the following service functions: |
| Eu.MDM.90 | Info | <ul style="list-style-type: none"> • Loading procedure |
| Eu.MDM.91 | Info | <ul style="list-style-type: none"> • Time synchronisation |
| Eu.MDM.92 | Info | <ul style="list-style-type: none"> • Diagnostics collector |
| Eu.MDM.93 | Info | <ul style="list-style-type: none"> • Logging |
| Eu.MDM.94 | Info | The functions of the MDM Core and the interaction with the service functions are described in this requirements specification. |
| Eu.MDM.97 | Req | The service functions that are provided by the subsystem MDM shall be launched by the MDM Core. |
| Eu.MDM.98 | Req | A user interface of the MDM Core shall allow to control and, in particular, to configure, terminate and restart the service functions provided by the subsystem MDM. |
| Eu.MDM.552 | Info | The maintainer responsible for the administration of the subsystem MDM performs the role of an MDM administrator. |
| Eu.MDM.99 | Head | 3.2 User functions |
| Eu.MDM.100 | Req | The following functions shall be provided to the MDM user via the local user interface: |
| Eu.MDM.101 | Req | <ul style="list-style-type: none"> • Local log-in and authentication of users, also via an external directory service where appropriate |

| ID | Type | Requirement |
|------------|------|--|
| Eu.MDM.102 | Req | <ul style="list-style-type: none"> Administration of users, such as creation and deletion of users, maintenance of user data, allocation of roles, if no external directory service is available |
| Eu.MDM.103 | Req | <ul style="list-style-type: none"> Two kinds of users are envisaged for the MDM: <ul style="list-style-type: none"> Maintainer (includes the acceptance tester role) MDM administrator |
| Eu.MDM.104 | Req | <ul style="list-style-type: none"> Only the MDM administrator is authorized to create or delete users or to change a user's role. If necessary, the role of the MDM administrator may be further broken down. |
| Eu.MDM.105 | Req | <ul style="list-style-type: none"> Loading of engineering data from a data carrier into the subsystem MDM <p><i>Note: Adopting engineering data requires a check for formal accuracy and completeness in a separate storage area (e.g. sandbox), and the adopted data must be released for use by a user action</i></p> |
| Eu.MDM.106 | Req | <ul style="list-style-type: none"> Configuration and activation of the engineering and configuration data and device software version to be applied in the loading procedure by the maintainer, making a choice from the available versions for a connected system |
| Eu.MDM.108 | Req | <ul style="list-style-type: none"> Loading of meta information from a data carrier into the subsystem MDM <p><i>Note: This refers, for example, to information that supports an internal or external assessment of diagnostic data, such as XML models which used to provide an external diagnostic system with a description of the internal structure of the components subjected to diagnostics.</i></p> |
| Eu.MDM.109 | Req | <ul style="list-style-type: none"> Selection and, in particular, filtering of a subset of the <ul style="list-style-type: none"> diagnostic data stored in the subsystem MDM and log data stored in the subsystem MDM, with subsequent on-screen representation and/or export to a data carrier |
| Eu.MDM.110 | Req | <ul style="list-style-type: none"> Configuration of service functions |
| Eu.MDM.111 | Req | <ul style="list-style-type: none"> Time synchronisation <ul style="list-style-type: none"> Definition of the time format and time zone Definition of the time accuracy Definition of the timing source priority |
| Eu.MDM.114 | Head | 3.3 General requirements for service functions |
| Eu.MDM.115 | Info | This section describes the functions that are to be provided in terms of the different service functions on the MDM Core. |
| Eu.MDM.116 | Head | 3.3.1 Service function Loading procedure |
| Eu.MDM.125 | Req | The MDM Core shall provide the following functions for the service function Loading procedure: |

