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Industrial communication networks - Fieldbus specifications - Part 5-3: Application layer service definition - Type 3 elements

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. 01/15

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NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes EN 61158-5-3:2012

English Version

**Industrial communication networks - Fieldbus specifications -  
Part 5-3: Application layer service definition - Type 3 elements  
(IEC 61158-5-3:2014)**

Réseaux de communication industriels - Spécifications des  
bus de terrain - Partie 5-3: Définition des services de la  
couche application - Éléments de type 3  
(CEI 61158-5-3:2014)

Industrielle Kommunikationsnetze - Feldbusse -  
Teil 5-3: Dienstfestlegungen des Application Layer  
(Anwendungsschicht) - Typ 3-Elemente  
(IEC 61158-5-3:2014)

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## Foreword

The text of document 65C/763/FDIS, future edition 3 of IEC 61158-5-3, 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 61158-5-3:2014.

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) 2015-06-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-09-22

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

IEC 61158-6-10:2014	NOTE	Harmonized as EN 61158-6-10 <sup>1)</sup> (not modified).
IEC 61784-1:2014	NOTE	Harmonized as EN 61784-1:2014 (not modified).
IEC 61784-2:2014	NOTE	Harmonized as EN 61784-2 <sup>1)</sup> (not modified).

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<sup>1)</sup> To be published.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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](http://www.cenelec.eu)

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-1	-	Programmable controllers - Part 1: General information	EN 61131-1	-
IEC 61158-1	2014	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158-1	2014
IEC 61158-3-3	2014	Industrial communication networks - Fieldbus specifications - Part 3-3: Data-link layer service definition - Type 3 elements	EN 61158-3-3 <sup>2)</sup>	-
IEC 61158-4-3	2014	Industrial communication networks - Fieldbus specifications - Part 4-3: Data-link layer protocol specification - Type 3 elements	EN 61158-4-3 <sup>2)</sup>	-
IEC 61158-5-10	2014	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10 <sup>2)</sup>	-
IEC 61158-6-3	2014	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3 <sup>2)</sup>	-
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic reference model: The basic model	-	-
ISO/IEC 7498-3	-	Information technology - Open Systems Interconnection - Basic reference model: Naming and addressing	-	-
ISO/IEC 8822	-	Information technology - Open Systems Interconnection - Presentation service definition	-	-

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<sup>2)</sup> To be published.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO/IEC 8824-1	-	Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application layer structure	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI services	-	-



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Industrial communication networks – Fieldbus specifications –  
Part 5-3: Application layer service definition – Type 3 elements**

**Réseaux de communication industriels – Spécifications des bus de terrain –  
Partie 5-3: Définition des services de la couche application – Éléments de type 3**





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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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Part 5-3: Application layer service definition – Type 3 elements**

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Partie 5-3: Définition des services de la couche application – Éléments de type 3**

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## CONTENTS

FOREWORD.....	11
INTRODUCTION.....	13
1 Scope.....	14
1.1 General.....	14
1.2 Specifications.....	15
1.3 Conformance.....	15
2 Normative references.....	15
3 Terms, definitions, abbreviations, symbols and conventions.....	16
3.1 Referenced terms and definitions.....	16
3.2 Fieldbus Application Layer Type 3 – specific terms and definitions.....	18
3.3 Abbreviations and symbols.....	25
3.4 Conventions.....	26
4 Concepts.....	31
5 Data type ASE.....	32
6 Communication model specification.....	32
6.1 DP concepts.....	32
6.2 ASEs.....	51
6.3 Summary of FAL classes.....	430
6.4 Permitted FAL services by AREP role.....	431
6.5 Conformance classes.....	435
6.6 Application characteristics.....	436
Bibliography.....	438
Figure 1 – Example of DP communication with a single controlling device.....	34
Figure 2 – Example of DP communication with several controlling devices.....	34
Figure 3 – Example of DP communication between field devices.....	35
Figure 4 – DP-slave model (modular DP-slave).....	37
Figure 5 – DP-slave model (compact DP-slave).....	38
Figure 6 – Overview of application processes.....	39
Figure 7 – DP-slave model (modular DP-slave).....	40
Figure 8 – Application Service Elements (ASEs).....	42
Figure 9 – Application Process with application Objects (APOs).....	43
Figure 10 – Access to a remote APO.....	44
Figure 11 – Access to a remote APO for publisher/subscriber association.....	45
Figure 12 – Example of one AR with two AREPs.....	46
Figure 13 – Relation of a simple process data object to the real object.....	52
Figure 14 – Relation of a combined process data object to the real objects.....	54
Figure 15 – Sequence of an isochronous DP cycle with one DP-master (class 1).....	85
Figure 16 – Additional time relationships in a DP system operating in isochronous mode.....	86
Figure 17 – DP system with optimized isochronous DP cycle.....	88
Figure 18 – Buffered synchronized isochronous mode at the DP-master (class 1).....	89

