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Part 4: Profiles including MMS and derivatives

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CONTENTS

FOREWORD 8
1 Scope 10
1.1 General 10
1.2 Code components 11
2 Normative references 11
3 Terms, definitions and abbreviated terms 12
3.1 General 12
3.2 Terms and definitions 13
3.3 Abbreviated terms 16
4 Security issues addressed by this part of IEC 62351 17
4.1 Communications reference models 17
4.2 Security for application and transport profiles 18
4.3 Compatibility and native modes 19
4.4 Security threats countered 19
4.4.1 General 19
4.4.2 Threats countered in compatibility mode 20
4.4.3 Threats countered in native mode 20
4.5 Attack methods countered 20
4.5.1 General 20
4.5.2 Attacks countered in compatibility mode 20
4.5.3 Attacks countered in native mode 20
4.6 Logging 21
5 Specific requirements 21
5.1 Specific requirements for ICCP/IEC 60870-6-x communication stack 21
5.2 Specific requirements for IEC 61850 22
6 Transport Security 22
6.1 General 22
6.2 Application of transport layer security (TLS) 22
6.2.1 General 22
6.2.2 The TLS cipher suite concept 23
6.2.3 TLS session resumption 23
6.2.4 TLS session renegotiation 23
6.2.5 Supported number of trust anchors 23
6.2.6 Public-key certificate size 23
6.2.7 Evaluation period for revocation state of public-key certificates 23
6.2.8 Public-key certificate validation 24
6.2.9 Security events handling 24
6.3 T-security in an OSI operational environment 24
6.3.1 General 24
6.3.2 TCP ports 24
6.3.3 Disabling of TLS 25
6.3.4 TLS cipher suites support 25
6.4 T-security in an XMPP operational environment 26
7 Application layer security overview (informative) 26
7.1 General 26
7.2 Description techniques 27

iTeh Standards (https://standards.iteh.ai) Document Preview
IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/iec/04e13e4c-175e-4663-9054-8239 8ab92a6b/iec-62351-4-2018

7.2.1 General 27
7.2.2 ASN.1 as an XML schema definition 27
7.2.3 W3C XML Schema Definition (W3C XSD) 28
7.2.4 XML namespace 28
8 Use of cryptographic algorithms 28
8.1 General 28
8.2 Basic cryptographic definitions 28
8.3 Public-key algorithms 29
8.4 Hash algorithms 30
8.5 Signature algorithms 30
8.6 Symmetric encryption algorithms used for encryption only 30
8.7 Authenticated encryption algorithms 31
8.8 Integrity check value algorithms 31
9 Object identifier allocation (normative) 32
10 General OSI upper layer requirements (normative) 32
10.1 Overview 32
10.2 General on OSI upper layer requirements 33
10.3 Session protocol requirements 33
10.4 Presentation protocol requirements 34
10.4.1 Context list 34
10.4.2 Abstract syntaxes 34
10.4.3 Presentation user data 34
10.4.4 ASN.1 encoding requirements 35
10.5 Association control service element (ACSE) protocol requirements 36
10.5.1 General 36
10.5.2 Protocol version 36
10.5.3 Titles 36
10.5.4 Use of ASN.1 EXTERNAL data type 36
11 A-security-profile (normative) 37
11.1 OSI requirements specific to A-security profile 37
11.1.1 General 37
11.1.2 Additional session protocol requirements 37
11.1.3 Additional presentation protocol requirement 37
11.1.4 Additional ACSE requirements 37
11.2 MMS Authentication value 39
11.2.1 General 39
11.2.2 MMS-Authentication value data type 39
11.2.3 Handling of the association request (AARQ-apdu) 40
11.2.4 Handling of the association result (AARE-apdu) 40
12 End-to-end application security model 41
12.1 Introduction and general architecture 41
12.2 Abstract syntax specifications 42
12.2.1 General 42
13 End-to-end application security (normative) 43
13.1 Association management 43
13.1.1 General concept 43
13.1.2 UTC time specification 43
13.1.3 Handshake request 43

iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/sist/0bbf6f0d-b3e4-475e-4663-9054-82398ab92a6b/iec-62351-4-2018

13.1.4 Handshake accept 44
13.1.5 Association reject by the protected protocol 45
13.1.6 Association reject due to security issues 45
13.1.7 Handshake security abort 46
13.1.8 Data transfer security abort 46
13.1.9 Abort by protected protocol 46
13.1.10 Association release request 47
13.1.11 Association release response 47
13.2 Data transfer phase 47
13.2.1 General 47
13.2.2 Clear data transfer 48
13.2.3 Encrypted data transfer 48
13.3 ClearToken data types 49
13.3.1 The ClearToken1 data type 49
13.3.2 The ClearToken2 data type 53
13.3.3 The ClearToken3 data type 54
13.4 Authentication and integrity specifications 55
13.4.1 The Signature data type 55
13.4.2 The authenticator data type 55
14 E2E security error handling (normative) 56
14.1 General 56
14.2 Specification of diagnostics 56
14.2.1 Handshake diagnostics 56
14.2.2 The data transfer diagnostics 57
14.3 Checking of E2E-security handshake request and accept 58
14.3.1 General 58
14.3.2 Signature checking 58
14.3.3 Protected protocol identity checking 59
14.3.4 ClearToken1 checking 59
14.4 Checking of security protocol control information during data transfer 60
14.4.1 General 60
14.4.2 Authenticator checking 60
14.4.3 Checks of the ClearToken2 value 60
15 E2E security used in an OSI operational environment 61
15.1 General 61
15.2 Additional upper layer requirements 61
15.2.1 Additional presentation layer requirements 61
15.2.2 Additional ACSE requirements 61
15.3 Association management in an OSI operational environment 62
15.3.1 General 62
15.3.2 Mapping to ACSE association request 62
15.3.3 Mapping to ACSE association response 62
15.3.4 Mapping to ACSE abort 63
15.3.5 Mapping to ACSE release request 64
15.3.6 Mapping to ACSE release response 64
15.4 Data transfer in OSI operational environment 64
15.4.1 General 64
15.4.2 Mapping of the clear data transfer SecPDU 64
15.4.3 Mapping of the encrypted data transfer SecPDU 65

iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/sist/...-62351-4-2018

15.5 OSI upper layer routing 65
15.6 OSI operational environment checking 66
15.6.1 General checking 66
15.6.2 Environment mapping checking 66
15.6.3 OSI operational environment diagnostics 67
16 E2E security used in in an XMPP operational environment 67
16.1 General on wrapping to an XMPP operational environment 67
16.2 Mapping of SecPDUs to iq stanzas 68
16.3 Mapping of SecPDUs to message stanzas 69
16.4 XMPP stanza error handling 69
16.5 XML namespaces 70
16.6 Encoding of EnvPDUs within XMPP stanzas 70
16.7 Multiple associations 71
16.8 Release collision consideration 71
17 Conformance to this document 71
17.1 General 71
17.2 Notation 71
17.3 Conformance to operational environment 71
17.4 Conformance to modes of operation 72
17.5 Conformance to compatibility mode 72
17.6 Conformance to native mode 73
Annex A (normative) Formal ASN.1 specification for the A-security-profile 75
Annex B (normative) Formal ASN.1 specification for the End-to-End security 76
Annex C (normative) Formal W3C XSD specification for the end-to-end security 82
Annex D (normative) ASN.1 module for OSI operational environment 89
D.1 Scope of annex 89
D.2 ASN.1 module 89
Annex E (normative) ASN.1 modules and W3C XSDs for an XMPP operational environment 91
E.1 Scope of Annex 91
E.2 ASN.1 modules for the XMPP operational environment 91
E.2.1 ASN.1 module for the urn:ietf:params:xml:ns:xmpp-stanzas XML namespace 91
E.2.2 ASN.1 module for the http://www.iec.ch/62351/2018/ENV_4 XML namespace 91
E.3 W3C XSDs for the XMPP operational environment 93
E.3.1 W3C XSD for the urn:ietf:params:xml:ns:xmpp-stanzas XML namespace 93
E.3.2 W3C XSD for the http://www.iec.ch/62351/2018/ENV_4 XML namespace 94
Annex F (normative) Template for virtual API specifications 96
F.1 General 96
F.2 ASN.1 virtual API specification 97
F.3 W3C XSD virtual API specification 97
Annex G (normative) End-entity public-key certificate specification 98
G.1 Scope of annex 98
G.2 General requirement 98
G.3 Length considerations 98
G.4 Basic Structure requirement and recommendations 98
G.4.1 Version component 98

iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/sist/1f1c3e09-e0e8-4b7f-8f3f-8f3f8f3f8f3f/iec-62351-4-2018

G.4.2 Serial number component 98
G.4.3 Issuer signature algorithm component 98
G.4.4 Issuer component 99
G.4.5 Validity component 99
G.4.6 Subject component 99
G.4.7 Subject public key Information component 99
G.4.8 Issuer unique ID and subject unique ID components 100
G.5 Extensions 100
G.5.1 General 100
G.5.2 Key usage extension 100
G.5.3 Revocation checking 100
G.5.4 IEC user role information extension 101
G.6 Specific requirements for operational environments 101
G.6.1 General 101
G.6.2 OSI operational environment 101
G.6.3 XMPP operational environment 101
Annex H (normative) Lower layer requirements for the OSI operational environment 102
H.1 Scope of annex 102
H.2 Transport protocol class 0 102
H.2.1 Enforcement of maximum lengths 102
H.2.2 Response to Class 0 unsupported TPDUs 102
H.2.3 Transport selectors 102
H.3 IETF RFC 1006 103
H.3.1 General 103
H.3.2 Version number 103
H.3.3 Length 103
H.3.4 Keep-alive 103
Annex I (informative) ASN.1 definition of ACSE 104
Bibliography 108

Figure 1 – Application and transport profiles (informative) 18
Figure 2 – T-profiles without and with TLS protection 24
Figure 3 – Association establishment 33
Figure 4 – Inclusion of User-data in SESSION DATA TRANFER SPDU 35
Figure 5 – E2E security building blocks 41
Figure 6 – Relationship between environment, E2E-security and protected protocol 41
Figure 7 – Relationships between APDUs 42
Figure 8 – The scope of E2E-security specification 42
Figure 9 – Upper layer routing 65
Figure F.1 – Virtual API concept 96

Table 1 – Relationship between security and security measure combinations 19
Table 2 – Commented recommended cipher suites from IEC TS 62351-4:2007 25
Table 3 – Cipher suites combinations in the context of this document 26
Table 4 – Mapping of SecPDUs to ACSE APDUs 62
Table 5 – Mapping of SecPDUs to XMPP stanzas 68

iTeh Standards
(https://standards.iteh.ai)
Document Preview
IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/sist/...-62351-4-2018

Table 6 – Conformance to operational environment 72
Table 7 – Conformance to modes of operation 72
Table 8 – Conformance to compatibility mode 72
Table 9 – Conformance to TLS cipher suites in compatibility mode 73
Table 10 – Conformance to native mode 73
Table 11 – Conformance to mode of encryption 73
Table 12 – Conformance to TLS cipher suites in native mode 74
Table 13 – Conformance to cryptographic algorithms for E2E-security 74
Table H.1 – TP class 0 maximum sizes 102

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IEC 62351-4:2018
https://standards.iteh.ai/catalog/standards/iec/04e13e4c-175e-4663-9054-82398ab92a6b/iec-62351-4-2018

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Part 4: Profiles including MMS and derivatives

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POWER SYSTEMS MANAGEMENT AND ASSOCIATED INFORMATION EXCHANGE – DATA AND COMMUNICATIONS SECURITY –

Part 4: Profiles including MMS and derivatives

1 Scope

1.1 General

This part of IEC 62351 extends the scope of IEC TS 62351-4:2007 [1][1] by specifying a compatibility mode that provides interoperation with implementation based on IEC TS 62351-4:2007 and by specifying extended capabilities referred to as native mode.

This part of IEC 62351 specifies security requirements both at the transport layer and at the application layer. While IEC TS 62351-4:2007 primarily provided some limited support at the application layer for authentication during handshake for the Manufacturing Message Specification (MMS) based applications, this document also provides support for extended integrity and authentication both for the handshake phase and for the data transfer phase. It provides for shared key management and data transfer encryption at the application layer and it provides security end-to-end (E2E) with zero or more intermediate entities. While IEC TS 62351-4:2007 only provides support for systems based on the MMS, i.e. systems using an Open Systems Interworking (OSI) protocol stack, this document also provides support for application protocols using other protocol stacks, e.g. an Internet protocol suite (see 4.1). This support is extended to protect application protocols using XML encoding. This extended security at the application layer is referred to as E2E-security.

In addition to E2E security, this part of IEC 62351 also provides mapping to environmental protocols carrying the security related information. Only OSI and XMPP environments are currently considered.

It is intended that this part of IEC 62351 be referenced as a normative part of standards that have a need for using application protocols, e.g., MMS, in a secure manner.

It is anticipated that there are implementations, in particular Inter-Control Centre Communications Protocol (ICCP) implementations that are dependent on the IEC TS 62351-4:2007 specifications of the T-profile and the A-security-profile. The specifications from IEC TS 62351-4:2007 are therefore included in this part of IEC 62351. Implementations supporting these specifications will interwork with implementation based on IEC TS 62351-4:2007.

NOTE The A-security-profile is in the strict sense not a profile, but the term is here kept for historical reasons.

This document represents a set of mandatory and optional security specifications to be implemented to protect application protocols.

The initial audience for this document is the members of the working groups developing or making use of protocols. For the measures described in this part of IEC 62351 to take effect, they shall be accepted and referenced by the specifications for the protocols themselves.

The subsequent audience for this document is the developers of products that implement these protocols and the end user that want to specify requirements for its own environment.

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[1] Numbers in square brackets refer to the bibliography.

Portions of this document may also be of use to managers and executives in order to understand the purpose and requirements of the work.

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In this document, code components are contained within Annexes A, B, C, D and E.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC TS 62351-1, *Power systems management and associated information exchange – Data and communications security – Part 1: Communication network and system security – Introduction to security issues*

IEC TS 62351-2, *Power systems management and associated information exchange – Data and communications security – Part 2: Glossary of terms*

IEC 62351-3:2014, *Power systems management and associated information exchange – Data and communications security – Part 3: Communication network and system security – Profiles including TCP/IP*
IEC 62351-3:2014/AMD1:2018

IEC TS 62351-8:2011, *Power systems management and associated information exchange – Data and communications security – Part 8: Role-based access control*

IEC 62351-9:2017, *Power systems management and associated information exchange – Data and communications security – Part 9: Cyber security key management for power system equipment*

ISO/IEC 8073:1997 | Rec. ITU-T X.224 (1995), *Information technology – open systems interconnection – Protocol for providing the connection-mode transport service*

ISO/IEC 8823-1:1994 | Rec. ITU-T X.226 (1994), *Information technology – open systems interconnection – connection-oriented presentation protocol: Protocol specification*

ISO/IEC 8824-1 | Rec. ITU-T X.680, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 8825-1 | Rec. ITU-T X.690, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 8825-4 | Rec. ITU-T X.693, *Information technology – ASN.1 encoding rules: XML Encoding Rules (XER)*

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ISO 8601:2004, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 9506-2:2003, *Industrial automation systems – Manufacturing Message Specification – Part 2: Protocol specification*

ISO/IEC 9594-8: | Rec. ITU-T X.509, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks*

Rec. ITU-T X.227 (1995), *Information technology – open systems interconnection – connection-oriented protocol for the association control service element: Protocol specification*

NOTE 1 The corresponding International Standard ISO/IEC 8650-1:1996 has been withdrawn.

Rec. ITU-T X.227 (1995)/Amd.1 (1996), *Information technology – open systems interconnection – connection-oriented protocol for the association control service element: Protocol specification – Amendment 1: Incorporation of extensibility markers*

NOTE 2 The corresponding International Standard amendment ISO/IEC 8650-1:1996/Amd.1:1997 has been withdrawn.

IETF RFC 1006:1987, *ISO Transport Service on top of the TCP, Version: 3*

IETF RFC 2104:1997, *HMAC: Keyed-Hashing for Message Authentication*

IETF RFC 3526:2003, *More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)*

IETF RFC 5114:2008, *Additional Diffie-Hellman Groups for Use with IETF Standards*

IETF RFC 5246:2008, *The Transport Layer Security (TLS) Protocol, Version 1.2*

IETF RFC 5480:2009, *Elliptic Curve Cryptography Subject Public Key Information*

IETF RFC 5639:2010, *Elliptic Curve Cryptography (ECC) Brainpool Standard Curves and Curve Generation*

IETF RFC 5869:2010, *HMAC-based Extract-and-Expand Key Derivation Function*

IETF RFC 6120:2011, *Extensible Messaging and Presence Protocol (XMPP): Core*

IETF RFC 6122:2011, *Extensible Messaging and Presence Protocol (XMPP): Address Format*

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3 Terms, definitions and abbreviated terms

3.1 General

For the purposes of this document, the terms and definitions given in IEC TS 62351-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp