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Standards

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Industrial communication networks - High availability automation networks -- Part 4: Cross-network Redundancy Protocol (CRP) (IEC 62439-4:2010 (EQV))

I.S. EN 62439-4:2010

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EUROPEAN STANDARD

EN 62439-4/A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2012

ICS 25.040; 35.040

English version

**Industrial communication networks -
High availability automation networks -
Part 4: Cross-network Redundancy Protocol (CRP)
(IEC 62439-4:2010/A1:2012)**

Réseaux de communication industrielle -
Réseaux d'automatisme à haute
disponibilité -
Partie 4 : Protocole de redondance
transréseau (CRP)
(CEI 62439-4:2010/A1:2012)

Industrielle Kommunikationsnetze -
Hochverfügbare Automatisierungsnetze -
Teil 4: Redundanz-Protokoll für
vermaschte Netze (CRP)
(IEC 62439-4:2010/A1:2012)

This amendment A1 modifies the European Standard EN 62439-4:2010; it was approved by CENELEC on 2012-03-30. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 65C/672/FDIS, future edition 1 of IEC 62439-4:2010/A1, 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 62439-4:2010/A1:2012.

The following dates are fixed:

- latest date by which the document has (dop) 2012-12-30
to be implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2015-03-30
standards conflicting with the
document have to be withdrawn

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

Endorsement notice

The text of the International Standard IEC 62439-4:2010/A1:2012 was approved by CENELEC as a European Standard without any modification.

EUROPEAN STANDARD

EN 62439-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2010

ICS 25.040; 35.040

Supersedes EN 62439:2008 (partially)

English version

**Industrial communication networks -
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Hochverfügbare Automatisierungsnetze -
Teil 4: Redundanz-Protokoll
für vermaschte Netze (CRP)
(IEC 62439-4:2010)

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CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 65C/583/FDIS, future edition 1 of IEC 62439-4, 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 was approved by CENELEC as EN 62439-4 on 2010-03-01.

This EN 62439-4 together with EN 62439-1, EN 62439-2, EN 62439-3, EN 62439-5 and EN 62439-6 supersedes EN 62439:2008.

EN 62439-4:2010 includes the following significant technical changes with respect to EN 62439:2008:

- adding a calculation method for RSTP (rapid spanning tree protocol, IEEE 802.1Q),
- adding two new redundancy protocols: HSR (High-availability Seamless Redundancy) and DRP (Distributed Redundancy Protocol),
- moving former Clauses 1 to 4 (introduction, definitions, general aspects) and the Annexes (taxonomy, availability calculation) to EN 62439-1, which serves now as a base for the other documents,
- moving Clause 5 (MRP) to EN 62439-2 with minor editorial changes,
- moving Clause 6 (PRP) was to EN 62439-3 with minor editorial changes,
- moving Clause 7 (CRP) was to EN 62439-4 with minor editorial changes, and
- moving Clause 8 (BRP) was to EN 62439-5 with minor editorial changes,
- adding a method to calculate the maximum recovery time of RSTP in a restricted configuration (ring) to EN 62439-1 as Clause 8,
- adding specifications of the HSR (High-availability Seamless Redundancy) protocol, which shares the principles of PRP to EN 62439-3 as Clause 5, and
- introducing the DRP protocol as EN 62439-6.

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

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2010-12-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2013-03-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62439-4:2010 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 series	NOTE	Harmonized in EN 61158 series (not modified).
IEC 62439-2	NOTE	Harmonized as EN 62439-2.
IEC 62439-3	NOTE	Harmonized as EN 62439-3.
IEC 62439-5	NOTE	Harmonized as EN 62439-5.
IEC 62439-6	NOTE	Harmonized as EN 62439-6.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-191	-	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-
IEC 62439-1	2010	Industrial communication networks - High availability automation networks - Part 1: General concepts and calculation methods	EN 62439-1	2010
ISO/IEC 8802-3	2000	Information technology - Telecommunications - and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications		-

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviations, acronyms, and conventions	7
3.1 Terms and definitions	7
3.2 Abbreviations and acronyms.....	7
3.3 Conventions	7
4 CRP overview.....	8
5 CRP nodes	8
6 CRP LAN topology	8
7 CRP key components	10
7.1 CRP general protocol operation.....	10
7.1.1 Doubly-attached nodes (DANCs)	10
7.1.2 Singly attached nodes	11
7.2 CRP statistics.....	11
7.3 CRP Network_Status_Table	12
7.4 CRP recovery time	15
7.4.1 Recovery time calculation.....	15
7.4.2 Maximum repair time	16
7.5 CRP multicast messages.....	16
7.5.1 Sending	16
7.5.2 Receiving	16
7.6 CRP unicast messages	16
7.6.1 Sending a frame	16
7.6.2 Receiving a frame.....	17
7.7 CRP redundancy information.....	17
7.8 CRP redundancy statistics.....	17
8 CRP protocol.....	17
8.1 CRP singly attached node	17
8.2 CRP doubly attached node	17
8.3 CRP Installation, configuration and repair	17
8.4 CRP LRE model attributes.....	18
8.4.1 Attribute specification	18
8.4.2 Impact of LRE configuration attributes	22
8.5 CRP encoding of the DiagnosticFrame	23
8.6 CRP Encoding of the AnnunciationFrame	24
8.7 CRP common protocol.....	26
8.7.1 AnnunciationFrames	26
8.7.2 DiagnosticFrames.....	26
8.7.3 Detection of duplicate Node_Index	27
8.7.4 Detection of duplicate Node_Name.....	27
8.7.5 Failure detection based on arrival of DiagnosticFrames	27
8.7.6 Status array entries	28
8.7.7 Other failure detection	28
8.8 CRP operational messages	28