Figure 19 – Enhanced synchronized isochronous mode at the DP-master (class 1) .....	90
Figure 20 – Input, output and PLL state machine interaction .....	91
Figure 21 – PLL state diagram .....	96
Figure 22 – OUTPUT state diagram .....	100
Figure 23 – INPUT state diagram .....	104
Figure 24 – Treatment of an alarm in the DP system .....	137
Figure 25 – Load Region state diagram for erasable memory .....	236
Figure 26 – Load region state diagram for non-erasable memory .....	237
Figure 27 – Function invocation state diagram .....	269
Figure 28 – System architecture .....	283
Figure 29 – Assignment of communication relationship to application relationship .....	290
Figure 30 – MS0 application relationship .....	296
Figure 31 – Output buffer model of a DP-slave without sync functionality .....	297
Figure 32 – Output buffer model of a DP-slave with sync functionality .....	297
Figure 33 – Input buffer model of a DP-slave without freeze functionality .....	298
Figure 34 – Input buffer model of a DP-slave with freeze functionality .....	298
Figure 35 – MS1 application relationship .....	299
Figure 36 – MS2 application relationship .....	299
Figure 37 – Example of inter-network communication .....	300
Figure 38 – Example without inter-network addressing .....	301
Figure 39 – First example with inter-network addressing .....	301
Figure 40 – Second example with inter-network addressing .....	302
Figure 41 – MS3 application relationship .....	304
Figure 42 – MM1 application relationship .....	304
Figure 43 – MM2 application relationship .....	305
Figure 44 – Cycle time of the DP system .....	437
Table 1 – Requirements and features of fieldbus DP .....	33
Table 2 – Status values of the service primitives .....	50
Table 3 – Access Rights MS1 .....	53
Table 4 – Access Rights MS2 .....	53
Table 5 – Access Rights MS1 .....	56
Table 6 – Access Rights MS2 .....	56
Table 7 – SCL matching rules .....	57
Table 8 – Read .....	57
Table 9 – Write .....	59
Table 10 – Data transport .....	60
Table 11 – Format (simple input data description) .....	64
Table 12 – Consistency (simple input data description) .....	64
Table 13 – Format (simple output data) .....	66
Table 14 – Consistency (simple output data) .....	66
Table 15 – Format (extended input data) .....	67
Table 16 – Consistency (extended input data) .....	68

Table 17 – Format (extended output data) .....	69
Table 18 – Consistency (extended output data) .....	70
Table 19 – Set Input .....	71
Table 20 – Read Input .....	71
Table 21 – Get Input .....	73
Table 22 – New Input .....	74
Table 23 – Set Output .....	75
Table 24 – Final .....	76
Table 25 – Read Output .....	76
Table 26 – Get Output .....	77
Table 27 – Clear Flag .....	77
Table 28 – New Flag .....	78
Table 29 – New Output .....	78
Table 30 – Clear Flag .....	78
Table 31 – Global Control .....	79
Table 32 – Clear Command .....	79
Table 33 – Sync Command .....	79
Table 34 – Freeze Command .....	80
Table 35 – New publisher data .....	80
Table 36 – Get publisher data .....	81
Table 37 – New Flag .....	81
Table 38 – SYNCH .....	82
Table 39 – SYNCH Delayed .....	82
Table 40 – DX Finished .....	83
Table 41 – SYNCH Event .....	83
Table 42 – Status .....	83
Table 43 – Primitives issued by the AL to the PLL state machine .....	92
Table 44 – Primitives issued by the user to the PLL state machine .....	92
Table 45 – Allowed values of Status .....	93
Table 46 – Primitives issued by the user to the input state machine .....	93
Table 47 – Primitives issued by the user to the output state machine .....	93
Table 48 – Primitives issued by the PLL to the output state machine .....	93
Table 49 – Primitives issued by the output to the PLL state machine .....	93
Table 50 – Primitives issued by the PLL to the input state machine .....	94
Table 51 – Primitives issued by the output to the input state machine .....	94
Table 52 – Primitives issued by the output state machine to the AL .....	94
Table 53 – Primitives issued by the AL to the output state machine .....	94
Table 54 – Primitives issued by the input state machine to the AL .....	94
Table 55 – Primitives issued by the AL to the input state machine .....	95
Table 56 – PLL state table .....	97
Table 57 – OUTPUT state table .....	101
Table 58 – INPUT state table .....	105
Table 59 – Identifier status .....	107

