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Industriell processtyrning – Nät med hög driftsäkerhet

High availability automation networks

Som svensk standard gäller europastandarden EN 62439:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62439:2008.

Nationellt förord

Europastandarden EN 62439:2008

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- **IEC 62439, First edition, 2008 - High availability automation networks**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 25.040; 35.040

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English version

High availability automation networks
(IEC 62439:2008)

Réseaux d'automatismes
à haute disponibilité
(CEI 62439:2008)

Hochverfügbare
Automatisierungsnetze
(IEC 62439:2008)

This European Standard was approved by CENELEC on 2008-06-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 65C/495/FDIS, future edition 1 of IEC 62439, 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 on 2008-06-01.

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) 2009-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-06-01

The International Electrotechnical Commission (IEC) and CENELEC draw attention to the fact that it is claimed that compliance with this document may involve the use of the following patents:

- Clause 5 (MRP) may involve Patent WO 99/046908 A1 “Local network, especially Ethernet network, with redundancy properties and redundancy manager”, owned by Siemens AG A&D, Gleiwitzerstr. 555, Nürnberg 90475 Germany and Hirschmann Automation and Control GmbH, Stuttgarter Strasse 45-51, Neckartenzlingen 72654, Germany;
- Clause 6 (PRP) may involve Patent WO06053459 “Reception of redundant and non-redundant frames”, owned by ABB Switzerland Ltd, Corporate Research, Segelhofstr 1K, 5405 Baden, Switzerland;
- Clause 7 (CRP) may involve Patent U.S. 6,826,590 „Block Oriented Control System on High Speed Ethernet“, owned by the Fieldbus Foundation, 9005 Mountain Ridge Drive – Bowie Bldg, Suite190, Austin, TX 78759, USA;
- Clause 8 (BRP) may involve Patent Application Serial No. US 11/520,192, "Multiple fault-tolerant Ethernet redundancy", owned by Rockwell Automation Technologies, Inc., 1 Allen-Bradley Drive, Mayfield Heights, Ohio, USA.

The IEC and CENELEC take 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 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 the IEC.

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

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62439:2008 was approved by CENELEC as a European Standard without any modification.

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	- ¹⁾	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-
IEC 61158	Series	Industrial communication networks - Fieldbus specifications	EN 61158	Series
IEC 61784-1	- ¹⁾	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	2008 ²⁾
IEC 61784-2	- ¹⁾	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3	EN 61784-2	2008 ²⁾
IEC 61918 (mod)	- ¹⁾	Industrial communication networks - Installation of communication networks in industrial premises	EN 61918	2008 ²⁾
IEEE 802	- ¹⁾	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture	-	-
IEEE 802a	- ¹⁾	IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture - Amendment 1: Ethertypes for Prototypes and Vendor-Specific Protocol Development	-	-
IEEE 802.1D	- ¹⁾	IEEE Standard for Local and Metropolitan Area Networks - Media Access Control (MAC) Bridges	-	-
IEEE 802.1Q	- ¹⁾	IEEE Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks	-	-
IEEE 802.3	- ¹⁾	IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications	-	-
IEEE 1588	- ¹⁾	IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems	-	-

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IETF RFC 791	- ¹⁾	Internet Protocol - DARPA Internet Program Protocol Specification	-	-

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INTRODUCTION

This International Standard specifies relevant principles for high availability networks that meet the requirements for industrial automation networks.

In the fault-free state of the network, this International Standard provides ISO/IEC 8802-3 compatible, reliable data communication, and preserves determinism of real-time data communication. In cases of fault, removal, and insertion of a component, it provides deterministic recovery times.

The typical Ethernet communication capabilities as used in the office world are fully retained, 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 Clause 4 and specified in the clauses following it. Clause 4 also distinguishes between the different solutions, giving guidance to the user.

This International Standard follows the general structure and terms of IEC 61158.

HIGH AVAILABILITY AUTOMATION NETWORKS

1 Scope

This International Standard is applicable to high-availability automation networks based on the ISO/IEC 8802-3 (Ethernet) technology.

This International Standard specifies

- a classification scheme for network characteristics (see Annex A);
- a methodology for estimating network availability (see Annex B);
- a set of communication protocols that realize high availability automation networks via the use of redundancy and that can be used in a variety of applications (see Clauses 5, 6, 7, 8).

2 Normative references

The following referenced documents are indispensable for the application of this International Standard. 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 (IEV) – Chapter 191: Dependability and quality of service*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61784-1, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 61784-2, *Industrial communications networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61918, *Industrial communications networks – Installation of communication networks in industrial premises*

IEEE 802, *IEEE standard for local and metropolitan area networks: Overview and Architecture*

IEEE 802a, *IEEE standard for local and metropolitan area networks: Overview and Architecture*

Amendment 1: *Ethertypes for Prototype and Vendor-Specific Protocol Development*

IEEE 802.1D, *IEEE standard for local and metropolitan area networks: Media Access Control (MAC) bridges*

IEEE 802.1Q, *IEEE standards for local and metropolitan area networks: Virtual bridged local area networks*

IEEE 802.3:2005, *Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

IEEE 1588, *IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems*