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CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references.....	11
3 Terms, definitions, abbreviated terms, acronyms, and conventions.....	12
3.1 Terms and definitions.....	12
3.2 Abbreviated terms and acronyms.....	19
3.3 Conventions.....	21
3.3.1 General conventions.....	21
3.3.2 Conventions for state machine definitions.....	21
3.3.3 Conventions for PDU specification.....	21
3.4 Reserved network addresses.....	21
4 Concepts for high availability automation networks.....	22
4.1 Characteristics of application of automation networks.....	22
4.1.1 Resilience in case of failure.....	22
4.1.2 Classes of network redundancy.....	23
4.1.3 Redundancy maintenance.....	23
4.1.4 Comparison and indicators.....	23
4.2 Generic network system.....	25
4.2.1 Network elements.....	25
4.2.2 Topologies.....	26
4.2.3 Redundancy handling.....	32
4.2.4 Network recovery time.....	32
4.2.5 Diagnosis coverage.....	32
4.2.6 Failures.....	32
4.3 Safety.....	34
4.4 Security.....	34
4.5 Conformance.....	34
4.5.1 Conformance to redundancy protocols.....	34
4.5.2 Conformance tests.....	34
5 MRP – Media Redundancy Protocol based on a ring topology.....	37
5.1 MRP Overview.....	37
5.2 MRP Media redundancy behaviour.....	38
5.2.1 Ring ports.....	38
5.2.2 Media Redundancy Manager (MRM).....	39
5.2.3 Media Redundancy Client (MRC).....	40
5.2.4 Redundancy domain.....	40
5.2.5 Usage with diagnosis and alarms.....	40
5.2.6 Ring diagnosis.....	41
5.2.7 Multiple MRM in a single ring.....	41
5.2.8 BLOCKED not supported (option).....	41
5.3 MRP Class specification.....	42
5.3.1 General.....	42
5.3.2 Template.....	42
5.3.3 Attributes.....	42
5.4 MRP Service specification.....	45

5.4.1	Start MRM	45
5.4.2	Stop MRM	46
5.4.3	State Change	47
5.4.4	Start MRC	48
5.4.5	Stop MRC	49
5.4.6	Read MRM	50
5.4.7	Read MRC	52
5.5	MRP Protocol specification	53
5.5.1	PDU description	53
5.5.2	Protocol machines	59
5.6	MRP Installation, configuration and repair	79
5.6.1	Ring port parameters	79
5.6.2	Ring topology parameters	80
5.6.3	MRM and MRC parameters	80
5.6.4	Configuration	81
6	PRP – Parallel Redundancy Protocol	81
6.1	PRP Principle of operation	81
6.1.1	Single points of failure	83
6.1.2	Node structure	83
6.1.3	Compatibility between singly and doubly attached nodes	84
6.1.4	Network management	84
6.1.5	Transition to non-redundant networks	84
6.1.6	Duplicate handling	85
6.1.7	Configuration check	90
6.1.8	Network supervision	90
6.1.9	Redundancy management interface	90
6.2	PRP protocol specifications	91
6.2.1	Installation, configuration and repair guidelines	91
6.2.2	MAC addresses	91
6.2.3	Multicast MAC addresses	91
6.2.4	IP addresses	91
6.2.5	Nodes	92
6.2.6	Duplicate accept mode	92
6.2.7	Duplicate discard mode	92
6.3	PRP service specification	98
6.3.1	Arguments	98
6.3.2	NodesTable	99
6.3.3	PRP Write	100
6.3.4	PRP Read	101
6.4	PRP Management Information Base	102
6.5	PRP Protocol Implementation Conformance Statement (PICS)	103
7	CRP – Cross-network Redundancy Protocol	103
7.1	CRP Overview	103
7.2	CRP Nodes	103
7.3	CRP LAN topology	103
7.4	CRP Key components	105
7.4.1	CRP General protocol operation	105
7.4.2	CRP Statistics	106
7.4.3	CRP Network_Status_Table	107

7.4.4	CRP Recovery time	110
7.4.5	CRP Multicast messages	111
7.4.6	CRP Unicast messages	111
7.4.7	CRP Redundancy information	112
7.4.8	CRP Redundancy statistics	112
7.5	CRP Protocol	112
7.5.1	CRP Singly attached node	112
7.5.2	CRP Doubly attached node	112
7.5.3	CRP Installation, configuration and repair	112
7.5.4	CRP LRE model attributes	112
7.5.5	CRP Encoding of the DiagnosticFrame	118
7.5.6	CRP Encoding of the AnnunciationFrame	119
7.5.7	CRP Common protocol	121
7.5.8	CRP Operational messages	123
7.5.9	CRP services	126
8	BRP – Beacon redundancy protocol	133
8.1	BRP Overview	133
8.2	BRP Principle of operation	133
8.2.1	General	133
8.2.2	Network topology	133
8.2.3	Network components	135
8.2.4	Rapid reconfiguration of network traffic	136
8.3	BRP stack and fault detection features	136
8.4	BRP Protocol specification	138
8.4.1	MAC addresses	138
8.4.2	EtherType	138
8.4.3	Fault detection mechanism	138
8.4.4	End node state diagram	138
8.4.5	Beacon end node state diagram	145
8.5	BRP Message structure	152
8.5.1	General	152
8.5.2	IEEE 802.3 tagged frame header	152
8.5.3	Beacon message	152
8.5.4	Learning_Update message	153
8.5.5	Failure_Notify message	153
8.5.6	Path_Check_Request message	153
8.5.7	Path_Check_Response message	154
8.6	BRP Fault recovery time	154
8.7	BRP Service definition	155
8.7.1	Supported services	155
8.7.2	Common service parameters	155
8.7.3	Set node parameters service	155
8.7.4	Get node parameters service	157
8.7.5	Add node receive parameters service	159
8.7.6	Remove node receive parameters service	160
8.7.7	Get node status service	161
Annex A	(informative) Classification of networks	163
Annex B	(informative) Availability calculations	165
Annex C	(normative) Network management information base	174

Annex D (informative) PRP algorithm as pseudo-code	197
Bibliography.....	200
Figure 1 – General network elements (tree topology)	25
Figure 2 – Example of tree topology.....	27
Figure 3 – Example of linear topology	28
Figure 4 – Example of ring topology.....	28
Figure 5 – Example of a partially meshed topology	29
Figure 6 – Example of fully meshed topology.....	30
Figure 7 – Single LAN structure without redundant leaf links.....	30
Figure 8 – Single LAN structure with redundant leaf links.....	31
Figure 9 – Redundant LAN structure without redundant leaf links	31
Figure 10 – Redundant LAN structure with redundant leaf links	31
Figure 11 – Conformance test overview	35
Figure 12 – MRP Stack	38
Figure 13 – MRP Ring topology with one manager and clients	39
Figure 14 – MRP MRM in an open ring	39
Figure 15 – MRP Ring with more than one MRM.....	41
Figure 16 – MRP Protocol machine for MRM.....	60
Figure 17 – MRP Protocol machine for MRC.....	70
Figure 18 – PRP General redundant network example.....	81
Figure 19 – PRP Redundant network example as two LANs (bus topology).....	82
Figure 20 – PRP Redundant ring example with SANs and DANPs.	82
Figure 21 – PRP Single Ring with DANPs in CRP mode.....	83
Figure 22 – PRP Two DANPs communicating	83
Figure 23 – PRP Redundancy Box, transition from single to double LAN.	85
Figure 24 – PRP Frame extended by an RCT.....	86
Figure 25 – PRP Tagged frame extended by an RCT.....	87
Figure 26 – PRP Constructed, padded frame closed by an RCT.....	87
Figure 27 – PRP Drop window on LAN_A.....	88
Figure 28 – PRP Drop window reduction after a discard.....	89
Figure 29 – PRP frame from LAN_B was not discarded.	89
Figure 30 – PRP Synchronized LANs.....	89
Figure 31 – CRP Stack architecture	103
Figure 32 – CRP Single LAN topography	104
Figure 33 – CRP Double LAN topology	104
Figure 34 – CRP DiagnosticFrame pair approach.....	105
Figure 35 – CRP Example system.....	106
Figure 36 – BRP Star network example.....	133
Figure 37 – BRP Linear network example	134
Figure 38 – BRP Ring network example.....	135
Figure 39 – BRP Stack architecture	136
Figure 40 – BRP State diagram of end node	139

Figure 41 – BRP State diagram for beacon end node.....	146
Figure B.1 – General symmetrical fault model.....	166
Figure B.2 – Simplified fault model	167
Figure B.3 – Asymmetric fault model.....	168
Figure B.4 – Network with no redundancy	169
Figure B.5 – Network with no single point of failure.....	170
Figure B.6 – Network with resiliency to second failure.....	172
Table 1 – Examples of application grace time	22
Table 2 – Examples of redundancy protocols.....	24
Table 3 – MRP Start MRM	45
Table 4 – MRP Stop MRM.....	47
Table 5 – MRP Change State.....	47
Table 6 – MRP Start MRC.....	48
Table 7 – MRP Stop MRC	49
Table 8 – MRP Read MRM	50
Table 9 – MRP Read MRC	52
Table 10 – MRP IEEE 802.3 DLPDU syntax.....	54
Table 11 – MRP OUI.....	54
Table 12 – MRP MulticastMACAddress	55
Table 13 – MRP TagControlInformation.Priority field.....	55
Table 14 – MRP LT field	55
Table 15 – MRP APDU syntax	56
Table 16 – MRP Substitutions.....	56
Table 17 – MRP_TLVHeader.Type.....	56
Table 18 – MRP_Version	57
Table 19 – MRP_Prio.....	57
Table 20 – MRP_PortRole	57
Table 21 – MRP_RingState.....	58
Table 22 – MRP_Interva.....	58
Table 23 – MRP_Transition.....	58
Table 24 – MRP_TimeStamp	58
Table 25 – MRP_Blocked.....	59
Table 26 – MRP_DomainUUID.....	59
Table 27 – MRP Local variables of MRM protocol machine	61
Table 28 – MRM State machine	62
Table 29 – MRP Local variables of MRC protocol machine	71
Table 30 – MRC State machine	71
Table 31 – MRP Functions.....	76
Table 32 – MRP FDB Clear Timer.....	79
Table 33 – MRP Topology Change Timer.....	79
Table 34 – MRP Network/Connection parameters	80
Table 35 – MRP MRM parameters	80

Table 36 – MRP MRC parameters.....	80
Table 37 – PRP_Supervision frame with VLAN tagging.....	96
Table 38 – PRP Constants.....	98
Table 39 – PRP Arguments.....	99
Table 40 – PRP Arguments.....	100
Table 41 – PRP Write	101
Table 42 – PRP Read	102
Table 43 – CRP Example Network_Status_Table for node 3.....	106
Table 44 – CRP Network_Status_Table for singly connected nodes.....	108
Table 45 – CRP Network_Status_Table for DANC	109
Table 46 – CRP Path_Status_Sets	116
Table 47 – CRP Example of a Path_Status_Set.....	116
Table 48 – CRP Configuration attributes impact on LAN operation.....	117
Table 49 – CRP DiagnosticFrame format.....	118
Table 50 – CRP AnnunciationFrame	119
Table 51 – CRP Unicast destination address handling	124
Table 52 – CRP Configuration Parameters.....	125
Table 53 – CRP Set assignment info service parameters	126
Table 54 – CRP Get redundancy info service.....	128
Table 55 – CRP Put redundancy info service	130
Table 56 – CRP Get statistics service	131
Table 57 – BRP End node flags	140
Table 58 – BRP End node state transition table	141
Table 59 – BRP Beacon end node flags	147
Table 60 – BRP Beacon end node state transition table.....	148
Table 61 – BRP Common Header with IEEE 802.3 tagged frame format	152
Table 62 – BRP Beacon message format.....	153
Table 63 – BRP Learning_Update message format.....	153
Table 64 – BRP Failure_Notify message format.....	153
Table 65 – BRP Path_Check_Request message format	153
Table 66 – BRP Path_Check_Response message format	154
Table 67 – BRP Set Node Parameters service parameters.....	156
Table 68 – BRP Get Node Parameters service parameters	157
Table 69 – BRP Add Node Receive Parameters service parameters	159
Table 70 – BRP Remove Node Receive Parameters service parameters.....	160
Table 71 – BRP Get Node Status service parameters	161
Table A.1 – Code assignment for the <TYPE> field.....	163
Table A.2 – Code assignment for the <PLCYleaf> field	163
Table A.3 – Code assignment for the <TPLGY> field	163
Table A.4 – Code assignment for the <ITYPE> field.....	164

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH AVAILABILITY AUTOMATION NETWORKS

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 - a) 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, 72634, Germany
 - b) Clause 6 (PRP) may involve Patent WO06053459 "Reception of redundant and non-redundant frames", owned by Swisscom Switzerland Ltd, Corporate Research, Segelhofstr 1K, 5405 Baden, Switzerland.
 - c) 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
 - d) 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

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IEC 62439 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement and control.

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

FDIS	Report on voting
65C/495/FDIS	65C/498/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 publication has been drafted in accordance with ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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 publication may be issued at a later date.

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: *Etherypes 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*

DARPA Internet Program Protocol Specification, *Internet Protocol, RFC 791*