ICS 25.040.40, 35.100.05 SLOVENSKÁ TECHNICKÁ NORMA Máj 2022

STN	**Priemyselné komunikačné siete Siete s vysokou pohotovosťou pre automatizáciu Časť 2: Protokol MRP (Media Redundancy Protocol)**	**STN EN IEC 62439-2** 18 4020

Industrial communication networks - High availability automation networks - Part 2: Media Redundancy Protocol (MRP)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/22

Obsahuje: EN IEC 62439-2:2022, IEC 62439-2:2021

Oznámením tejto normy sa od 19.01.2025 ruší
STN EN 62439-2 (18 4020) z augusta 2018

obsahuje farebné strany

134651

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2022
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62439-2

February 2022

ICS 25.040.40; 35.100.05

Supersedes EN 62439-2:2017 and all of its amendments and corrigenda (if any)

English Version

Industrial communication networks - High availability automation networks - Part 2: Media Redundancy Protocol (MRP) (IEC 62439-2:2021)

Réseaux de communication industriels - Réseaux de haute disponibilité pour l'automatisation - Partie 2: Protocole de redondance du support (MRP)
(IEC 62439-2:2021)

Industrielle Kommunikationsnetze: Hochverfügbare Automatisierungsnetze - Teil 2: Medienredundanz-Protokoll (MRP)
(IEC 62439-2:2021)

This European Standard was approved by CENELEC on 2022-01-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2022 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

European foreword

The text of document 65C/1118/FDIS, future edition 3 of IEC 62439-2, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62439-2:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022-10-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-01-19

This document supersedes EN 62439-2:2017 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62439-2:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61158-1 NOTE Harmonized as EN IEC 61158-1

IEC 61784-1 NOTE Harmonized as EN IEC 61784-1

IEC 61784-2 NOTE Harmonized as EN IEC 61784-2

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60050-192	-	International Electrotechnical Vocabulary (IEV) - Part 192: Dependability	-	-
IEC 61158-6-10	2019	Industrial communication networks - Fieldbus specifications - Part 6-10: Application layer protocol specification - Type 10 elements	EN IEC 61158-6-10	2019
IEC 62439-1	2010	Industrial communication networks - High availability automation networks - Part 1: General concepts and calculation methods	EN 62439-1	2010
AMD1	2012		A1	2012
AMD2	2016		A2	2017
ISO/IEC 10164-1		Information technology - Open Systems Interconnection - Systems Management: Object Management Function	-	-
ISO/IEC/IEEE 8802-3		Telecommunications and exchange between information technology systems - Requirements for local and metropolitan area networks - Part 3: Standard for Ethernet	-	-
IEEE Std 802.1Q	2018	IEEE Standard for Local and Metropolitan Area Network - Bridges and Bridged Networks	-	-
IEEE Std 802.3	2018	IEEE Standard for Ethernet	-	-

IEC 62439-2

Edition 3.0 2021-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Industrial communication networks – High availability automation networks – Part 2: Media Redundancy Protocol (MRP)

Réseaux de communication industriels – Réseaux de haute disponibilité pour l'automatisation – Partie 2: Protocole de redondance du support (MRP)

IEC 62439-2:2021-12(en-fr)

THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC online collection - oc.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 62439-2

Edition 3.0 2021-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Industrial communication networks – High availability automation networks – Part 2: Media Redundancy Protocol (MRP)

Réseaux de communication industriels – Réseaux de haute disponibilité pour l'automatisation – Partie 2: Protocole de redondance du support (MRP)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-1057-3

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

® Registered trademark of the International Electrotechnical Commission
Marque déposée de la Commission Electrotechnique Internationale

