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OPC Unified Architecture - Teil 11: Zugang zu historischen Daten (IEC 62541-11:2020)

Architecture unifiée OPC - Partie 11: Accès à l'Historique (IEC 62541-11:2020)

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English Version

**OPC Unified Architecture - Part 11: Historical Access
(IEC 62541-11:2020)**Architecture unifiée OPC - Partie 11: Accès à l'Historique
(IEC 62541-11:2020)OPC Unified Architecture - Teil 11: Zugang zu historischen
Daten
(IEC 62541-11:2020)

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EN IEC 62541-11:2020 (E)**European foreword**

The text of document 65E/710/FDIS, future edition 3 of IEC 62541-11, prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62541-11:2020.

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-07-28

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

IEC 62541-6	NOTE	Harmonized as EN 62541-6
IEC 62541-7	NOTE	Harmonized as EN 62541-7

Annex A (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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TR 62541-1	-	OPC unified architecture - Part 1: Overview and concepts	CLC/TR 62541-1	-
IEC 62541-3	-	OPC Unified Architecture - Part 3: Address Space Model	-	-
IEC 62541-4	-	OPC Unified Architecture - Part 4: Services	-	-
IEC 62541-5	-	OPC Unified Architecture - Part 5: Information Model	-	-
IEC 62541-8	-	OPC Unified Architecture - Part 8: Data Access	EN IEC 62541-8	-
IEC 62541-13	-	OPC Unified Architecture - Part 13: Aggregates	EN IEC 62541-13	-

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NORME INTERNATIONALE



OPC unified architecture –
Part 11: Historical Access

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Architecture unifiée OPC –
Partie 11: Accès à l'Historique

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OPC UNIFIED ARCHITECTURE –

Part 11: Historical Access

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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IEC 62541-11 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) a new method for determining the first historical point has been added;
- b) added clarifications on how to add, insert, modify, and delete annotations.

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

FDIS	Report on voting
65E/710/FDIS	65E/728/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in the "Terms and definition" clause in one of the parts of the IEC 62541 series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms and names* are, with a few exceptions, also written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts of the IEC 62541 series, published under the general title *OPC Unified Architecture*, can be found on the IEC website.

[https://standards.iteh.ai/catalog/standards/sist/9219ea09-0c5a-4cb8-89f2-](https://standards.iteh.ai/catalog/standards/sist/9219ea09-0c5a-4cb8-89f2-60cddc055015/sist-en-iec-62541-11-2020)

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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OPC UNIFIED ARCHITECTURE –

Part 11: Historical Access

1 Scope

This part of IEC 62541 is part of the OPC Unified Architecture standard series and defines the *information model* associated with Historical Access (HA). It particularly includes additional and complementary descriptions of the *NodeClasses* and *Attributes* needed for Historical Access, additional standard *Properties*, and other information and behaviour.

The complete *AddressSpace* Model including all *NodeClasses* and *Attributes* is specified in IEC 62541-3. The predefined *Information Model* is defined in IEC 62541-5. The *Services* to detect and access historical data and events, and description of the *ExtensibleParameter* types are specified in IEC 62541-4.

This document includes functionality to compute and return *Aggregates* like minimum, maximum, average etc. The *Information Model* and the concrete working of *Aggregates* are defined in IEC 62541-13.

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 TR 62541-1, *OPC Unified Architecture – Part 1: Overview and Concepts*

IEC 62541-3, *OPC Unified Architecture – Part 3: Address Space Model*

IEC 62541-4, *OPC Unified Architecture – Part 4: Services*

IEC 62541-5, *OPC Unified Architecture – Part 5: Information Model*

IEC 62541-8, *OPC Unified Architecture – Part 8: Data Access*

IEC 62541-13, *OPC Unified Architecture – Part 13: Aggregates*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TR 62541-1, IEC 62541-3, IEC 62541-4, and IEC 62541-13 as well as 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>

3.1.1**annotation**

metadata associated with an item at a given instance in time

Note 1 to entry: An *Annotation* is metadata that is associated with an item at a given instance in time.

3.1.2**BoundingValues**

values associated with the starting and ending time

Note 1 to entry: *BoundingValues* are the values that are associated with the starting and ending time of a *ProcessingInterval* specified when reading from the historian. *BoundingValues* may be required by *Clients* to determine the starting and ending values when requesting *raw data* over a time range. If a *raw data* value exists at the start or end point, it is considered the bounding value even though it is part of the data request. If no *raw data* value exists at the start or end point, then the *Server* will determine the boundary value, which may require data from a data point outside of the requested range. See 4.4 for details on using *BoundingValues*.

3.1.3**HistoricalNode**

Object, Variable, Property or View in the *AddressSpace* where a *Client* can access historical data or *Events*

Note 1 to entry: A *HistoricalNode* is a term used in this document to represent any *Object, Variable, Property or View* in the *AddressSpace* for which a *Client* may read and/or update historical data or *Events*. The terms "*HistoricalNode's history*" or "history of a *HistoricalNode*" will refer to the time series data or *Events* stored for this *HistoricalNode*. The term *HistoricalNode* refers to both *HistoricalDataNodes* and *HistoricalEventNodes*.

3.1.4**HistoricalDataNode**

Variable or Property in the *AddressSpace* where a *Client* can access historical data

Note 1 to entry: A *HistoricalDataNode* represents any *Variable or Property* in the *AddressSpace* for which a *Client* may read and/or update historical data. "*HistoricalDataNode's history*" or "history of a *HistoricalDataNode*" refers to the time series data stored for this *HistoricalNode*. Examples of such data are:

- device data (like temperature sensors)
- calculated data
- status information (open/closed, moving)
- dynamically changing system data (like stock quotes)
- diagnostic data

The term *HistoricalDataNodes* is used when referencing aspects of the standard that apply to accessing historical data only.

3.1.5**HistoricalEventNode**

Object or View in the *AddressSpace* for which a *Client* can access historical *Events*

Note 1 to entry: "*HistoricalEventNode's history*" or "history of a *HistoricalEventNode*" refers to the time series *Events* stored in some historical system. Examples of such data are:

- *Notifications*
- system *Alarms*
- operator action *Events*
- system triggers (such as new orders to be processed)

The term *HistoricalEventNode* is used when referencing aspects of the standard that apply to accessing historical *Events* only.

3.1.6**modified values**

HistoricalDataNode's value that has been changed (or manually inserted or deleted) after it was stored in the historian

Note 1 to entry: For some *Servers*, a lab data entry value is not a *modified value*, but if a user corrects a lab value, the original value would be considered a *modified value*, and would be returned during a request for *modified values*. Also manually inserting a value that was missed by a standard collection system can be considered a *modified value*. Unless specified otherwise, all historical *Services* operate on the current, or most recent, value for the specified *HistoricalDataNode* at the specified timestamp. Requests for *modified values* are used to access values that have been superseded, deleted or inserted. It is up to a system to determine what is considered a *modified value*. Whenever a *Server* has modified data available for an entry in the historical collection, it shall set the *ExtraData* bit in the *StatusCode*.

3.1.7

raw data

data that is stored within the historian for a *HistoricalDataNode*

Note 1 to entry: The data can be all data collected for the *DataValue* or it can be some subset of the data depending on the historian and the storage rules invoked when the item's values were saved.

3.1.8

StartTime/EndTime

bounds of a history request which define the time domain

Note 1 to entry: For all requests, a value falling at the end time of the time domain is not included in the domain, so that requests made for successive, contiguous time domains will include every value in the historical collection exactly once.

3.1.9

TimeDomain

interval of time covered by a particular request, or response

Note 1 to entry: In general, if the start time is earlier than or the same as the end time, the time domain is considered to begin at the start time and end just before the end time; if the end time is earlier than the start time, the time domain still begins at the start time and ends just before the end time, with time "running backward" for the particular request and response. In both cases, any value which falls exactly at the end time of the *TimeDomain* is not included in the *TimeDomain*. See the examples in 4.4. *BoundingValues* affect the time domain as described in 4.4.

All timestamps that can legally be represented in a *UtcTime DataType* are valid timestamps, and the *Server* may not return an invalid argument result code due to the timestamp being outside of the range for which the *Server* has data. See IEC 62541-3 for a description of the range and granularity of this *DataType*. *Servers* are expected to handle out-of-bounds timestamps gracefully, and return the proper *StatusCodes* to the *Client*.

3.1.10

Structured History Data

structured data stored in a history collection where parts of the structure are used to uniquely identify the data within the data collection

Note 1 to entry: Most historical data applications assume only one current value per timestamp. Therefore, the timestamp of the data is considered the unique identifier for that value. Some data or metadata such as *Annotations* may permit multiple values to exist at a single timestamp. In such cases, the *Server* would use one or more parameters of the *Structured History Data* entry to uniquely identify each element within the history collection. *Annotations* are examples of *Structured History Data*.

3.2 Abbreviated terms

DA	data access
HA	historical access
HDA	historical data access
UA	Unified Architecture

4 Concepts

4.1 General

This document defines the handling of historical time series data and historical *Event* data in the OPC Unified Architecture. Included is the specification of the representation of historical data and *Events* in the *AddressSpace*.