Table 60 – Channel type .....	108
Table 61 – IO type .....	109
Table 62 – Status type .....	109
Table 63 – Status specifier .....	110
Table 64 – Status specifier .....	111
Table 65 – Module status .....	111
Table 66 – Status specifier .....	112
Table 67 – Link status .....	112
Table 68 – Link error .....	113
Table 69 – Set Slave Diag .....	114
Table 70 – Ext Diag Flag .....	115
Table 71 – Get Slave Diag .....	117
Table 72 – Read Slave Diag .....	126
Table 73 – New Slave Diag .....	136
Table 74 – Alarm type .....	138
Table 75 – Add Ack .....	139
Table 76 – Alarm specifier .....	139
Table 77 – Alarm notification .....	140
Table 78 – Alarm Ack .....	141
Table 79 – Prm data type .....	146
Table 80 – Supported feature .....	156
Table 81 – Supported profile feature .....	156
Table 82 – Role .....	157
Table 83 – Check user Prm .....	159
Table 84 – Prm structure .....	160
Table 85 – MS1 Command .....	162
Table 86 – Check user Prm result .....	164
Table 87 – Status values .....	165
Table 88 – Check Ext user Prm .....	166
Table 89 – Check Ext user Prm result .....	169
Table 90 – Status values .....	170
Table 91 – Check Cfg .....	170
Table 92 – Check Cfg result .....	171
Table 93 – Status values .....	172
Table 94 – Set Cfg .....	172
Table 95 – Get Cfg .....	173
Table 96 – Set Slave Add .....	174
Table 97 – Initiate .....	175
Table 98 – Abort .....	178
Table 99 – Instance .....	178
Table 100 – MS0 init DP-slave .....	179
Table 101 – MS1 init DP-slave .....	179
Table 102 – MS2 init DP-slave .....	180

Table 103 – DP-slave started.....	180
Table 104 – Alarm limit .....	181
Table 105 – DP-slave stopped .....	181
Table 106 – Reset DP-slave .....	182
Table 107 – DP-slave fault.....	182
Table 108 – Application ready DP-slave.....	182
Table 109 – Start subscriber .....	183
Table 110 – Stop subscriber .....	183
Table 111 – Publisher active.....	184
Table 112 – Status.....	185
Table 113 – Init DP-master CI1 .....	185
Table 114 – DP-master CI1 started .....	186
Table 115 – Alarm limit .....	187
Table 116 – DP-master CI1 stopped .....	187
Table 117 – Reset DP-master CI1 .....	187
Table 118 – DP-master CI1 fault.....	188
Table 119 – DP-master CI1 reject .....	188
Table 120 – Set mode DP-master CI1 .....	189
Table 121 – DP-master CI1 mode changed .....	190
Table 122 – Load bus Par DP-master CI1 .....	191
Table 123 – Mark DP-master CI1 .....	192
Table 124 – Abort DP-master CI1 .....	192
Table 125 – Read value DP-master CI1 .....	193
Table 126 – Delete SC DP-master CI1 .....	193
Table 127 – DP-master CI1 event .....	194
Table 128 – Init DP-master CI2 .....	195
Table 129 – Reset DP-master CI2.....	196
Table 130 – DP-master CI2 fault.....	196
Table 131 – DP-master CI2 reject .....	196
Table 132 – DP-master CI2 closed.....	197
Table 133 – DP-master CI2 event .....	197
Table 134 – USIF state .....	198
Table 135 – Data rate .....	202
Table 136 – USIF state .....	203
Table 137 – Isochronous mode .....	203
Table 138 – Slave type .....	206
Table 139 – Alarm mode.....	207
Table 140 – Get Master Diag .....	210
Table 141 – MDiag identifier .....	210
Table 142 – Start Seq.....	211
Table 143 – Area code (start seq).....	212
Table 144 – Download .....	213
Table 145 – Upload.....	214

Table 146 – End Seq .....	215
Table 147 – Act Para Brct.....	216
Table 148 – Area code (Act Para Brct).....	216
Table 149 – Act param.....	217
Table 150 – Area code (Act param) .....	218
Table 151 – Activate .....	218
Table 152 – Access rights MS1.....	220
Table 153 – Access rights MS2.....	221
Table 154 – Load region state .....	221
Table 155 – Initiate load .....	223
Table 156 – Default values for the parameter Intersegment Request Timeout.....	224
Table 157 – Push segment .....	225
Table 158 – Pull segment .....	227
Table 159 – Terminate load .....	229
Table 160 – Primitives issued by the user to the Load Region state machine.....	231
Table 161 – Primitives issued by the Load Region state machine to the user.....	232
Table 162 – Primitives issued by the Function Invocation to the Load Region state machine.....	232
Table 163 – Primitives issued by the Load Region to the Function Invocation state machine.....	233
Table 164 – Load Region state definitions .....	233
Table 165 – Load Region function table.....	234
Table 166 – Load Region state table for erasable memory.....	237
Table 167 – Load Region state table for non-erasable memory.....	249
Table 168 – Access rights MS1.....	254
Table 169 – Access rights MS2.....	254
Table 170 – Function Invocation state.....	255
Table 171 – Load Region object in use .....	255
Table 172 – Access rights MS1.....	256
Table 173 – Access rights MS2.....	257
Table 174 – Load Region object in use .....	257
Table 175 – Start.....	258
Table 176 – Stop .....	259
Table 177 – Resume.....	260
Table 178 – Reset .....	261
Table 179 – Get FI state .....	262
Table 180 – Call .....	263
Table 181 – Primitives issued by the user to the Function Invocation state machine .....	265
Table 182 – Primitives issued by the Function Invocation state machine to the user .....	266
Table 183 – Primitives issued by the Load Region to the Function Invocation state machine.....	266
Table 184 – Primitives issued by the Function Invocation to the Load Region state machine.....	267
Table 185 – Function Invocation state definitions.....	267

Table 186 – Function definitions .....	268
Table 187 – Function Invocation state table .....	269
Table 188 – CS status .....	285
Table 189 – Summertime .....	285
Table 190 – Synchronization active.....	286
Table 191 – Announcement hour .....	286
Table 192 – Summertime .....	287
Table 193 – Accuracy .....	287
Table 194 – Set time.....	288
Table 195 – Sync interval violation .....	289
Table 196 – Parameter of Initiate service without inter-network addressing.....	301
Table 197 – Parameter of Initiate service with inter-network addressing (first example) .....	302
Table 198 – Parameter of Initiate service with inter-network addressing (second example).....	303
Table 199 – AR type .....	309
Table 200 – Sync supported .....	310
Table 201 – Freeze supported .....	311
Table 202 – Group identifier .....	313
Table 203 – DPV1 enabled .....	313
Table 204 – Fail safe .....	314
Table 205 – WD Base .....	314
Table 206 – No Add change.....	316
Table 207 – Alarm mode supported .....	319
Table 208 – Isochronous mode supp.....	323
Table 209 – Isochronous mode .....	323
Table 210 – Alarm mode .....	324
Table 211 – Time device type .....	325
Table 212 – S_SAP_index .....	328
Table 213 – D_addr .....	329
Table 214 – Service_activate .....	330
Table 215 – Role_in_service.....	331
Table 216 – Indication_mode .....	331
Table 217 – Max_DLSDU_length_req_low .....	332
Table 218 – Max_DLSDU_length_req_high.....	333
Table 219 – Max_DLSDU_length_ind_low .....	333
Table 220 – Max_DLSDU_length_ind_high .....	334
Table 221 – S_SAP_index .....	339
Table 222 – D_SAP_index .....	339
Table 223 – D_addr .....	340
Table 224 – Service_activate .....	340
Table 225 – Role_in_service.....	341
Table 226 – Indication_mode .....	341
Table 227 – Max_DLSDU_length_req_low .....	342

Table 228 – Max_DLSDU_length_req_high.....	342
Table 229 – Max_DLSDU_length_ind_low .....	343
Table 230 – Max_DLSDU_length_ind_high .....	343
Table 231 – Sync.....	344
Table 232 – Freeze.....	345
Table 233 – DPV1 enabled .....	346
Table 234 – Fail safe .....	346
Table 235 – Enable publisher.....	347
Table 236 – WD Base .....	347
Table 237 – Alarm mode .....	348
Table 238 – Fail safe .....	358
Table 239 – S_SAP_index .....	365
Table 240 – D_SAP_index .....	366
Table 241 – D_addr .....	366
Table 242 – Service_activate .....	366
Table 243 – Role_in_service.....	367
Table 244 – Max_DLSDU_length_req_low .....	367
Table 245 – Max_DLSDU_length_req_high.....	367
Table 246 – Max_DLSDU_length_ind_low .....	368
Table 247 – Max_DLSDU_length_ind_high .....	368
Table 248 – DLL init DP-slave .....	369
Table 249 – Load ARL DP-slave .....	370
Table 250 – Get ARL DP-slave .....	376
Table 251 – Set ARL isochronous mode .....	382
Table 252 – Load ARL DP-master CI1 .....	383
Table 253 – Get ARL DP-master CI1.....	386
Table 254 – ARL Slave update DP-master CI1.....	388
Table 255 – Load ARL DP-master CI2 .....	390
Table 256 – Get ARL DP-master CI2.....	391
Table 257 – Load CRL DP-slave .....	392
Table 258 – Load CRL DXB link entries .....	394
Table 259 – Get CRL DP-slave .....	395
Table 260 – Load CRL DP-master CI1 .....	397
Table 261 – Get CRL DP-master CI1 .....	410
Table 262 – CRL Slave activate.....	423
Table 263 – CRL Slave new Prm .....	424
Table 264 – CRL Slave new Prm data.....	425
Table 265 – Load CRL DP-master CI2 .....	427
Table 266 – Get CRL DP-master CI2 .....	429
Table 267 – Fieldbus AL class summary .....	430
Table 268 – Assignment of the services to DP-masters and DP-slaves .....	432
Table 269 – Support of AR types in the different DP-device types.....	433
Table 270 – Support of services at the different AREPs respectively CREPs .....	434



Table 271 – Conformance classes DP-master (class 1) .....	436
Table 272 – Conformance classes DP-master (class 2) .....	436

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –  
FIELD BUS SPECIFICATIONS –****Part 5-3: Application layer service definition –  
Type 3 elements**

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NOTE Combinations of protocol Types are specified in IEC 61784-1 and IEC 61784-2.

International Standard IEC 61158-5-3 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

The main change with respect to the previous edition is listed below:

- Correction of spelling and improved formatting for a better reading.

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

FDIS	Report on voting
65C/763/FDIS	65C/773/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.

A list of all parts of the IEC 61158 series, published under the general title *Industrial communication networks – Fieldbus specifications*, can be found on the IEC web site.

The committee has decided that the contents of this 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.

**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

This part of IEC 61158 is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1:2013.

The application service is provided by the application protocol making use of the services available from the data-link or other immediately lower layer. This standard defines the application service characteristics that fieldbus applications and/or system management exploit.

Throughout the set of fieldbus standards, the term “service” refers to the abstract capability provided by one layer of the OSI Basic Reference Model to the layer immediately above. Thus, the application layer service defined in this standard is a conceptual architectural service, independent of administrative and implementation divisions.

## **INDUSTRIAL COMMUNICATION NETWORKS – FIELDBUS SPECIFICATIONS –**

### **Part 5-3: Application layer service definition – Type 3 elements**

## **1 Scope**

### **1.1 General**

This standard is one of a series produced to facilitate the interconnection of automation system components. It is related to other standards in the set as defined by the “three-layer” fieldbus reference model described in IEC 61158-1.

This sub-part contains material specific to Type 3 fieldbus.

The fieldbus Application Layer (FAL) provides user programs with a means to access the fieldbus communication environment. In this respect, the FAL can be viewed as a “window between corresponding application programs.”

This standard provides common elements for basic time-critical and non-time-critical messaging communications between application programs in an automation environment and material specific to Type 3 fieldbus. The term “time-critical” is used to represent the presence of a time-window, within which one or more specified actions are required to be completed with some defined level of certainty. Failure to complete specified actions within the time window risks failure of the applications requesting the actions, with attendant risk to equipment, plant and possibly human life.

This standard defines in an abstract way the externally visible service provided by the different Types of fieldbus Application Layer in terms of

- a) an abstract model for defining application resources (objects) capable of being manipulated by users via the use of the FAL service;
- b) the primitive actions and events of the service;
- c) the parameters associated with each primitive action and event, and the form which they take; and
- d) the interrelationship between these actions and events, and their valid sequences.

The purpose of this standard is to define the services provided to

- a) the FAL user at the boundary between the user and the Application Layer of the Fieldbus Reference Model; and
- b) Systems Management at the boundary between the Application Layer and Systems Management of the Fieldbus Reference Model.

This standard specifies the structure and services of the IEC fieldbus Application Layer, in conformance with the OSI Basic Reference Model (ISO/IEC 7498-1) and the OSI Application Layer Structure (ISO/IEC 9545).

FAL services and protocols are provided by FAL application-entities (AE) contained within the application processes. The FAL AE is composed of a set of object-oriented Application Service Elements (ASEs) and a Layer Management Entity (LME) that manages the AE. The ASEs provide communication services that operate on a set of related application process

object (APO) classes. One of the FAL ASEs is a management ASE that provides a common set of services for the management of the instances of FAL classes.

Although these services specify, from the perspective of applications, how request and responses are issued and delivered, they do not include a specification of what the requesting and responding applications are to do with them. That is, the behavioral aspects of the applications are not specified; only a definition of what requests and responses they can send/receive is specified. This permits greater flexibility to the FAL users in standardizing such object behavior. In addition to these services, some supporting services are also defined in this standard to provide access to the FAL to control certain aspects of its operation.

## 1.2 Specifications

The principal objective of this standard is to specify the characteristics of conceptual application layer services suitable for time-critical communications, and thus supplement the OSI Basic Reference Model in guiding the development of application layer protocols for time-critical communications.

A secondary objective is to provide migration paths from previously-existing industrial communications protocols. It is this latter objective which gives rise to the diversity of services standardized as the various Types of IEC 61158, and the corresponding protocols standardized in subparts of IEC 61158-6.

This specification may be used as the basis for formal Application Programming-Interfaces. Nevertheless, it is not a formal programming interface, and any such interface will need to address implementation issues not covered by this specification, including

- a) the sizes and octet ordering of various multi-octet service parameters, and
- b) the correlation of paired request and confirm, or indication and response, primitives.

## 1.3 Conformance

This standard does not specify individual implementations or products, nor do they constrain the implementations of application layer entities within industrial automation systems.

There is no conformance of equipment to this application layer service definition standard. Instead, conformance is achieved through implementation of conforming application layer protocols that fulfill any given Type of application layer services as defined in this part of IEC 61158.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE All parts of the IEC 61158 series, as well as IEC 61784-1 and IEC 61784-2 are maintained simultaneously. Cross-references to these documents within the text therefore refer to the editions as dated in this list of normative references.

IEC 61131-1, *Programmable controllers – Part 1: General information*

IEC 61158-1:2014, *Industrial communication networks – Fieldbus specifications – Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series*

IEC 61158-3-3:2014, *Industrial communication networks – Fieldbus specifications – Part 3-3: Data-link layer service definition – Type 3 elements*

IEC 61158-4-3:2014, *Industrial communication networks – Fieldbus specifications – Part 4-3: Data-link layer protocol specification – Type 3 elements*

IEC 61158-5-10:2014, *Industrial communication networks – Fieldbus specifications – Part 5-10: Application layer service definition – Type 10 elements*

IEC 61158-6-3:2014, *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

ISO/IEC 7498-1, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 7498-3, *Information technology – Open Systems Interconnection – Basic Reference Model: Naming and addressing*

ISO/IEC 8822, *Information technology – Open Systems Interconnection – Presentation service definition*

ISO/IEC 8824-1, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 9545, *Information technology – Open Systems Interconnection – Application Layer structure*

ISO/IEC 10731, *Information technology – Open Systems Interconnection – Basic Reference Model – Conventions for the definition of OSI services*

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