| ID | Type | Requirement |
|------------|------|---|
| Eu.MDM.126 | Req | <ul style="list-style-type: none"> The MDM Core shall support the permanent storage and administration of at least two versions of the engineering data, which are independent of each other and may involve a different number of connected systems |
| Eu.MDM.127 | Req | <ul style="list-style-type: none"> The MDM Core shall support the subsystem functions which are defined in the service function Loading procedure for the matching of the engineering and configuration data between the subsystem MDM and the connected systems |
| Eu.MDM.128 | Req | <ul style="list-style-type: none"> The MDM Core shall support the subsystem functions which are defined in the service function Loading procedure for the upgrade of specific software products between the subsystem MDM and the connected systems |
| Eu.MDM.610 | Req | <p>IT security requirements related to the preparation and deployment of configuration and engineering data shall be defined by national specifications in accordance with the EULYNX Security Concept [Eu.Doc.15] and the EULYNX Security Specifications [Eu.Doc.114].</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.611 | Req | <p>IT security requirements related to the preparation and deployment of device software shall be defined by national specifications in accordance with the EULYNX Security Concept [Eu.Doc.15] and the EULYNX Security Specifications [Eu.Doc.114].</p> <p>Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications.</p> |
| Eu.MDM.135 | Head | <h3>3.3.2 Service function Diagnostics collector</h3> |
| Eu.MDM.146 | Req | <p>If the service function Diagnostics collector is realised in the Subsystem – Maintenance and Data Management, the MDM Core shall provide the following functions for the service function Diagnostics collector:</p> |
| Eu.MDM.147 | Req | <ul style="list-style-type: none"> The MDM Core shall support the subsystem functions which are defined in the service function Diagnostics collector for the handling of diagnostic messages between the subsystem MDM and the connected systems |
| Eu.MDM.156 | Req | <ul style="list-style-type: none"> The MDM Core shall buffer the diagnostic data for a minimum period of 720 hours (30 days). <p><i>Note: Buffering of the diagnostic data is necessary to ensure that in the event of a connection failure of the diagnostic system, the data can be sent at a later date and viewed on the local user interface.</i></p> |
| Eu.MDM.157 | Req | <ul style="list-style-type: none"> The MDM Core shall delete outdated, buffered diagnostic data of the connected systems, which is older than 720 hours and has been transmitted successfully to the diagnostic system. <p><i>Note: The administration of the diagnostic data in terms of its transfer to the diagnostic system and the age of the data should be handled independently of each other. It is assumed that a failure of the connection to the diagnostic system is very short in relation to the diagnostic data buffering period. If, however, the connection to the diagnostic system remains unavailable beyond the permitted buffering period, for example because the system is not yet available again, then the data will have to be buffered beyond the 30-day period. A buffer overflow must be prevented. Manual deletion is not planned.</i></p> |
| Eu.MDM.158 | Req | <ul style="list-style-type: none"> Subsystem MDM internal diagnostic messages shall only be stored locally on the MDM Core and will not be deleted automatically after 720 hours. |

| ID | Type | Requirement |
|------------|------|---|
| Eu.MDM.159 | Req | <ul style="list-style-type: none"> The MDM Core shall display locally stored diagnostic messages on the local user interface of the MDM Core. |
| Eu.MDM.162 | Req | <ul style="list-style-type: none"> The user interface of the MDM Core shall provide selection criteria and filter functions that allow to export locally stored diagnostic data of the connected systems from the MDM Core to a data carrier. |
| Eu.MDM.163 | Head | 3.3.3 Service function Time synchronisation |
| Eu.MDM.175 | Req | If the service function Diagnostics collector is realised in the Subsystem – Maintenance and Data Management, the MDM Core shall provide the following functions for the service function Time synchronisation: |
| Eu.MDM.176 | Req | <ul style="list-style-type: none"> The subsystem MDM shall include an NTP server that can be used as a time server for all EULYNX System subsystems and adjacent systems |
| Eu.MDM.177 | Req | <ul style="list-style-type: none"> The manufacturer of the subsystem MDM shall be allowed to configure the NTP service (for example, by using the ntp.conf configuration file under Linux) |
| Eu.MDM.178 | Req | <ul style="list-style-type: none"> The subsystem MDM shall support the connection of a radio clock as per the DCF-77 standard or a GNSS receiver which may be used as a time source for the NTP service |
| Eu.MDM.181 | Head | 3.3.4 Service function Logging |
| Eu.MDM.554 | Req | <p>For the logging of the data traffic on SCI-XX (the Transport layer, Safety, retransmission and redundancy layer and Application layer as defined in Eu.SAS.736), the MDM shall be connected via a mirror port or Network Terminal Access Point (TAP) at the central connection of the Electronic Interlocking to the PoS-Signalling. When redundant connections are used, each of the redundant connections shall be connected via a mirror port or via a TAP to the MDM.</p> <p>Note: On Category 3 networks [EN 50159], the logging of the data traffic on SCI-XX may require alignment with the security concepts for securing communication that are described in the EULYNX Security concept [Eu.Doc.15], see Eu.Sec.437.</p> |
| Eu.MDM.183 | Req | The MDM Core shall provide the following functions for the service function Logging: |
| Eu.MDM.184 | Req | <ul style="list-style-type: none"> The MDM Core shall be capable of storing the recorded log files for a minimum period of 2160 hours (90 days) |
| Eu.MDM.185 | Req | <ul style="list-style-type: none"> The MDM Core shall automatically delete log files that are older than 2160 hours |
| Eu.MDM.190 | Req | <ul style="list-style-type: none"> The MDM Core shall compress a log file created by the service function Logging one day after the date of creation. <p><i>Note: The service function Logging closes a log file as soon as it reaches the 100MB limit or when the date changes. The MDM Core should compress each of these files automatically.</i></p> |
| Eu.MDM.191 | Req | <ul style="list-style-type: none"> The user interface of the MDM Core shall allow to select locally stored log files covering a configurable period of time and to export such files from the MDM Core to a data carrier |

| ID | Type | Requirement |
|------------|------|--|
| Eu.MDM.192 | Req | <ul style="list-style-type: none">• The user interface of the MDM Core shall allow to select locally stored log files for a specific connected system and to export such files from the MDM Core to a data carrier |
| Eu.MDM.193 | Head | 3.4 Specific requirements for the Subsystem - Maintenance and Data Management |
| Eu.MDM.572 | Info | Further specific requirements shall be defined by national specifications. Note: In future phases of the System Pillar, national specifications will be replaced by harmonised specifications. |