8.8.1	Load balancing	28
8.8.2	LAN and port maintenance	28
8.8.3	Selecting transmission path	29
8.8.4	Selecting reception adapter	30
8.8.5	Crossed_cable_status	30
8.8.6	Configured parameters	30
8.9	CRP services	31
8.9.1	Configuration options and services	31
8.9.2	LAN redundancy service specification	31
9	CRP Management Information Base (MIB)	38
	Bibliography	41
	Figure 1 – CRP stack architecture	8
	Figure 2 – CRP single LAN topography	9
	Figure 3 – CRP double LAN topology	9
	Figure 4 – CRP DiagnosticFrame pair approach	10
	Figure 5 – CRP example system	11
	Table 1 – CRP example Network_Status_Table for node 3	11
	Table 2 – CRP Network_Status_Table for singly connected nodes	13
	Table 3 – CRP Network_Status_Table for DANC	14
	Table 4 – CRP Path_Status_Sets	21
	Table 5 – CRP example of a Path_Status_Set	21
	Table 6 – CRP configuration attributes impact on LAN operation	22
	Table 7 – CRP DiagnosticFrame format	23
	Table 8 – CRP AnnunciationFrame	24
	Table 9 – CRP unicast destination address handling	29
	Table 10 – CRP configuration parameters	30
	Table 11 – CRP Set_Assignment_Info service parameters	31
	Table 12 – CRP Get_Redundancy_Info service	33
	Table 13 – CRP Set_Redundancy_Info service	35
	Table 14 – CRP Get_Redundancy_Statistics service	37

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – HIGH AVAILABILITY AUTOMATION NETWORKS –

Part 4: Cross-network Redundancy Protocol (CRP)

FOREWORD

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International Standard IEC 62439-4 has been prepared by subcommittee 65C: Industrial Networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This standard cancels and replaces IEC 62439 published in 2008. This first edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 62439 (2008):

- adding a calculation method for RSTP (rapid spanning tree protocol, IEEE 802.1Q),
- adding two new redundancy protocols: HSR (High-availability Seamless Redundancy) and DRP (Distributed Redundancy Protocol),
- moving former Clauses 1 to 4 (introduction, definitions, general aspects) and the Annexes (taxonomy, availability calculation) to IEC 62439-1, which serves now as a base for the other documents,
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– 5 –

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- moving Clause 8 (BRP) was to IEC 62439-5 with minor editorial changes,
- adding a method to calculate the maximum recovery time of RSTP in a restricted configuration (ring) to IEC 62439-1 as Clause 8,
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- introducing the DRP protocol as IEC 62439-6.

The text of this standard is based on the following documents:

FDIS	Report on voting
65C/583/FDIS	65C/589/RVD

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

This International Standard is to be read in conjunction with IEC 62439-1:2010, *Industrial communication networks – High availability automation networks – Part 1: General concepts and calculation methods*.

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

This publication has been drafted in accordance with ISO/IEC Directives, Part 2.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

A bilingual version of this standard may be issued at a later date.

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 8802-3 (IEEE 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 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 concerning a full-duplex Ethernet in which each device periodically transmits a message representing its connectivity to the other devices, allowing them to choose a redundant path in case of failure, given in 7.1 and 7.3.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences either free of charge or 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:

Fieldbus Foundation

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USA

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INDUSTRIAL COMMUNICATION NETWORKS – HIGH AVAILABILITY AUTOMATION NETWORKS –

Part 4: Cross-network Redundancy Protocol (CRP)

1 Scope

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

This part of the IEC 62439 series specifies a redundancy protocol that is based on the duplication of the network, the redundancy protocol being executed within the end nodes, as opposed to a redundancy protocol built in the switches. The switchover decision is taken in each node individually. The cross-network connection capability enables single attached end nodes to be connected on either of the two networks.

2 Normative references

The following referenced documents are indispensable for the application 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 60050-191, *International Electrotechnical Vocabulary – Chapter 191: Dependability and quality of service*

IEC 62439-1:2010, *Industrial communication networks – High availability automation networks – Part 1: General concepts and calculation methods*

ISO/IEC 8802-3:2000, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

3 Terms, definitions, abbreviations, acronyms, and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-191, as well as in IEC 62439-1, apply.

3.2 Abbreviations and acronyms

For the purposes of this document, the abbreviations and acronyms given in IEC 62439-1, apply, in addition to the following:

DANC Doubly attached node implementing CRP

SANC Singly attached node implementing CRP

3.3 Conventions

This document follows the conventions defined in IEC 62439-1.

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