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**Kommunikationsnetze und -systeme für die Automatisierung der elektrischen Energieversorgung –
Teil 8-1: Spezifische Abbildung von Kommunikationsdiensten (SCSM) –
Abbildungen auf MMS (nach ISO 9506-1 und ISO 9506-2) und
ISO/IEC 8802-3
(IEC 57/1823/CDV:2017);
Englische Fassung EN 61850-8-1:2011/prA1:2017**

Communication networks and systems for power utility automation –
Part 8-1: Specific communication service mapping (SCSM) –
Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3
(IEC 57/1823/CDV:2017);
English version EN 61850-8-1:2011/prA1:2017

Réseaux et systèmes de communication pour l'automatisation des systèmes électriques –
Partie 8-1: Mise en correspondance des services de communication spécifiques (SCSM) –
Mise en correspondance pour MMS (ISO 9506-1 et ISO 9506-2) et pour l'ISO/CEI 8802-3
(IEC 57/1823/CDV:2017);
Version anglaise EN 61850-8-1:2011/prA1:2017

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2017-11-03 wird der Öffentlichkeit zur Prüfung und
Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses
Entwurfs besonders zu vereinbaren.

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Gesamtumfang 122 Seiten

DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE

Nationales Vorwort

Die Englische Fassung des europäischen Dokuments EN 61850-8-1:2011/prA1:2017 „Kommunikationsnetze und -systeme für die Automatisierung der elektrischen Energieversorgung – Teil 8-1: Spezifische Abbildung von Kommunikationsdiensten (SCSM) – Abbildungen auf MMS (nach ISO 9506-1 und ISO 9506-2) und ISO/IEC 8802-3 (IEC 57/1823/CDV:2017)“ (Entwurf in der Umfrage) ist unverändert in diesen Norm-Entwurf übernommen worden.

Die Internationale Elektrotechnische Kommission (IEC) und das Europäische Komitee für Elektrotechnische Normung (CENELEC) haben vereinbart, dass ein auf IEC-Ebene erarbeiteter Entwurf für eine Internationale Norm zeitgleich (parallel) bei IEC und CENELEC zur Umfrage (CDV-Stadium) und Abstimmung als FDIS (en: Final Draft International Standard) bzw. Schluss-Entwurf für eine Europäische Norm gestellt wird, um eine Beschleunigung und Straffung der Normungsarbeit zu erreichen. Dem entsprechend ist das internationale Dokument „Communication networks and systems for power utility automation – Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3 (IEC 57/1823/CDV:2017)“ unverändert in den Entwurf EN 61850-8-1:2011/prA1:2017 übernommen worden.

Das internationale Dokument wurde vom TC 57 „Power systems management and associated information exchange“ der Internationalen Elektrotechnischen Kommission (IEC) erarbeitet.

Bei der Abstimmung zu dem Europäischen Schluss-Entwurf bei CENELEC und dem Internationalen Schluss-Entwurf bei IEC [Final Draft International Standard (FDIS)] sind jeweils nur „JA/NEIN“-Entscheidungen möglich, wobei „NEIN“-Entscheidungen fundiert begründet werden müssen. Dokumente, die bei CENELEC als Europäische Norm angenommen und ratifiziert werden, sind unverändert als Deutsche Normen zu übernehmen.

Für dieses Dokument ist das nationale Arbeitsgremium K 952 „Netzleittechnik“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE (www.dke.de) zuständig.

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Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe des Dokuments.

Der Zusammenhang der zitierten Dokumente mit den entsprechenden Deutschen Dokumenten ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für den vorliegenden Normentwurf erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der EN 61850-8-1:2011/prA1:2017 veröffentlicht. Zu deren Abschnitt 1, der den Anwendungsbereich festlegt, und Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als Nationaler Anhang NA des vorliegenden Normentwurfs hinzugefügt. Für einige der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Dieser Normentwurf steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Es ist vorgesehen, auch bei der entsprechenden zukünftigen Deutschen Norm auf die deutsche Sprachfassung zu verzichten und diese in der englischsprachigen Fassung zu veröffentlichen.

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Nationaler Anhang NA (informativ)

Auszugsweise Übersetzung^{N1)}

1 Anwendungsbereich

Inhalt von Abschnitt 1 Anwendungsbereich wird in neuen Abschnitt 1.1 Allgemeines verschoben

Der folgende Unterabschnitt wird hinzugefügt:

1.2 Name und Version des Namensraums

Dieser neue Abschnitt ist obligatorisch für alle IEC 61850-Namensräume (wie in Teil 7-1 von IEC 61850, Ausgabe 2 festgelegt).

Die folgenden Parameter identifizieren diese neue Version dieses Namensraums:

- Version des Namensraums: 2007
- Überarbeitung des Namensraums: B
- Name des Namensraums: „IEC 61850-8-1:2007B“

3 Begriffe

Der folgenden Abschnitt wird hinzugefügt:

Für die Anwendung dieses Dokuments gelten die Begriffe nach IEC 61850-2 und die folgenden Begriffe.

3.2

Grundlegende ACSI-Konformität

Wie in IEC 61850-7-2 festgelegt.

^{N1)} Nationale Fußnote: Die Nummerierung aus IEC 57/1823e/CDV:2017-03 wurde beibehalten.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

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.
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International Standard IEC 61850-8-1 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This first revision of the second edition cancels and replaces the second edition, published in 2011, and constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- the update of the normative references,
- the corrections due to tissues {1376, 1309}
- the extension of the transport layer with IPv6,
- the extension of the time synchronization A-Profile with 1588 profiled with IEC/IEEE 61850-9-3
- the extension of GOOSE and SMV A and T-Profiles to support the routable GOOSE and SMV introduced by TR IEC 61850-90-5
- the removal of OSI-T profile support for client / server communication
- the update of the reference for PRP / HSR causes reference to PRP1 to be change to PRP

Compared to the second edition, this first revision of the second edition:

provides clarifications and corrections to the second edition of IEC 61850-8-1, based on the tissues = { 753, 770, 784, 817, 821, 827, 834, 851, 854, 935, 942, 951, 1036, 1040, 1041, 1042, 1043, 1047, 1058, 1063, 1064, 1068, 1135, 1155, 1164, 1171, 1174, 1178, 1181, 1192, 1274, 1285, 1287, 1289, 1290, 1299, 1300, 1309, 1324, 1336, 1345, 1361, 1369, 1376, 1422, 1440, 1441, 1442, 1443, 1453, 1454, 1462, 1495, 1499, 1500}

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

FDIS	Report on voting

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 the ISO/IEC Directives, Part 2.

