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**Management von Systemen der Energietechnik und zugehöriger
Datenaustausch –
Langfristige Interoperabilität –
Teil 2: "End-to-end"-Qualitäts-Codes für SCADA (supervisory control
and data acquisition)
(IEC 62361-2:2013);
Englische Fassung EN 62361-2:2013**

Power systems management and associated information exchange –
Interoperability in the long term –
Part 2: End to end quality codes for supervisory control and data acquisition (SCADA)
(IEC 62361-2:2013);
English version EN 62361-2:2013

Gestion des systèmes de puissance et échanges d'informations associés –
Interopérabilité à long terme –
Partie 2: Codes de qualité de bout en bout pour le contrôle de supervision et acquisition
de données (SCADA)
(CEI 62361-2:2013);
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Anwendungsbeginn

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Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN IEC 62361:2008-01.

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

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Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (stability date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

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Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen 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.

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Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die englische Fassung der DIN EN 62361-2 veröffentlicht. Für die meisten der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Diese Norm steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

**Power systems management and associated information exchange -
Interoperability in the long term -
Part 2: End to end quality codes for supervisory control and data
acquisition (SCADA)
(IEC 62361-2:2013)**

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acquisition)
(IEC 62361-2:2013)

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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.

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CENELEC

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 57/1374/FDIS, future edition 1 of IEC 62361-2, 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 62361-2:2013.

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) 2014-07-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-10-30

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Endorsement notice

The text of the International Standard IEC 62361-2:2013 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

The scope of IEC 62361-2 is to create a common list of SCADA quality codes for reference by other standards to avoid embedding quality code lists in other standards.

POWER SYSTEMS MANAGEMENT AND ASSOCIATED INFORMATION EXCHANGE – INTEROPERABILITY IN THE LONG TERM –

Part 2: End to end quality codes for supervisory control and data acquisition (SCADA)

1 Scope

This part of IEC 62361 documents the quality codes used by existing IEC standards related to supervisory control and data acquisition (SCADA) in the field of power systems management. Meter reading quality coding is not considered to be in the scope of this version of the document. It determines and documents mapping between these standards. Eventual loss of quality information that might occur in mapping is documented. A cohesive and common list of quality codes with semantics is defined. The identified standards to be dealt with in this document are: IEC 60870-5, IEC 60870-6 TASE.2, IEC 61850, IEC 61970, DAIS DA, OPC DA and OPC UA.

Data covered by this part of IEC 62361 is measurements provided by the following links, applications or interfaces:

- RTU, 61850 or OPC DA links to SCADA
- Validation added by state estimation
- TASE.2 (ICCP) or TASE.1 (ELCOM) links between control centers
- Servers, e.g. SCADA, that provide OPC or DAIS DA-data.

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.

IEC 60870-5 (all parts), *Telecontrol equipment and systems – Part 5: Transmission protocols*

IEC 60870-6 (all parts), *Telecontrol equipment and systems – Part 6: Telecontrol protocols compatible with ISO standards and ITU-T recommendations*

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 61850-3, *Communication networks and systems for power utility automation – Part 3: General requirements*

IEC 61850-7-2:2010, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

IEC 61850-7-3, *Communication networks and systems for power utility automation – Part 7-3: Basic communication structure – Common data classes*

IEC 61970 (all parts), *Energy management system application program interface (EMS-API)*

IEC 61970-301, *Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base*

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

DAIS Data Access format/05-06-01; www.omg.com

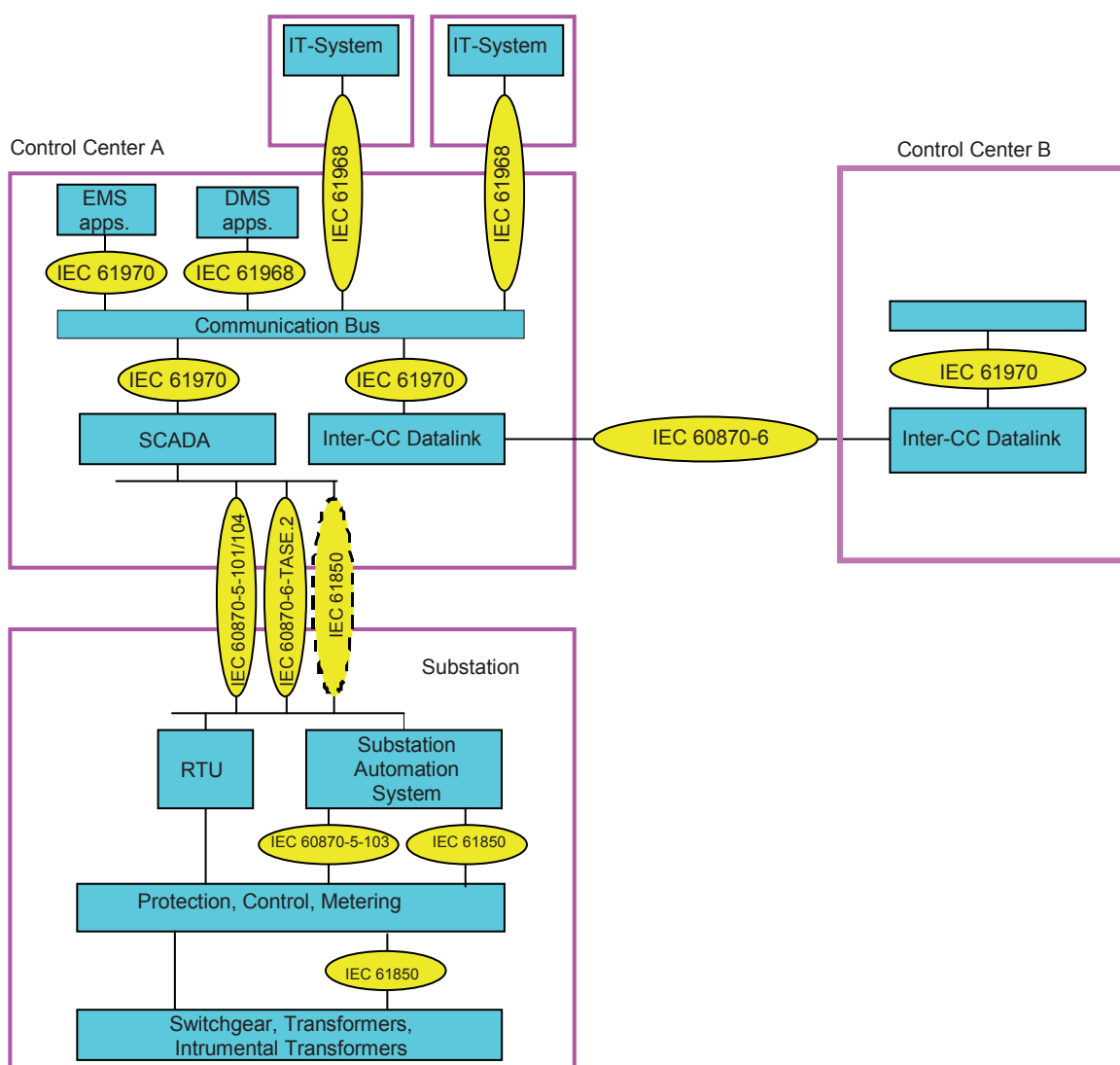
OPC Data Access version 2.03; www.opcfoundation.org.

OPC UA Part 8 -Data Access RC 1.01.10 Specification.doc

3 Terms and definitions

No special terms or definitions are required to understand this document.

4 Overview of applicable IEC standards



IEC 2213/13

Figure 1 – Overview of IEC power systems information exchange standards

Figure 1 provides an overview of the IEC power systems information exchange standards. Refer to IEC/TR 62357-1 (*Power systems management and associated information exchange – Part 1: Reference architecture*) for further information.

When data is transmitted using a telecommunications protocol, the quality of the data must be preserved, and have a common meaning on both side of the transmission.

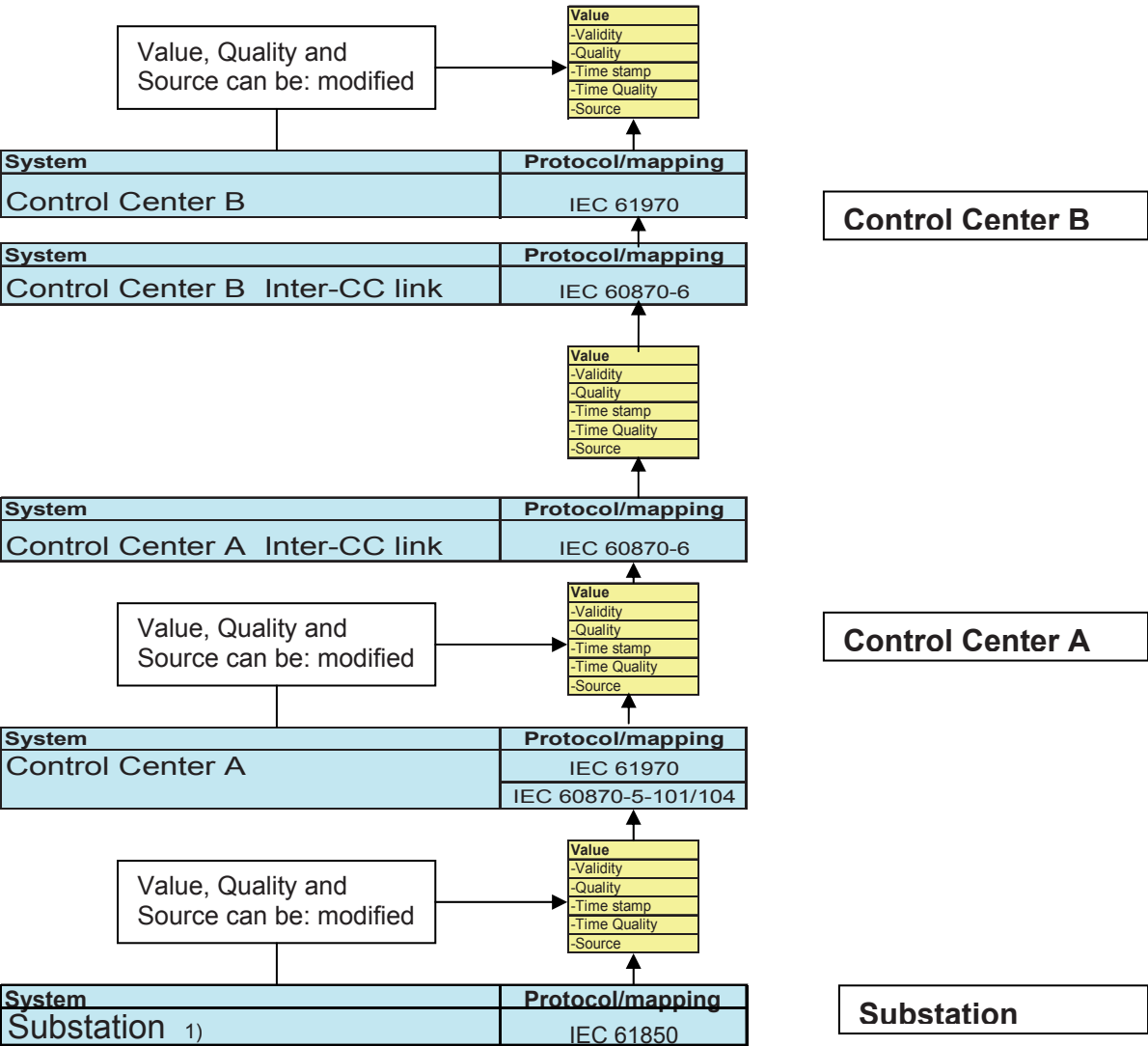
To facilitate harmonization and simplify maintenance of the standards, all IEC standards in the field of power systems management and associated information exchange should refer to this standard regarding quality codes. Specifications for quality codes should not be developed in the other standards. Upcoming revisions of this document can then work to harmonize quality codes across several standards.

5 Quality code flow diagram from substation to control center

IEC power systems information exchange standards for substation communication, control center communication and communication standards intended for exchange of information between applications at the control center level do have their own quality codes.

The quality codes flow through this chain of hierarchical systems from the IED to the control center. The quality codes need to be mapped between these standards. As different standards do not today support the same quality codes and semantics definitions for quality codes are not identical in the standards, mapping is difficult and loss of quality information can likely happen.

Figure 2 provides an example of the quality code flow diagram from substation to remote control center.



IEC 2214/13

Figure 2 – Example of quality code flow diagram from substation to remote control center

NOTE A number of systems with multiple Client-Server relationships can also exist within the substation

The primary purpose of the quality code is to provide information to applications and users of control systems if a value is good or not.

Most standards also have detailed quality codes that can help applications decide if questionable values can be used or provide information why a value is Invalid and cannot be used.

Some applications utilize the time stamp of values. Time quality codes must be provided to indicate if the time stamp can be used. For special applications also the time accuracy of the time stamp is relevant.

In addition to quality codes most standards have source quality that gives information about the origin of the value. Quality codes and value can also be set by local supervision functions or by operator input in systems in the acquisition chain.

Quality codes are important in the maintenance of control systems and are used to identify erroneous signals in the control systems. The quality codes should if possible indicate what type of failure has occurred.

Test activities in substations during commissioning and maintenance will generate values that are not “real”. The quality code test should indicated that these of values are not for operational use.

6 List of quality codes by existing standards

6.1 Comparison of quality codes in existing standards

Table 1 provides an overview of quality codes in existing standards.

Table 1 – Overview of quality codes in existing standards

Quality information	IEC and OMG SCADA related protocols:				
	IEC 61850	IEC 60870-5-101/104	IEC 60870-6 TASE.2	DAIS DA	OPC DA
Data/Information related quality					
Good	Validity-good	-	Validity-valid	Good	Good
Invalid	Validity-invalid	Invalid/Counter reading invalid	Validity-notvalid	Bad	Bad
	Overflow	-	-	-	-
	OutofRange	-	-	-	-
	BadReference	-	-	-	-
	Oscillatory	-	-	-	-
	Failure	-	-	Device failure	Device failure
				Configuration error	Configuration error
				Not connected	Not connected
				Sensor failure	Sensor failure
				Comm failure	Comm failure
				Last known value	Last known value
				Out of service	Out of service
Questionable	Validity-questionable	Not topical/Counter not adjusted	Validity-suspect	Uncertain	Uncertain
	OutofRange	-	-	Engineering units exceeded	Engineering units exceeded
	BadReference	-	-	Sensor not accurate	Sensor not accurate
	Oscillatory	-	-	Quality ocillatory	-
	OldData	-	-	Last usable value	Last usable value
	Inconsistent	-	-	Sub-normal	Sub-normal
	Inaccurate	-	-	Sensor not accurate	Sensor not accurate
	-	-	-		

Data source related information					
Process	Source-process (4)	-	Source-telemetered	Source process	-
Substituted	Source-substituted	Substituted	Source-entered	Primary substituted	Local override (5)
Calculated	-	-	Source-calculated		-
Estimated	-	-	Source-estimated	Source-corrected	-
	-	-	-	Source inherited substituted	-
Defaulted	-	-	-	Remote defaulted	-
Additional data quality information					
Test	Test	Test		TEST_MASK	-
OperatorBlocked	OperatorBlocked	Blocked (1)	Validity-held	OPERATOR_BLOCKED_MASK	-
Timestamp related quality					
Invalid time	ClockFailure	Invalid time	Time stamp quality	TS_ACC_BAD_TIME	-
Clock not synchronized	ClockNot synchronized	-	-	-	-
TimeAccuracy	TimeAccuracy	-	-	TS_ACC_10_MSEC TS_ACC_100_MSEC TS_ACC_SECOND	-

NOTE 1 Blocking and deblocking may be initiated e.g. by a local lock or a local automatic function.

NOTE 2 A correlation function has detected that the value is not consistent with other data. Typically set by a network state estimator.

NOTE 3 Value has been replaced by state estimator (This is an additional quality code and not an enumeration of source).

NOTE 4 Source Process is defined to be from process I/O or calculated by some application function.

NOTE 5 Validity shall be GOOD when code Local Override is set.

6.2 IEC 60870-5-101/ IEC 60870-5-104 quality codes

6.2.1 Data related quality

The following quality bits are used for single point information, double point information, step position information, bitstring of 32 bit and measured value:

OVERFLOW/NO OVERFLOW (OV)

The value of the information object is beyond a predefined range of value (mainly applicable to analogue values).

BLOCKED/NOT BLOCKED (BL)

The value of the information object is blocked for transmission; the value remains in the state that was acquired before it was blocked. Blocking and deblocking may be initiated e.g. by a local lock or a local automatic cause.

SUBSTITUTED/NOT SUBSTITUTED (SB)

The value of the information object is provided by input of an operator (dispatcher) or by an automatic source.

