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OPC Unified Architecture - Part 11: Historical Access (IEC 62541-11:2015)

OPC Unified Architecture - Teil 11: Zugang zu historischen Daten (IEC 62541-11:2015)

Architecture unifiée OPC - Partie 11: Accès à l'Historique (IEC 62541-11:2015)

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EUROPEAN STANDARD

**EN 62541-11**

NORME EUROPÉENNE

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**OPC unified architecture - Part 11: Historical Access  
(IEC 62541-11:2015)**Architecture unifiée OPC - Partie 11: Accès à l'Historique  
(IEC 62541-11:2015)OPC Unified Architecture - Teil 11: Zugang zu historischen  
Daten  
(IEC 62541-11:2015)

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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 65E/380/CDV, future edition 1 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 62541-11:2015.

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) 2016-01-29
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-04-29

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

IEC/TR 62541-2	NOTE	Harmonized as CLC/TR 62541-2.
IEC 62541-6	NOTE	Harmonized as EN 62541-6.
IEC 62541-7	NOTE	Harmonized as EN 62541-7.
IEC 62541-9	NOTE	Harmonized as EN 62541-9.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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](http://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	EN 62541-3	-
IEC 62541-4	-	OPC Unified Architecture - Part 4: Services	EN 62541-4	-
IEC 62541-5	-	OPC unified architecture - Part 5: Information Model	EN 62541-5	-
IEC 62541-8	-	OPC Unified Architecture - Part 8: Data Access	EN 62541-8	-
IEC 62541-13	-	OPC unified architecture - Part 13: Aggregates	EN 62541-13	-

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



OPC unified architecture –  
Part 11: Historical Access

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Partie 11: Accès à l'Historique

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## OPC UNIFIED ARCHITECTURE –

## Part 11: Historical Access

## FOREWORD

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International Standard 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.

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

CDV	Report on voting
65E/380/CDV	65E/410/RVC

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.

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.

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

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## OPC UNIFIED ARCHITECTURE –

### Part 11: Historical Access

#### 1 Scope

This part of IEC 62541 is part of the overall 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 standard 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, 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 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 abbreviations

##### 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.

##### 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. There does not have to be a value stored at that 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 may 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 may be all data collected for the *DataValue* or it may 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* effect the time domain as described in 4.4.

All timestamps which 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 meta data 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 Abbreviations**

DA	Data Access
HA	Historical Access
HDA	Historical Data Access
UA	Unified Architecture

**4 Concepts****4.1 General**

This standard 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*.

**4.2 Data architecture**

A *Server* supporting Historical Access provides *Clients* with transparent access to different historical data and/or historical *Event* sources (e.g. process historians, event historians, etc.).

The historical data or *Events* may be located in a proprietary data collection, database or a short term buffer within the memory. A *Server* supporting Historical Access will provide