In this document, the following table numbering and table referencing scheme has been used:

- Table numbering with additional characters 'N' (e.g. Table 10N) indicates tables following the Edition 2.1 Table numbering
- Table numbering with no additional characters indicates table following the Edition 2 Table numbering

79 A list of all the parts in the IEC 61850 series, under the general title *Communication networks*
80 *and systems for power utility automation*, can be found on the IEC website.

81 Future standards in this series will carry the new general title as cited above. Titles of existing
82 standards in this series will be updated at the time of the next edition.

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

- 86 • reconfirmed,
- 87 • withdrawn,
- 88 • replaced by a revised edition, or
- 89 • amended.

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

91

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.

92

93

94

INTRODUCTION

95 This document is part of a set of specifications which details layered utility communication
96 architecture.

97 This part of IEC 61850 is intended to provide inter-device operation of a variety of devices to
98 achieve interoperability providing detailed information on how to create and exchange
99 concrete communication messages that implement abstract services and models specified in
100 IEC 61850-7-4, IEC 61850-7-3, and IEC 61850-7-2.

101 The mapping allows for data exchange over ISO/IEC 8802-3 Local Area Networks between all
102 kinds of utility devices. Some of the protocol stacks used within this document are routable.
103 Therefore the actual communications path may not be restricted to the LAN. Data exchange
104 consists of real-time monitoring and control data, including measured values, to name just a
105 few.

106 NOTE This part of IEC 61850 does not provide tutorial material. It is recommended that IEC 61850-5 and
107 IEC 61850-7-1 be read in conjunction with IEC 61850-7-2.

108

109

110

111 New tables have been introduced in the Ed2.1 of this standard. The following cross reference
112 table delivers the correspondancy.
113

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Table 59	Table 69	Mapping of CDC NTS to MMS type definition
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Table 124	Table 150	ReadJournal conformance statement
Table 125	Table 151	JournalEntry conformance statement
	<i>no used in this standard</i>	
Table 126	Table 152	InitializeJournal conformance statement
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COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

Part 8-1: Specific communication service mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3

1 Scope

Move content of clause 1 Scope to new clause 1.1 General

Add the following sub-clause:

1.2 Namespace name and version

This new section is mandatory for any IEC 61850 namespace (as defined by the part 7-1 of IEC 61850 Edition 2).

The parameters which are identifying this new release of this namespace are:

- Namespace Version: 2007
- Namespace Revision: B
- Namespace name: "IEC 61850-8-1:2007B"

2 Normative references

Remove normative references:

IEC 60874-10-1:1997, *Connectors for optical fibres and cables – Part 10-1: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1*

IEC 60874-10-2:1997, *Connectors for optical fibres and cables – Part 10-2: Detail specification for fibre optic connector type BFOC/2,5 terminated to single-mode fibre type B1*

IEC 60874-10-3:1997, *Connectors for optical fibres and cables – Part 10-3: Detail specification for fibre optic connector type BFOC/2,5 for single and multimode fibre*

IEC 61850-9-1:2003, *Communication networks and systems in substations – Part 9-1: Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link*

ISO/IEC 8602:1995, *Information technology – Protocol for providing the OSI connectionless-mode transport service*

ISO/IEC 8877:1992, *Information technology – Telecommunications and information exchange between systems – Interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T*

ISO/IEC ISP 10608-1:1992, *Information technology – International Standardized Profile TAnnnn – Connection-mode Transport Service over Connectionless-mode Network Service – Part 1: General overview and subnetwork-independent requirements*

ISO/IEC ISP 10608-2:1992, *Information technology – International Standardized Profile TAnnnn – Connection-mode Transport Service over Connectionless-mode Network Service – Part 2: TA51 profile including subnetwork-dependent requirements for CSMA/CD Local Area Networks (LANs)*

- 158 RFC 4330, *Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI*, IETF,
159 available at <http://www.ietf.org>
- 160
- 161
- 162 *Replace normative references:*
- 163 IEC 61850-6, *Communication networks and systems for power utility automation – Part 6:*
164 *Configuration description language for communication in electrical substations related to IEDs*
- 165 IEC 61850-7-1, *Communication networks and systems for power utility automation – Part 7-1:*
166 *Basic communication structure – Part 7-1: Principles and models*
- 167 IEC 61850-7-2, *Communication networks and systems for power utility automation – Part 7-2:*
168 *Basic communication structure – Abstract communication service interface (ACSI)*
- 169 IEC 61850-7-3, *Communication networks and systems for power utility automation – Part 7-3:*
170 *Basic communication structure – Common data classes*
- 171 IEC 61850-7-4, *Communication networks and systems for power utility automation – Part 7-4:*
172 *Basic communication structure – Compatible logical node classes and data object classes*
- 173 IEC 62439-3:2016, *Industrial communication networks – High availability automation networks*
174 *– Part 3: Parallel Redundancy Protocol (PRP) and High availability Seamless Redundancy*
175 *(HSR)*
- 176 ISO/IEC 8649:1996 [ITU-T X.217:1996], *Information technology – Open Systems*
177 *Interconnection – Service definition for the Associated Control Service Element*
- 178 ISO/IEC 8650-1:1996 [ITU-T X.227:1996], *Information technology – Open Systems*
179 *Interconnection – Connection-oriented protocol for the Association Control Service Element:*
180 *Protocol specification*
- 181 ISO/IEC/IEEE 8802-3:2014, *Standard for Ethernet*
- 182 RFC 1122, *Requirements for Internet Hosts – Communication Layers*, IETF, available at
183 <http://www.ietf.org>
- 184 RFC 1123, *Requirements for Internet Hosts – Application and Support*, IETF, available at
185 <http://www.ietf.org>
- 186
- 187
- 188
- 189 *Add normative references:*
- 190 IEC/IEEE 61850-9-3, *Communication networks and systems for power utility automation –*
191 *Part 9-3: Precise Time Protocol – Profile for Power Utility Automation*
- 192 IEC TR 61850-90-4, *Communication networks and systems for power utility automation – Part*
193 *90-4: Network engineering guidelines*
- 194 IEC 62351-1, *Power systems management and associated information exchange - Data and*
195 *communications security - Part 1: Communication network and system security - Introduction*
196 *to security issues*
- 197 IEC/TS 62351-8, *Power systems management and associated information exchange - Data*
198 *and communications security - Part 8: Role-based access control*
- 199 IEC 62351-9, *Power systems management and associated information exchange - Part 9:*
200 *Data and Communication Security - Key Management*

- 201 IEC/TR 62357-200:2015-08, *Power system management and associated information*
202 *exchange – Part 200: Guidelines for migration from Internet Protocol version 4 (IPv4) to*
203 *Internet Protocol version 6 (IPv6)*
- 204 ISO 4217:2015, *Code for the representation of currencies*
- 205 RFC 919, *Broadcasting Internet Datagrams*, IETF, available at <http://www.ietf.org>
- 206 RFC 1035, *Domain Names – Implementation and specification*, IETF, available at
207 <http://www.ietf.org>
- 208 RFC 1240, *OSI Connectionless Transport Services on top of UDP Version:1*, IETF, available
209 at <http://www.ietf.org>
- 210 RFC 2460, *Internet Protocol, Version 6 (IPv6) Specification*, IETF, available at
211 <http://www.ietf.org>
- 212 RFC 2474, *Definition of Differentiated Services Field (DS Field) in IPv4 and IPv6 Headers*,
213 available at <http://www.ietf.org>
- 214 RFC 2991, *Multipath Issues in Unicast and Multicast Next-Hop Selection*, available at
215 <http://www.ietf.org>
- 216 RFC 3168, *The Addition of Explicit Congestion Notification (ECN) to IP*, available at
217 <http://www.ietf.org>
- 218 RFC 3246, *An Expedited Forwarding PHB (Per-Hop Behavior)*, available at <http://www.ietf.org>
- 219 RFC 3629, *UTF-8, a transformation format of ISO 1646 – IETF*, available at
220 <http://www.ietf.org>
- 221 RFC 4291, *IP Version 6 Addressing Architecture*, available at <http://www.ietf.org>
- 222 RFC 4604, *Internet Group Management Protocol, Version 3 (IGMPv3)*, available at
223 <http://www.ietf.org>
- 224 RFC 5771, *IANA Guidelines for IPv4 Multicast Address Assignments*, available at
225 <http://www.ietf.org>
- 226 RFC 5905, *Network Time Protocol (NTP) Version 4: Protocol and Algorithms Specification*,
227 IETF, available at <http://www.ietf.org>
- 228 RFC 6864, *Requirements for Internet Hosts – Communication Layers*, IETF, available at
229 <http://www.ietf.org>
- 230 RFC 7766, *Requirements for Internet Hosts – Application and Support*, IETF, available at
231 <http://www.ietf.org>

232 **3 Terms and definitions**

233 *Add the following clause:*

234 For the purposes of this document, the terms and definitions given in IEC 61850-2 as well as
235 the following apply.

236 **3.2**

237 **ACSI basic conformance**

238 As defined in IEC 61850-7-2.

239 **4 Abbreviations**

240 *Add the following abbreviations:*

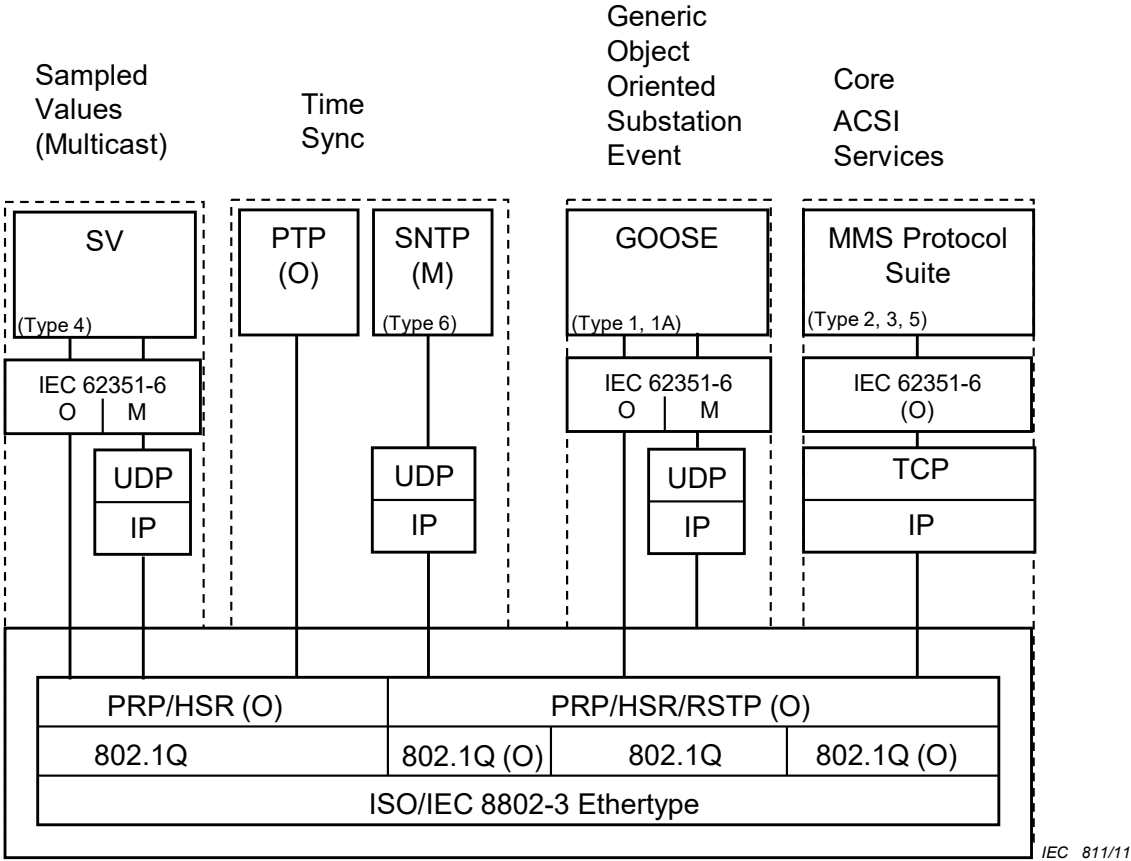
241

GMT	Greenwich Mean Time
HSR	High-availability Seamless Redundancy
NTP	Network Time Protocol
PRP	Parallel Redundancy Protocol
R-GOOSE	Routable GOOSE
R-SV	Routable Sampled Value
Tissue	Technical Issue

5 Overview

5.1 General

Replace Figure 1 with:



(Type x) is the Message type and performance class defined in IEC 61850-5

Figure 1 – Overview of functionality and profiles

6 Communication stack

6.2 Client/server services and communication profiles

Replace clause 6.2.2 with:

6.2.2 A-Profile**6.2.2.1 General**

Services and protocols of the A-Profile client/server shall be as shown in Table 3.

Table 3 – Service and protocols for client/server communication A-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Application	Manufacturing Message Specification	ISO 9506-1:2003	ISO 9506-2:2003	m
	Application level security	Work in progress in IEC 62351-4 ed2.0	IEC 62351-4 ed2.0	c
	Association Control Service Element	ISO/IEC 8649:1996	ISO/IEC 8650-1:1996	m
Presentation	Connection Oriented Presentation	ISO/IEC 8822:1994	ISO/IEC 8823-1:1994	m
	Abstract Syntax	ISO/IEC 8824-1:2008	ISO/IEC 8825-1:2008	m
Session	Connection Oriented Session	ISO/IEC 8326:1996	ISO/IEC 8327-1:1997	m
c Conditional secured profile				

There is 1 T-Profile that may be used by the client/server A-Profile: TCP/IP. The previously defined T-Profile over OSI has been deprecated in this revision of the standard. An implementation that claims conformance to this standard shall implement the TCP/IP profile as a minimum.

6.2.2.2 Implementation agreements

This A-Profile shall conform to the agreements specified in ISO/ISP 14226-1, ISO/ISP 14226-2, ISO/ISP 14226-3, ISO/IEC ISP 11188-1 and ISO/IEC ISP 11188-3.

There are further agreements required for compatibility with existing implementations. These impact parameters used in ACSE and Presentation.

The following information shall be proposed, at a minimum, on a P-Connect.req:

- For ACSE, the Object Identifiers that need to be proposed, as a minimum are:

Abstract Syntax = 2.2.1.0.1 (ACSE)

Transfer Syntax = 2.1.1 (ASN.1 basic encoding)

- For ISO-9506, the Object identifiers that need to be proposed, as a minimum are:

Abstract Syntax = 1.0.9506.2.1 (MMS)

Transfer Syntax = 2.1.1 (ASN.1 basic encoding)

- The proposed ASO Context name shall be:

ASO Context Name = 1.0.9506.2.3 (this is called "Application Context" in ISO 9506-2).

- The MMS version number shall be as specified in Table 123N and Table 124N.

- The max_mms_pdu_size is defined as the maximum number of octets in an MMSpdu encoded using the negotiated transfer syntax. This size shall apply to all MMSpdu's with the exception of the initiate-Request PDU, initiate-Response PDU, and initiate-Error PDU. The max_mms_pdu_size shall be negotiated during connection initiation using the Local Detail Calling and Local Detail Called parameters of the MMS initiate service.

- The local detail called parameter in the initiate response shall specify the negotiated max_mms_pdu_size for the application association.
- If the local detail calling parameter was omitted in the indication primitive, then the local detail called parameter:
 - a) may be omitted from the response, indicating that the calling MMS implementation and the called MMS implementation are prepared to support an unbounded max_mms_pdu_size;
 - b) may be specified in the response, indicating a requirement to support the specified value for max_mms_pdu_size.
- If the local detail calling parameter was included in the request, then this parameter shall be present in the response and its value shall be less than or equal to the value of the local detail calling parameter of the request.
- If present in the response, the local detail called parameter shall not be less than 64; however, it is recommended that at least 8192 octets be supported.
- The negotiated max_mms_pdu_size shall be applied as follows:
 - a) Any received MMSpdu whose length is less than or equal to the negotiated max_mms_pdu_size shall be properly parsed and processed.
 - b) An MMS implementation should not send an MMSpdu whose size exceeds the negotiated max_mms_pdu_size. If an MMS implementation sends an MMSpdu that exceeds the negotiated max_mms_pdu_size, then it shall be prepared to receive a reject pdu. Should an MMS implementation receive an MMSpdu that exceeds the negotiated max_mms_pdu_size, it shall either reject the MMSpdu or accept the MMSpdu as if no size violation had occurred and perform the expected processing.
 - c) If an MMS implementation is unable to send a service response because the response would exceed the max_mms_pdu_size, then it shall return a Service response (-) with an error class of SERVICE and an error code of OTHER.
 - d) When rejecting an MMSpdu because it exceeds the negotiated max_mms_pdu_size, an MMS implementation shall use a Reject PDU Type of PDU-ERROR and a Reject Code of INVALID-PDU in the resulting reject pdu.

Replace clause 6.2.3 with:

6.2.3 TCP/IP T-Profile

6.2.3.2 Service and protocols

Table 4 shows services and protocols of the TCP/IP T-Profile client/server.

329

Table 4 – Service and protocols for client/server TCP/IP T-Profile

OSI Model Layer	Specification			m/o
	Name	Service specification	Protocol specification	
Communication	Requirement for internet host	RFC 6864		m
Transport	ISO Transport on top of TCP	RFC 1006		m
	TLS	IEC 62351-3:2014 and IEC 62351-4:ed2 work in progress		c
	Internet Control Message Protocol (ICMP)	RFC 792		m
	Transmission Control Protocol (TCP)	RFC 793		m
Network	Internet Protocol	RFC 791 – IPv4		m
		RFC 2460 – IPv6		o
	An Ethernet Address Resolution Protocol (ARP)	RFC 826		m
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Redundancy	IEC 62439-3 – PRP or HSR		o
	Rapid Spanning Tree Protocol (RSTP)	IEEE 802.1D		o
DataLink	Standard for the transmission of IP datagrams over Ethernet networks	RFC 894		m
	Standard for Ethernet	ISO/IEC/IEEE 8802-3:2014		m
Physical	Electrical	IEC TR 61850-90-4		AtLeastOne(1)
	Optical	IEC TR 61850-90-4		AtLeastOne(1)
c Conditional secured profile				

330

331 6.2.3.3 Implementation agreements**332 6.2.3.3.1 TCP_KEEPALIVE**

333 The TCP_KEEPALIVE function according to RFC 6864 shall be implemented. The value of the
 334 maximum time before a lost connection is detected shall be documented in seconds in the
 335 PIXIT.

336 NOTE It is recommended that the minimum-maximum value of the allowable range should be no greater than
 337 20 s. The value of the maximum time before a lost of connection is detected is not intended to be changed via SCL
 338 since the impact of the parameter is IED wide.

339 6.2.3.3.2 Transport selector

340 The Transport Selector size shall be limited to a maximum of 4 octets.

341 6.2.3.3.3 TCP Port usage

342 The TCP port used on a TCP-SYN shall be per IANA for iso-tsap (port 102 decimal) or iso-
 343 tp0s (port 3782 decimal). iso-tp0s shall only be used for secure profiles (see IEC 62351-4).

344

345 *Remove Clause 6.2.4.*

6.3 GSE management and GOOSE services communication profiles

Replace clause 6.3.2 with:

6.3.2 A-Profile

6.3.2.1 General

Table 6 shows services and protocols of the A-Profile GSE Management and GOOSE services.

Table 6 – Service and protocols for GSE Management and GOOSE communication A-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Application	GSE/GOOSE protocol	See Annex A		m
	Security	IEC 62351-6:Ed2 work in progress		c2
Presentation	Abstract Syntax	NULL		m
Session	Secure Session	See Annex J		c1
	OSI Connectionless Transport Services on top of UDP	RFC 1240		c1

c1 – shall be 'm' if using UDP/IP in the T-Profile
c2 – shall be 'm' if the implementation declares support for layer 2 GOOSE security

The presentation layer encoding shall be Basic Encoding Rules as defined in ISO/IEC 8824-1 and ISO/IEC 8825-1 to encode the grammar referenced.

6.3.2.2 Implementation agreement

RFC 1240 defines several transport parameters. Table 7N specifies the parameters that shall be supported and lengths for those parameters.

Table 7N – RFC 1240 A-Profile Options

Transport Parameter Description	Parameter Value (decimal)	LI value	Mandatory/Optional/ eXcluded	Comment
Source TSAP	193	1	X	Used to identify the application emitter within a node.
Destination TSAP	194	1	X	
Checksum	195		X	
User Data			M	

The variable parts of RFC 1240 shall not be used within this standard. Therefore, only the LI and UD fields shall be present (e.g. 2 octets).

Replace clause 6.3.3 with:

6.3.3 T-Profile

6.3.3.2 General

The T-Profile for GSE and GOOSE Services shall be as shown in Table 1N.

371

Table 1N – GOOSE/GSE T-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Transport	UDP	RFC 768 – User Datagram Protocol		c
Network	Internetwork Protocol	RFC 791 - IPv4		c
		RFC 2460 – IPv6		o
		RFC 2474 – Differentiateed Service Field RFC 2991 – Next-Hop Selection RFC 3168 – Explicit Congestion Notification RFC 3246 – Per-Hop Behavior RFC 4604 – IGMPv3		c
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Redundancy	IEC 62439-3 – PRP or HSR		o
	Rapid Spanning Tree Protocol (RSTP)	IEEE 802.1D		o
DataLink	Priority Tagging/ VLAN	IEEE 802.1Q		m
	Standard for Ethernet	ISO/IEC/IEEE 8802-3:2014		m
Physical	Electrical	IEC TR 61850-90-4		AtLeastOne(1)
	Optical	IEC TR 61850-90-4		AtLeastOne(1)
c must be implemented at the same time if support of GOOSE over UDP/IP is declared.				

372 **6.3.3.3 Implementation agreements**

373

374 T-DATA service

375 The T-DATA service shall be mapped directly to the M_UNITDATA service of the DataLink or
 376 the sending of a UDP packet.

377 M_UNITDATA maps onto the MAC layer whereas the UDP packet maps onto sending of an IP
 378 packet.

379 For M_UNITDATA:

380

381 Link layer: MAC – sublayer.

382 See Annex C for definitions.

383 The T-DATA destination address for a GOOSE message shall contain a multicast MAC
 384 address. The T-DATA source address for a GOOSE message shall contain a unicast MAC
 385 address.

386 The T-DATA destination address for a GSE management messages shall contain a unicast
 387 MAC address. The T-DATA source address for a GSE Management messages shall contain a
 388 unicast MAC address.

389 Link Layer: Priority tagging/Virtual LAN

390 See Annex C.

391 For UDP:

392 The T-DATA destination address for a GOOSE message shall contain a multicast IP address,
 393 DSCP QOS specification as specified in J.5.4, and optional IEEE 802.1Q information as
 394 specified in J.5.2.7.6. The T-DATA source address for a GOOSE message shall contain a
 395 unicast IP address.

396 The T-DATA destination address for a GSE management messages shall contain a unicast IP
 397 address. The T-DATA source address for a GSE Management messages shall contain a
 398 unicast MAC address.

399 The destination UDP Port shall be port 102 decimal. The source port shall be locally assigned
 400 and the specification of it is out-of-scope. The UDP field implementation shall follow the
 401 specification of Table 9N.

Table 9N – UDP Field Implementation Requirements

UDP	Mandatory/Optional/ eXcluded
Source Port	M
Destination Port	M
Length	M
Checksum	M

403

404 For IGMPv3:

405 See Annex J.5.3.

406

407 6.4 Time sync

408

409 *Replace clause 6.4.2 with:*

410

411 6.4.2 A-Profile

412 6.4.2.1 General

413 The A-Profile for Time Sync Services shall be as shown in Table 10N.

Table 10N – Time sync A-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Application	Simple Network Time Protocol	RFC 5905		m
	PTP Profile for Power Utility Automation	IEC/IEEE 61850-9-3		o
Presentation				
Session				
NOTE: It is intended to make SNTP and PTP 9-3 Conditional At Least One in the next major revision of this standard.				

415

416 6.4.2.2 Implementation agreements

417 This A-Profile shall conform to the agreements specified in RFC 6864 and RFC 7766.

418 Mode 3 of SNTP time synchronization shall be supported for SNTP Clients.

419 Mode 4 of SNTP time synchronization shall be supported for SNTP Servers.

420 Mode 3, 4 of SNTP time synchronization shall be supported for SNTP Clients and Servers.

421 *Replace clause 6.4.3 with:*

6.4.3 T-Profile**6.4.3.2 General**

The T-Profile for Time Sync Services shall be as shown in Table 11N.

Table 11N – Time sync T-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Transport	Internet Control Message Protocol (ICMP)	RFC 792		m
	User Datagram Protocol (UDP)	RFC 768		m
Network	Internet Protocol	RFC 791 – IPv4		m
		RFC 2460 – IPv6		o
	An Ethernet Address Resolution Protocol (ARP)	RFC 826		m
	Broadcasting Internet Datagrams	RFC 922 RFC 950 RFC 919		m
	Host Extensions for IP Multicasting	RFC 1112		m
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Redundancy	IEC 62439-3 – PRP or HSR		o
	Rapid Spanning Tree Protocol (RSTP)	IEEE 802.1D		o
DataLink	Standard for the transmission of IP datagrams over Ethernet networks	RFC 894		m
	Standard for Ethernet	ISO/IEC 8802-3:2014		m
Physical	Electrical	IEC TR 61850-90-4		AtLeastOne(1)
	Optical	IEC TR 61850-90-4		AtLeastOne(1)

6.4.3.3 Implementation agreement for SNTP

The following implementation agreement applies to implementations claiming conformance with this standard.

The UDP port number assigned by the IANA to NTP is 123. The SNTP client shall use this value in the UDP Destination Port field for client request messages.

Add clause 6.5

6.5 Sampled value management and Sampled value services communication profiles**6.5.1 Sampled value mapping overview**

The sampled value communication profile shall be used for any implementation claiming conformance to this standard and declaring support for one of the IEC 61850-7-2 services shown in Table 12N.

Table 12N – Services requiring sampled value Management and sampled value communication profile

Model	IEC 61850-7-2 service
Sampled value	GetMsvReference GetMSVElementNumber

Model	IEC 61850-7-2 service
	SendMSVMessage GetUsvReference GetUSVElementNumber SendUSVMessage

442

443 **6.5.2 A-Profile**444 **6.5.2.2 General**

445 Table 13N shows services and protocols of the A-Profile Sampled value Management and
446 SMV / USV services.

447 **Table 13N – Service and protocols for Sampled value Management and**
448 **Multicast / Unicast sampled value communication A-Profile**

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Application	SMV/USV protocol	See Annex A for Sampled value Management See IEC 61850-9-2 for Multicast / Unicast sampled value communication		m
	Security	IEC 62351-6:Ed2 work in progress		c2
Presentation	Abstract Syntax	NULL		m
Session	Secure Session	See Annex G		c1
	OSI Connectionless Transport Services on top of UDP	RFC 1240		c1
c1 – shall be ‘m’ if using UDP/IP in the T-Profile				
c2 – shall be ‘m’ if the implementation declares support for layer 2 SMV security				

449 The presentation layer encoding shall be Basic Encoding Rules as defined in ISO/IEC 8824-1
450 and ISO/IEC 8825-1 to encode the grammar referenced.

451 **6.5.2.3 Implementation agreement**

452 Same as specified in 6.3.2.2.

453

454 **6.5.3 T-Profile**455 **6.5.3.2 General**

456 The T-Profile for MSV Services shall be as shown in Table 14N.

457

Table 14N – MSV T-Profile

OSI model layer	Specification			m/o
	Name	Service specification	Protocol specification	
Transport	UDP	RFC 768 – User Datagram Protocol		c
Network	Internetwork Protocol	RFC 791 - IPv4		c
		RFC 2460 – IPv6		o
		RFC 2474 – Differentiateed Service Field RFC 2991 – Next-Hop Selection RFC 3168 – Explicit Congestion Notification RFC 3246 – Per-Hop Behavior RFC 4604 – IGMPv3		c
Link Redundancy	Parallel Redundancy Protocol and High Availability Seamless Redundancy	IEC 62439-3 – PRP or HSR		o
DataLink	Priority Tagging/ VLAN	IEEE 802.1Q		m
	Standard for Ethernet	ISO/IEC 8802-3:2014		m
Physical	Electrical	IEC TR 61850-90-4		AtLeastOne(1)
	Optical	IEC TR 61850-90-4		AtLeastOne(1)
^ must be implemented at the same time if support of MSV over UDP/IP is declared.				

458 **6.5.3.3 Implementation agreements**

459 T-DATA service

460 The T-DATA service shall be mapped directly to the M_UNITDATA service of the DataLink or
 461 the sending of a UDP packet.

462 M_UNITDATA maps onto the MAC layer whereas the UDP packet maps onto sending of an IP
 463 packet.

464 For M_UNITDATA:

465 .

466 Link layer: MAC – sublayer.

467 See Annex C for definitions.

468 The T-DATA destination address for a MSV message shall contain a multicast MAC address.
 469 The T-DATA source address for a MSV message shall contain a unicast MAC address.

470 The T-DATA destination address for a Sampled value management messages shall contain a
 471 unicast MAC address. The T-DATA source address for a Sampled value Management
 472 messages shall contain a unicast MAC address.

473 Link Layer: Priority tagging/Virtual LAN

474 See Annex C.

475 For UDP:

476 The T-DATA destination address for a MSV message shall contain a multicast IP address,
 477 DSCP QOS specification as specified in J.5.4, and optional IEEE 802.1Q information as
 478 specified in as specified in J.5.2.7.6. The T-DATA source address for a MSV message shall
 479 contain a unicast IP address.

480 The T-DATA destination address for a Sample value management messages shall contain a
 481 unicast IP address. The T-DATA source address for a Sample value Management messages
 482 shall contain a unicast MAC address.

483 The destination UDP Port shall be port 102 decimal. The source port shall be locally assigned
484 and the specification of it is out-of-scope.

485 The UDP field implementation shall follow the specification of Table 8N.

486

487 For IGMPv3:

488 See Annex J.5.3.

489

490

491

492 **7 Objects of IEC 61850**

493 **7.3 Logical node (LN)**

494 **7.3.1 General**

495 *Replace Figure 4 with:*

496

MX
ST
CO
CF
DC
SP
SG
RP
LG
BR
GO
GS
SV
SE
MS
US
EX
SR
OR
BL
RG
RS

497

IEC 814/11

498

Figure 4 – Ordered list of functional constraints

499 *Append NOTE 1 with:*

500 RG for Routable GOOSE control blocks; and RS for Routable Multicast Sampled Values control blocks.

501

502 *Rename clause 7.3.3*

503 **7.3.3 Mapping of DataObjects reference to VariableAccessSpecifications**

504

505

506 *Append clause 7.3.3 with:*

507 Any reference of a SubDataObject that contains an array shall use a
508 AlternateAccessSpecification in the variableAccessSpecifications as soon as one of the array
509 elements is addressed. See AlternateAccess conformance in 24.2.2.4.

510

511 *Rename clause 7.3.4*

512 **7.3.4 Mapping of DataAttributes (DataAttr) reference to VariableAccessSpecifications**

513

514

515 *Append clause 7.3.4 with:*

516 Any reference of a DataAttribute, SubDataAttribute that contains an array shall use an
517 AlternateAccessSpecification in the variableAccessSpecifications as soon as one of the array
518 elements is addressed. See AlternateAccess conformance in 24.2.2.4.

519

520 **8 Mapping of IEC 61850-7-2 data attributes**

521 **8.1 Mapping of Attributes specified in IEC 61850-7-2**

522 **8.1.1 BasicTypes**

523 *Add following NOTE to Table 15:*

524 For the purposes of the rest of the clauses in this document, the precision of unsigned / integer shall be
525 determined by the IEC 61850-7-2 unless otherwise specified.

526

527 **8.1.2 Additional definitions of BasicType**

528 **8.1.2.2 General**

529 *Replace the second paragraph with:*

530 The amount of bits conveyed by a sent variable length bit-string shall always be equal to the
531 maximum length of the defined variable length bit-string at the sender side, so that forward
532 semantic compatibility can be maintained. Zero (0) length bit-string are not allowed in the
533 context of IEC 61850-8-1.

534

535 *Replace clause 8.1.2.5 and clause 8.1.2.6 with:*

536 **8.1.2.5 VISIBLE STRING**

537 The IEC 61850-7-2 VISIBLE STRING shall map to a value represented by a MMS variable
538 length MMS visible-string. The maximum size of the MMS visible-string shall be the size as
539 specified in IEC 61850-7-2 and IEC 61850-7-3.

540 The character set, of MMSString, shall be constrained to ISO646String.

541 **8.1.2.6 UNICODE STRING**

542 The IEC 61850-7-2 UNICODE STRING shall map to a value represented by a MMS variable
543 length MMSString. The maximum size of the MMSString data type shall be the number of
544 Unicode characters specified in IEC 61850-7-2 and IEC 61850-7-3. The serialization of a
545 Unicode character occurs as specified in RFC 3629, and may involve up to 4 octets.

546 Extensions to the Data syntax of ISO 9506-2 are given in Annex F.

8.1.3 Common ACSITypes**8.1.3.2 ObjectReference***Add clause 8.1.3.2.4***8.1.3.2.1 Object Reference within DataRef of reports.**

The IEC 61850-7-2 ObjectReference maps to a variable length MMS visible-string. The maximum size of the visible-string shall be 129 octets. The value is the fully MMS scope qualified name of the MMS object. The value shall be constructed as:

<MMS Domain Name>/<MMS Object Name>

The allowed character set is defined in IEC 61850-7-2.

The value shall be constructed as:

- Reference to a FCD DataObject:

<LDName>/<LNName>\$<FC>\$<DataObjectName>[<SubDataObjectName>[(<NumArrayElement>)][\$...]]

Example: The datRef representing the ACSI reference LDevice/MHA11.HA.phsAHar(7) functionally constrained MX will be LD1/MMHA1\$MX\$HA\$phsAHar(7)

- Reference to a FCDA

<LDName>/<LNName>\$<FC>\$<DataObjectName>[<SubDataObjectName>[(<NumArrayElement>)][\$...]] \$<DataAttributeName> [(<NumArrayElement>)] [\$<SubDataAttributeName>[\$...]]

Example: The datRef representing the ACSI reference LDevice/MHA11.HA.phsAHar(7).cVal.mag.f will be LD1/MMHA1\$MX\$HA\$phsAHar(7)\$cVal\$mag\$f

8.1.3.4 ServiceError

Replace Table 13 with:

Table 17N – Associate ACSI service error mappings

ACSI service error	MMS ServiceError		Comment
	Error class	Error code	
parameter-value-inconsistent	initiate	version-incompatible	
failed-due-to-communications-constraint	initiate	parameter-CBB-insufficient nesting-level-insufficient max-services-outstanding-called-insufficient max-services-outstanding-calling-insufficient max-services-outstanding-calling-insufficient service-CCB-insufficient	
access-violation	access	object-access-denied	Result::=Failure
failed-due-to-server-constraint	Any class	Any unmapped error codes	

8.1.3.4.3 MPPM NamedVariableList Services**8.1.3.4.3.4 DefineNamedVariableList**

Add bullet to the list of the MMS ServiceError responses:

- A DefineNamedVariableList-Request that specifies an objectScope="domainSpecific" and specifies a variableListName which does not contain the name of an existing MMS NamedVariable. In this case, the MPPM shall return a MMS Confirmed-ErrorPDV shall be errorClass="access" with an errorCode="object-non-existent".

Replace clause 8.1.3.4.3.6 with:

8.1.3.4.3.6 DeleteNamedVariableList

The MMS DeleteNamedVariableList service returns a Response+, Error, or MMS ServiceError. This clause details the mappings for the MMS responses regarding errors that can occur when the MMPM is performing the DeleteNamedVariableList service request:

- A DeleteNamedVariableList-Request that specifies a scopeOfDelete domain, aa-specific, or vmd is out-of-scope of this standard.
- A DeleteNamedVariableList-Request that specifies a scopeOfDelete specific and none of the listOfVariableListName objects exist. In this instance the MMPM shall return a Response+ with the numberMatched=0.
- A DeleteNamedVariableList-Request that attempts to delete one or more NamedVariableLists that do not have the attribute of MMSDeletable=TRUE. In this instance the MMPM shall return a Response+ with the appropriate numberMatched value and appropriate numberDeleted value.
- A DeleteNamedVariableList-Request that attempts to delete a NamedVariableList whose MMSDeletable=TRUE, and the MMPM is unable to delete the object. For example when a NamedVariableList is used in a Report Control Block. In this case the MMPM shall return a Response- with the number of NamedVariableLists that were successfully deleted.

See Table 25N for DeleteNamedVariableList service error mappings.

Table 25N – DeleteNamedVariableList service error mappings

ACSI service error	MMS ServiceError		Comments
	Error class	Error code	
instance-not-available	access	object-non-existent	
access-violation	access	object-access-denied	
failed-due-to-communications-constraint	Any class	Any unmapped error codes	
ACSI service error	MMS Response+		Comments
	Parameter	value	
instance-not-available	numberMatched	0	
	numberDeleted	0	
failed-due-to-server-constraint	numberMatched	non-zero	
	numberDeleted	Less than numberMatched.	
ACSI service error	MMS Response-		Comments
	Parameter	value	
failed-due-to-server-constraint	numberDeleted	any value	Constraint to Error Type: Error class = Service error code = object- constraint-conflict
Note: There are two (2) mappings to failed-due to-server-constraint. These mappings are due to the service procedures defined in ISO/IEC 9506-1. The relevant section of the service procedure follows: "If an error occurs in the deletion of any of the specified objects, then a negative response shall be issued with the NumberDeleted parameter indicating the number of objects that were deleted. Failure to delete an object with the MMS Deletable attribute equal to false shall not be deemed an error."			

603 **8.1.3.4.4 MPPM NamedVariable Services**604 **8.1.3.4.4.1 Read**605 *Add bullet to the list of the MMS ServiceError responses:*

- 606 • A Read-Request of VariableAccessSpecification that specifies an object which
 607 accessibility depends on the value of another object (e.g. Setting group values). The
 608 MPPM shall return a failure within the Read-Response+ indicating
 609 dataAccessError="temporarily-unavailable".

610

611 *Replace Table 22 with:*

612

613 **Table 26N – Read service error mappings**

ACSI service error	MMS ServiceError		Comments
	Error class	Error code	
failed-due-to-communications-constraint	service	pdu-size (3)	In ISO 9506:1990 the value of (3) was pdu-size. In ISO 9506:2003, the (3) value is reserved.
failed-due-to-communications-constraint	Any class	Any unmapped error codes	
ACSI service error	MMS Response+		Comments
	DataAccessError		
access-violation	object-access-denied		
instance-not-available	object-non-existent		
failed-due-to-communications-constraint	Any other DataAccessErrors		
access-not-allowed-in-current-state	temporarily-unavailable		

614

615 **8.1.3.4.4.2 Write**616 *Replace Table 23 with:*

617

Table 27N – Write service error mappings

ACSI service error	MMS ServiceError		Comments
	Error class	Error code	
failed-due-to-communications-constraint	Any class	Any unmapped error codes	
ACSI service error	MMS Response+		Comments
	DataAccessError		
access-violation	object-access-denied		
instance-not-available	object-non-existent		
instance-locked-by-other-client	temporarily-unavailable		
type-conflict	type-inconsistent		
parameter-value-inconsistent	object-value-invalid		
failed-due-to-communications-constraint	Any other DataAccessErrors		
access-not-allowed-in-current-state	temporarily-unavailable		
ACSI service error	MMS Reject		Comments
	Reject PDU Type	Reject Code	
parameter-value-inconsistent	pdu-error	Invalid-pdu	

8.1.3.10 Reason for inclusion in reports (ReasonForInclusionInReport)

The values for ReasonForInclusionInReport are encoded as a PACKED LIST, however Bit(0) is reserved. Therefore, the mapping of the ReasonForInclusionInReport to MMS is a variable length BITSTRING. The minimum size of the BITSTRING shall be seven(6) bits. Additional bits are reserved for future versions of the standard. The bits are assigned as specified in Table 38N.

Table 38N – Encoding of the ReasonForInclusionInReport

Reason for inclusion	MMS bit position
Reserved (reserved to provide backward compatibility with UCA 2.0)	0
data-change	1
quality-change	2
data-update	3
integrity	4
general-interrogation	5

Add clauses 8.1.3.11 to 8.1.3.18

8.1.3.11 Reason for inclusion in logs (ReasonForInclusionInLog)

The values for ReasonForInclusionInLog are encoded as a PACKED LIST, however Bit(0) is reserved. Therefore, the mapping of the ReasonForInclusionInLog to MMS is a variable length BITSTRING. The minimum size of the BITSTRING shall be seven(7) bits. Additional bits are reserved for future versions of the standard. The bits are assigned as specified in Table 39N.

Table 39N – Encoding of the ReasonForInclusionInLog

Reason for inclusion	MMS bit position
Reserved (reserved to provide backward compatibility with UCA 2.0)	0
data-change	1
quality-change	2
data-update	3
integrity	4
general-interrogation	5
application-trigger	6

8.1.3.12 PhyComAddr for UDP/IP communication

The PhyComAddr, used in context of UDP/IP communication by different control blocks, is mapped to the structure defined in Table 40N.

Table 40N – PhyComAddr for UPD/IP communication

Component Name	Data Type	m/o	Comments
Addr	OCTET STRING	m	The OCTET STRING has a variable length of 16 octets. It shall use a length of 4 Octet to encode an IPv4 address, whereas it shall use a length of 16 Octets to encode an IPv6 address. Addr represents the UDP/IP destination address
isIPv6	Boolean	m	Shall be TRUE if the Addr and GwAddr and IGMPsrc are IPv6 addresses. Shall be FALSE if an IPv4 is specified

PRIORITY	Unsigned8	m	Range of values shall be limited from 0 to 255. This value is for Layer-2 priority (e.g. through local switches on the LAN of the publisher). The value is not guaranteed to be conveyed through a router.
VID	Unsigned16	m	Range of values shall be limited from 0 to 4 095. The value of zero (0) is the default value and indicates that no 802.1 VLAN is specified. This value is for Layer-2 ID (e.g. through local switches on the LAN of the publisher). The value is not guaranteed to be conveyed through a router.
APPID	Unsigned16	m	As defined in Annex C
gwAddr	OCTET STRING	m	The OCTET STRING has a variable length of 16 octets. It shall use a length of 4 Octet to encode an IPv4 address, whereas it shall use a length of 16 Octets to encode an IPv6 address. GwAddr represents the address of the first hop gateway.
tOS	Unsigned8	m	Specifies the DSCP field of the IPv4 header or the Traffic Class field of the IPv6 header Range of values shall be limited from - 0 to 2^6-1 if IPv6 is FALSE. - 0 to 2^8-1 if IPv6 is TRUE
IGMPsrc	OCTET STRING	m	The OCTET STRING has a variable length of 16 octets. It shall use a length of 4 Octet to encode an IPv4 address, whereas it shall use a length of 16 Octets to encode an IPv6 address. IGMPsrc represents the unicast src address to be used for IGMPv3 subscription.

8.1.3.13 RCBReportOptions

The values for RCBReportOptions are encoded as a PACKED LIST. Therefore the mapping of the RCBReportOptions to MMS is a variable length BITSTRING. The minimum size of the BITSTRING shall be ten (10) bits. Additional bits are reserved for future versions of the standard. The bits are assigned as specified in Table 41N.

Table 41N – Encoding of the RCBReportOptions

ACSI value of BRCState	MMS bit position
Reserved	0
sequence-number	1
report-time-stamp	2
reason-for-inclusion	3
data-set-name	4
data-reference	5
buffer-overflow	6
entryID	7
conf-revision	8
segmentation	9

8.1.3.14 LCBLogEntryOptions

Not mapped. This Clause forces the reasonCodes to always appear in the Log