CONTENTS

FOREWORD 7
INTRODUCTION 9
1 Scope 10
1.1 General 10
1.2 Code component distribution 10
2 Normative references 11
3 Terms, definitions, abbreviated terms and conventions 11
3.1 Terms and definitions 11
3.2 Abbreviated terms 12
3.3 Conventions 12
4 MRP Overview 12
5 MRP Media redundancy behavior 16
5.1 General 16
5.2 Ring ports 16
5.3 Media Redundancy Manager (MRM) 17
5.4 Media Redundancy Client (MRC) 19
5.5 Redundancy domain 19
5.6 Media Link Check 19
5.7 Application of the Continuity Check protocol 20
5.7.1 General 20
5.7.2 Continuity Check Message Interval 20
5.7.3 Maintenance Domain Level 20
5.7.4 Maintenance Association ID (MAID) 20
5.7.5 Maintenance Association End Point ID (MEPID) 21
5.7.6 Sender ID TLV 21
5.7.7 Port Status TLV 21
5.7.8 Interface Status TLV 21
5.8 Usage with diagnosis and alarms 21
5.9 Ring diagnosis 22
5.10 Multiple MRM in a single ring: Manager voting option 22
5.10.1 General 22
5.10.2 Basic principle of the manager voting process 23
5.10.3 The manager voting process 24
5.11 BLOCKED not supported (Option) 26
5.12 Interconnection port 26
5.13 Media redundancy Interconnection Manager (MIM) 28
5.14 Media redundancy Interconnection Client (MIC) 30
5.15 Interconnection domain 31
5.16 Interconnection diagnosis 31
6 MRP Class specification 31
6.1 General 31
6.2 Template 32
6.2.1 Media redundancy template 32
6.2.2 Media redundancy Interconnection template 33
6.3 Attributes 34
7 MRP Service specification 38

7.1 Start MRM 38
7.2 Stop MRM 39
7.3 State Change 40
7.4 Start MRC 41
7.5 Stop MRC 42
7.6 Read MRM 43
7.7 Read MRC 45
7.8 Start MIM 46
7.9 Stop MIM 48
7.10 Interconnection State Change 49
7.11 Start MIC 49
7.12 Stop MIC 51
7.13 Read MIM 52
7.14 Read MIC 53
8 MRP protocol specification 55
8.1 PDU description 55
8.1.1 Basic data types 55
8.1.2 DLPDU abstract syntax reference 55
8.1.3 Coding of the DLPDU field SourceAddress 56
8.1.4 Coding of the DLPDU field DestinationAddress 56
8.1.5 Coding of the field TagControlInformation 56
8.1.6 Coding of the field LT 57
8.1.7 MRP APDU abstract syntax 57
8.1.8 Coding of the field MRP_TLVHeader 59
8.1.9 Coding of the field MRP_SubTLVHeader 59
8.1.10 Coding of the field MRP_Ed1Type and MRP_Ed1ManufacturerData 60
8.1.11 Coding of the field MRP_Version 60
8.1.12 Coding of the field MRP_SequenceID 60
8.1.13 Coding of the field MRP_SA 60
8.1.14 Coding of the field MRP_OtherMRMSA 61
8.1.15 Coding of the field MRP_Prio 61
8.1.16 Coding of the field MRP_OtherMRMPrio 61
8.1.17 Coding of the field MRP_PortRole 61
8.1.18 Coding of the field MRP_RingState 62
8.1.19 Coding of the field MRP_Interval 62
8.1.20 Coding of the field MRP_Transition 62
8.1.21 Coding of the field MRP_TimeStamp 62
8.1.22 Coding of the field MRP_Blocked 63
8.1.23 Coding of the field MRP_ManufacturerOUI 63
8.1.24 Coding of the field MRP_IECOUI 63
8.1.25 Coding of the field MRP_ManufacturerData 63
8.1.26 Coding of the field MRP_DomainUUID 63
8.1.27 Coding of the field MRP_InState 64
8.1.28 Coding of the field MRP_InID 64
8.1.29 Coding of the field MRP_LinkInfo 64
8.2 Protocol machines 64
8.2.1 MRM protocol machine 64
8.2.2 MRC protocol machine 75
8.2.3 MRA protocol machine 81

8.2.4 MRA, MRM and MRC functions 102
8.2.5 FDB clear timer 106
8.2.6 Topology change timer 106
8.2.7 MIM protocol machine 107
8.2.8 MIC protocol machine 115
8.2.9 MIM and MIC functions 122
8.2.10 Interconnection Topology Change timer 127
8.2.11 Interconnection Link Status Poll timer 127
9 MRP installation, configuration and repair 128
9.1 Ring port and Interconnection port parameters 128
9.2 Ring topology parameters 128
9.3 MRM parameters 129
9.4 MRC parameters and constraints 129
9.5 MRA compatibility to earlier Automanager protocol version 130
9.6 Interconnection topology parameters 130
9.7 MIM parameters 130
9.8 MIC parameters and constraints 131
9.9 Calculation of MRP ring recovery time 132
9.9.1 Overview 132
9.9.2 Deduction of formula 132
9.9.3 Worst-case calculation for recovery time of 10 ms 134
9.9.4 Worst-case calculation for 50 devices 135
9.10 Calculation of MRP Automanager voting time 135
9.11 Calculation of MRP Interconnection recovery time 135
10 MRP Management Information Base (MIB) 137
10.1 General 137
10.2 MRP MIB with a monitoring view 137
10.3 MRP MIB with a management and monitoring view 151
Annex A (normative) Optional earlier version of the Automanager protocol 166
Annex B (informative) Timing considerations for 10 Mbit/s link speed 167
Annex C (informative) Using MRP together with scheduling and shaping mechanisms as defined in IEEE Std 802.1Q and interspersing express traffic as defined in IEEE Std 802.3 169
C.1 General 169
C.2 Avoiding negative impact on the recovery time of an MRP ring 169
C.2.1 General 169
C.2.2 Interspersing express traffic 169
C.2.3 Enhancements for scheduled traffic 170
C.3 Configuration guidelines for increased performance of MRP 170
C.3.1 General 170
C.3.2 Interspersing express traffic 170
C.3.3 Enhancements for scheduled traffic 171
C.4 Calculation of MRP ring recovery time 171
C.4.1 Worst-case calculation for recovery time of 10 ms, using frame preemption 171
C.4.2 Worst-case calculation for 50 devices, using frame preemption 172
Annex D (informative) Advanced MRP and MRP Interconnection topologies 173
D.1 General 173
D.2 MRP Single Switch Multiple Rings (MRP-SSMR) 173

D.3 Multiple MRP Interconnection 173
D.4 MRP Interconnection Dual Switch Multiple Couplings (MRP-I DSMC) 174
Bibliography 175

Figure 1 – Two MRP rings redundantly connected via MRP Interconnection 14
Figure 2 – MRP stack 16
Figure 3 – MRP ring topology with one manager and clients 17
Figure 4 – MRP open ring with MRM 18
Figure 5 – MRP ring with MRA at network startup 23
Figure 6 – MRP ring after the manager voting process 23
Figure 7 – Manager voting process 25
Figure 8 – MRA located outside the MRP ring 26
Figure 9 – MRP Interconnection topology 28
Figure 10 – MRP ring interconnection open 29
Figure 11 – MRP protocol machine for MRM 65
Figure 12 – MRP protocol machine for MRC 76
Figure 13 – MRP protocol machine for MRA 82
Figure 14 – MRP protocol machine for MIM in RC-mode and LC-mode 107
Figure 15 – MRP protocol machine for MIC in RC-mode and LC-mode 115
Figure D.1 – MRP Topologies 173
Figure D.2 – MRP Interconnection Topologies 174
Figure D.3 – MRP Interconnection Dual Switch Multiple Couplings Topology 174

Table 1 – Coding of the Maintenance Association ID (MAID) 21
Table 2 – MRP Start MRM 38
Table 3 – MRP Stop MRM 40
Table 4 – MRP Change State 40
Table 5 – MRP Start MRC 41
Table 6 – MRP Stop MRC 42
Table 7 – MRP Read MRM 43
Table 8 – MRP Read MRC 45
Table 9 – MRP Start MIM 47
Table 10 – MRP Stop MIM 48
Table 11 – MRP Interconnection Change State 49
Table 12 – MRP Start MIC 50
Table 13 – MRP Stop MIC 51
Table 14 – MRP Read MIM 52
Table 15 – MRP Read MIC 54
Table 16 – MRP DLPDU syntax for ISO/IEC/IEEE 8802-3 (IEEE Std 802.3) 55
Table 17 – MRP OUI 56
Table 18 – MRP MulticastMACAddress 56
Table 19 – MRP TagControlInformation.Priority field 57
Table 20 – MRP LT field 57
Table 21 – MRP APDU syntax 57

Table 22 – MRP Substitutions 58
Table 23 – MRP_TLVHeader.Type 59
Table 24 – MRP_SubTLVHeader.Type 59
Table 25 – MRP_Ed1Type and MRP_Ed1ManufacturerData 60
Table 26 – MRP_Ed1Type and MRP_Ed1ManufacturerData 60
Table 27 – MRP_Version 60
Table 28 – Coding of the field MRP_OtherMRMSA 61
Table 29 – MRP_Prio 61
Table 30 – Coding of the field MRP_OtherMRMPrio 61
Table 31 – MRP_PortRole 62
Table 32 – MRP_RingState 62
Table 33 – MRP_Interval 62
Table 34 – MRP_Transition 62
Table 35 – MRP_TimeStamp 63
Table 36 – MRP_Blocked 63
Table 37 – MRP_DomainUUID 63
Table 38 – MRP_InState 64
Table 39 – MRP_LinkInfo 64
Table 40 – MRP Local variables of MRM protocol machine 66
Table 41 – MRM State machine 67
Table 42 – MRP Local variables of MRC protocol machine 77
Table 43 – MRC state machine 77
Table 44 – MRP local variables of MRA protocol machine 83
Table 45 – MRA state machine 84
Table 46 – MRP functions and macros 102
Table 47 – MRP FDB clear timer 106
Table 48 – MRP topology change timer 107
Table 49 – MRP Local variables of MIM protocol machine 108
Table 50 – MIM State machine for LC-mode 109
Table 51 – MIM State machine for RC-mode 111
Table 52 – MRP Local variables of MIC protocol machine 116
Table 53 – MIC State machine for LC-mode 116
Table 54 – MIC State machine for RC-mode 120
Table 55 – MRP Interconnection functions 123
Table 56 – MRP Interconnection topology change timer 127
Table 57 – MRP Interconnection link status poll timer 128
Table 58 – MRP Network/Connection parameters 128
Table 59 – MRP MRM parameters 129
Table 60 – MRP MRC parameters 130
Table 61 – MRP MIM parameters 131
Table 62 – MRP MIC parameters 131
Table A.1 – Compatible mode MRP_Option for MRP_Test Substitutions 166
Table A.2 – Compatible mode MRP_Option frames MRP_TestMgrNAck and MRP_TestPropagate Substitutions 166

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

INDUSTRIAL COMMUNICATION NETWORKS – HIGH AVAILABILITY AUTOMATION NETWORKS –

Part 2: Media Redundancy Protocol (MRP)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62439-2 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2016. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) improvements for the Continuity Check Protocol,
b) introduction of further specifiers for the rings, the interconnection links, and the device roles,
c) extensions and information on the use of baudrates smaller than 100 Mbit/s,
d) information on using MRP together with scheduling and shaping mechanisms,
e) introduction of an MRP Interconnection profile for a 30 ms reconfiguration time.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65C/1118/FDIS	65C/1137/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This International Standard is to be read in conjunction with IEC 62439-1.

A list of all parts of the IEC 62439 series, published under the general title *Industrial communication networks – High availability automation networks*, can be found on the IEC website.

This IEC standard includes Code Components i.e. components that are intended to be directly processed by a computer. Such content is any text found between the markers <CODE BEGINS> and <CODE ENDS>, or otherwise is clearly labeled in this standard as a Code Component.

The purchase of this IEC standard carries a copyright license for the purchaser to sell software containing Code Components from this standard directly to end users and to end users via distributors, subject to IEC software licensing conditions, which can be found at: http://www.iec.ch/CCv1.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The IEC 62439 series specifies relevant principles for high availability networks that meet the requirements for industrial automation networks.

In the fault-free state of the network, the protocols of the IEC 62439 series provide ISO/IEC/IEEE 8802-3 (IEEE Std 802.3™) compatible, reliable data communication, and preserve determinism of real-time data communication. In cases of fault, removal, and insertion of a component, they provide deterministic recovery times.

These protocols retain fully the typical Ethernet communication capabilities as used in the office world, so that the software involved remains applicable.

The market is in need of several network solutions, each with different performance characteristics and functional capabilities, matching diverse application requirements. These solutions support different redundancy topologies and mechanisms which are introduced in IEC 62439-1 and specified in the other Parts of the IEC 62439 series. IEC 62439-1 also distinguishes between the different solutions, giving guidance to the user.

The IEC 62439 series follows the general structure and terms of the IEC 61158 series.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent. IEC takes no position concerning the evidence, validity, and scope of this patent right.

The holder of this patent right has assured IEC that s/he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from the patent database available at http://patents.iec.ch.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. IEC shall not be held responsible for identifying any or all such patent rights.

INDUSTRIAL COMMUNICATION NETWORKS – HIGH AVAILABILITY AUTOMATION NETWORKS –

Part 2: Media Redundancy Protocol (MRP)

1 Scope

1.1 General

The IEC 62439 series is applicable to high-availability automation networks based on the ISO/IEC/IEEE 8802-3 (IEEE Std 802.3) (Ethernet) technology.

This part of the IEC 62439 series specifies a recovery protocol based on a ring topology, designed to react deterministically on a single failure of an inter-switch link or switch in the network, under the control of a dedicated media redundancy manager node.

1.2 Code component distribution

Each Code Component is a ZIP package containing at least the electronic representation of the Code Component itself and a file describing the content of the package (IECManifest.xml).

The IECManifest contains different sections giving information on:

- the copyright notice;
- the identification of the code component;
- the publication related to the code component;
- the list of the electronic files which compose the code component;
- an optional list of history files to track changes during the evolution process of the code component.

The Code Components included in this IEC standard are a set of SNMP MIBs. The Code Component IEC-62439-2-MIB.mib is a file containing the MIB with the management and monitoring view. It will be available in a full version, which contains the MIB defined in this document with the documentation associated and access is restricted to purchaser of this document.

The Code Component (full version) is freely accessible on the IEC website for download at: https://www.iec.ch/sc65c/supportingdocuments/IEC_62439-2.MIB.{VersionStateInfo}.full.zip but the usage remains under the licensing conditions.

The life cycle of a code component is not restricted to the life cycle of the related publication. The publication life cycle goes through two stages, Version (corresponding to an edition) and Revision (corresponding to an amendment). Consequently, new release(s) of the Code Component(s) may be released, which supersede(s) the previous release, and will be distributed through the IEC website at: https://www.iec.ch/sc65c/supportingdocuments.

The latest version/release of the document will be found by selecting the file IEC_62439-2.MIB.{VersionStateInfo}.full.zip for the code component with the highest value for VersionStateInfo.

In case of any differences between the downloadable code and the IEC pdf published content, the downloadable code(s) is(are) the valid one; it may be subject to updates. See history files.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-192, *International Electrotechnical Vocabulary – Part 192: Dependability* (available at www.electropedia.org)

IEC 61158-6-10:2019, *Industrial communication networks – Fieldbus specifications – Part 6-10: Application layer protocol specification – Type 10 elements*

IEC 62439-1:2010, *Industrial communication networks – High availability automation networks – Part 1: General concepts and calculation methods*
IEC 62439-1:2010/AMD1:2012
IEC 62439-1:2010/AMD2:2016[1]

ISO/IEC 10164-1, *Information technology – Open Systems Interconnection – Systems Management: Object Management Function*

ISO/IEC/IEEE 8802-3, *Telecommunications and exchange between information technology systems – Requirements for local and metropolitan area networks – Part 3: Standard for Ethernet*

IEEE Std 802.1Q-2018, *IEEE Standard for Local and Metropolitan Area Networks – Bridges and Bridged Networks*

IEEE Std 802.3-2018, *IEEE Standard for Ethernet*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN