This document is a preview generated by EVS

Application integration at electric utilities - System interfaces for distribution management - Part 3: Interface for network operations

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 61968-3:2018 sisaldab Euroopa standardi EN IEC 61968-3:2018 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 61968-3:2018 consists of the English text of the European standard EN IEC 61968-3:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 18.05.2018.	Date of Availability of the European standard is 18.05.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

This document is a preview generated by EVS

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 33.200

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61968-3

May 2018

ICS 33.200

Supersedes EN 61968-3:2004

English Version

Application integration at electric utilities - System interfaces for distribution management - Part 3: Interface for network operations (IEC 61968-3:2017)

Intégration d'applications pour les services électriques - Interfaces système pour la gestion de la distribution - Partie 3: Interface pour l'exploitation du réseau (IEC 61968-3:2017)

Integration von Anwendungen in Anlagen der Elektrizitätsversorgung - Systemschnittstellen für Netzführung - Teil 3: Schnittstelle für Netzbetriebsarten (IEC 61968-3:2017)

This European Standard was approved by CENELEC on 2017-03-03. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2018 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 61968-3:2018 E

This document is a preview generated by EVS

European foreword

The text of document 57/1810/FDIS, future edition 2 of IEC 61968-3, prepared by IEC/TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61968-3:2018.

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)	2018-11-18
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2021-05-18

This document supersedes EN 61968-3:2004.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Endorsement notice

The text of the International Standard IEC 61968-3:2017 was approved by CENELEC as a European Standard without any modification.

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

IEC 61968-4	NOTE	Harmonized as EN 61968-4.
IEC 61968-6	NOTE	Harmonized as EN 61968-6.
IEC 61968-8	NOTE	Harmonized as EN 61968-8.
IEC 61968-9	NOTE	Harmonized as EN 61968-9.
IEC 61968-11	NOTE	Harmonized as EN 61968-11.
IEC 61968-13	NOTE	Harmonized as EN 61968-13.
IEC 62361-100	NOTE	Harmonized as EN 62361-100.

This document is a preview generated by EVS

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where 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.

Publication	Year	Title	EN/HD	Year
IEC 61968-1	-	Application integration at electric utilities - System interfaces for distribution management -- Part 1: Interface architecture and general requirements	EN 61968-1	-
IEC/TS 61968-2	-	Application integration at electric utilities - System interfaces for distribution management -- Part 2: Glossary	-	-
IEC 61968-100	-	Application integration at electric utilities - System interfaces for distribution management -- Part 100: Implementation profiles	EN 61968-100	-
IEC 61970-301	-	Energy Management System Application Program Interface (EMS-API) - Part 301: Common information model (CIM) base	EN 61970-301	-

This document is a preview generated by EVS

CONTENTS

FOREWORD 6
INTRODUCTION 8
1 Scope 9
2 Normative references 10
3 Terms, definitions and abbreviated terms 11
3.1 Terms and definitions 11
3.2 Abbreviated terms 11
4 Reference and Information Models 11
4.1 General approach to network operations 11
4.2 Reference Model 12
4.3 Interface Reference Model 13
4.4 Network operations functions and components 13
4.5 Static Information Model 15
4.5.1 General 15
4.5.2 Classes related to network operations 15
5 Network operations message payloads 15
5.1 General 15
5.2 **OperationsConfiguration** payload 16
5.2.1 General 16
5.2.2 Message payload 16
5.3 **MeasurementsAndControls** payload 17
5.3.1 General 17
5.3.2 Measurement 17
5.3.3 Control 18
5.3.4 Message payload 18
5.4 **TemporaryNetworkChanges** payload 21
5.4.1 General 21
5.4.2 Message payloads 22
5.5 **SwitchingPlan** payload 27
5.5.1 General 27
5.5.2 Message payload 28
5.6 **OperationalTags** payload 36
5.6.1 General 36
5.6.2 Message payload 37
5.7 **TroubleTicket** payload 38
5.8 **Incident** payload 39
5.8.1 General 39
5.8.2 Message payload 41
5.9 **Outage** payload 42
5.9.1 General 42
5.9.2 Message payload 44
5.10 Metering message payloads 45
5.10.1 **EndDeviceEvent** 45
5.10.2 **MeterReading** 45

This document is a preview generated by EVS

5.11 **Work** message payloads 46
5.11.1 **WorkOrder** 46
5.12 **SwitchingOrder** 47
5.12.1 General 47
5.12.2 Message payload 48
5.13 **TroubleOrder** 49
5.13.1 General 49
5.13.2 Message payload 50
5.14 **OutageSchedule** 51
5.14.1 General 51
5.14.2 Message payload 52
6 Document Conventions 55
6.1 UML diagrams 55
6.2 Message payload definitions 55
6.2.1 General 55
6.2.2 Mandatory versus Optional 55
6.3 Synchronous versus Asynchronous Messages 55
6.4 Message exchanges 55
Annex A (informative) Use Cases 56
A.1 General 56
A.2 FLISR 56
A.2.1 Overview 56
A.2.2 FLISR for SCADA-detected outage, SCADA switching 56
A.2.3 FLISR for trouble call and AMI outage, crew switching 58
A.3 Planned outage 62
A.3.1 Planned outage for maintenance – Manual process 62
A.3.2 Planned outage for maintenance – Crew switching 63
Annex B (normative) XML Schemas for message payloads 68
B.1 General 68
B.2 **Incidents** message payload 68
B.3 **MeasurementsAndControls** message payload 75
B.4 **OperationalTags** message payload 82
B.5 **OperationsConfig** message payload 85
B.6 **OutagesAndFaults** message payload 87
B.7 **OutageSchedules** message payload 96
B.8 **SwitchingOrders** message payload 117
B.9 **SwitchingPlans** message payload 123
B.10 **TemporaryNetworkChanges** message payload 140
B.11 **TroubleOrders** message payload 150
Bibliography 160

Figure 1 – IEC 61968-3 Scope 10
Figure 2 – IEC 61968-3 Reference Model 12
Figure 3 – **OperationsConfiguration** message payload 16
Figure 4 – **MeasurementsAndControls** 17

This document is a preview generated by EVS

Figure 5 – **MeasurementsAndControls** message payload 19
Figure 6 – **MeasurementsAndControls** message payload, **AnalogValue** detail 20
Figure 7 – **MeasurementsAndControls** message payload, Setpoint (**AnalogControl**) detail 21
Figure 8 – Temporary Network Changes 22
Figure 9 – **TemporaryNetworkChanges** message payload 22
Figure 10 – **TemporaryNetworkChanges** message payload, **Clamp** detail 23
Figure 11 – **TemporaryNetworkChanges** message payload, **Cut** detail 24
Figure 12 – **TemporaryNetworkChanges** message payload, **EnergySource** Details 25
Figure 13 – **TemporaryNetworkChanges** message payload, **Ground** details 26
Figure 14 – **TemporaryNetworkChanges** message payload, **Jumper** Details 27
Figure 15 – Switching Plan 28
Figure 16 – **SwitchingPlans** message payload 29
Figure 17 – **SwitchingPlans** message payload, **SafetyDocument** detail 30
Figure 18 – **SwitchingPlan** message payload, **ClearanceAction** detail 31
Figure 19 – **SwitchingPlan** message payload, **GenericAction** detail 32
Figure 20 – **SwitchingPlan** message payload, **EnergySourceAction** detail 32
Figure 21 – **SwitchingPlan** message payload, **CutAction** detail 33
Figure 22 – **SwitchingPlan** message payload, **GroundAction** detail 34
Figure 23 – **SwitchingPlan** message payload, **JumperAction** detail 34
Figure 24 – **SwitchingPlan** message payload, **SwitchingAction** detail 35
Figure 25 – **SwitchingPlan** message payload, **TagAction** detail 36
Figure 26 – Tags 37
Figure 27 – **OperationalTags** message payload 38
Figure 28 – Trouble Ticket 39
Figure 29 – **Incident** 40
Figure 30 – **Incident** message payload 41
Figure 31 – **Outage** 42
Figure 32 – **OutagesAndFaults** message payload 44
Figure 33 – End Device Event 45
Figure 34 – Meter Reading 46
Figure 35 – Work Order 47
Figure 36 – Switching Order 48
Figure 37 – **SwitchingOrder** message payload 49
Figure 38 – Trouble Order 50
Figure 39 – **TroubleOrder** message payload 51
Figure 40 – Outage Schedule 52
Figure 41 – **OutageSchedule** message payload 53

This document is a preview generated by EVS

Figure 42 – **OutageSchedule** message payload, **PlannedOutages** detail 54
Figure A.1 – FLISR for SCADA-Detected Outage, SCADA Switching 57
Figure A.2 – FLISR for trouble call and AMI outage, crew switching 60
Figure A.3 – Planned outage for maintenance – Manual process 63
Figure A.4 – Planned outage for maintenance, crew switching 65

Table 1 – Business Functions and Abstract Components 14
Table 2 – Interpretation of Network Operations Business Functions 15
Table 3 – Classes related to network operations 15
Table A.1 – Message Flow for FLISR SCADA-Detected Outage, SCADA Switching 58
Table A.2 – Message flows for FLISR for trouble call and AMI outage, crew switching 61
Table A.3 – Message flows for planned outage for maintenance, crew switching 66

This document is a preview generated by EVS

INTRODUCTION

The purpose of this part of IEC 61968 is to define a standard for the integration of network operations systems with each other and other systems and business functions within the scope of IEC 61968. The specific details of communication protocols those systems employ are outside the scope of this part of IEC 61968. Instead, this part of IEC 61968 will recognize and model the general capabilities that can be potentially provided by network operations systems. In this way, this part of IEC 61968 will not be impacted by the specification, development and/or deployment of next generation network operations systems, either through the use of standards or proprietary means.

The IEC 61968 series of standards is intended to facilitate inter-application integration as opposed to intra-application integration. Intra-application integration is aimed at programs in the same application system, usually communicating with each other using middleware that is embedded in their underlying runtime environment, and tends to be optimised for close, real-time, synchronous connections and interactive request/reply or conversation communication models. Therefore, these inter-application interface standards are relevant to loosely coupled applications with more heterogeneity in languages, operating systems, protocols and management tools. This series of standards is intended to support applications that need to exchange data every few seconds, minutes, or hours rather than waiting for a nightly batch run. This series of standards, which are intended to be implemented with middleware services that exchange messages among applications, will complement, not replace utility data warehouses, database gateways, and operational stores.

As used in IEC 61968, a distribution management system (DMS) consists of various distributed application components for the utility to manage electrical distribution networks. These capabilities include monitoring and control of equipment for power delivery, management processes to ensure system reliability, voltage management, demand-side management, outage management, work management, automated mapping and facilities management. Standard interfaces are defined for each class of applications identified in the interface reference model (IRM), which is described in IEC 61968-1.

This document is a preview generated by EVS

APPLICATION INTEGRATION AT ELECTRIC UTILITIES – SYSTEM INTERFACES FOR DISTRIBUTION MANAGEMENT –

Part 3: Interface for network operations

This document is a preview generated by EVS

1 Scope

Per the IEC 61968 Interface Reference Model, the Network Operations function defined in this part of IEC 61968 provides utilities the means to supervise main substation topology (breaker and switch state) and control equipment status. It also provides the means for handling network connectivity and loading conditions. Finally, it makes it possible for utilities to locate customer telephone complaints and supervise the location of field crews.

IEC 61968-3 specifies the information content of a set of message payloads that can be used to support many of the business functions related to network operations. Typical uses of the message payloads defined in IEC 61968-3 include data acquisition by external systems, fault isolation, fault restoration, trouble management, maintenance of plant, and the commissioning of plant.

The scope diagram shown in Figure 1 illustrates the possibility of implementing IEC 61968-3 functionality as either a single integrated advanced distribution management system or as a set of separate functions – OMS, DMS and SCADA. Utilities may chose to buy these systems from different vendors and integrate them using the IEC 61968-3 messages. Alternatively, a single vendor could provide two or all of these components as a single integrated system. In the case of more than one system being provided by the same vendor, the vendor may chose to use either extensions of the IEC 61968-messages or a proprietary integration mechanism to provide enhanced functionality over and above what is required/supported by the IEC 61968-3 specification.

An additional part of IEC 61968 will document integration scenarios or use cases, which are informative examples showing typical ways of using the message payloads defined in this document as well as message payloads to be defined in other parts of the IEC 61968 series.