

TECHNICAL REPORT



**OPC unified architecture –
Part 1: Overview and concepts**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.40; 35.100.01

ISBN 978-2-8322-3640-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms, definitions and abbreviations	6
3.1 Terms and definitions	6
3.2 Abbreviations	10
4 Structure of the OPC UA series.....	10
4.1 Specification organization.....	10
4.2 Core specification parts.....	11
4.3 Access Type specification parts.....	12
4.4 Utility specification parts.....	12
5 IEC 62541 standards – Overview	13
5.1 UA scope	13
5.2 General.....	13
5.3 Design goals	13
5.4 Integrated models and services	15
5.4.1 Security model	15
5.4.2 Integrated <i>AddressSpace</i> model	16
5.4.3 Integrated object model	16
5.4.4 Integrated services.....	17
5.5 Sessions	17
5.6 Redundancy.....	17
6 Systems concepts.....	17
6.1 Overview.....	17
6.2 OPC UA <i>Clients</i>	18
6.3 OPC UA <i>Servers</i>	19
6.3.1 General.....	19
6.3.2 Real objects	19
6.3.3 OPC UA <i>Server</i> application	19
6.3.4 OPC UA <i>AddressSpace</i>	20
6.3.5 Publisher/subscriber entities.....	20
6.3.6 OPC UA <i>Service</i> Interface	20
6.3.7 <i>Server to Server</i> interactions	21
7 Service Sets	22
7.1 General.....	22
7.2 Discovery Service Set	22
7.3 SecureChannel Service Set.....	22
7.4 Session Service Set	23
7.5 NodeManagement Service Set.....	23
7.6 View Service Set.....	24
7.7 Query Service Set	24
7.8 Attribute Service Set	24
7.9 Method Service Set.....	24
7.10 MonitoredItem Service Set	24
7.11 Subscription Service Set	25
Bibliography	26

Figure 1 – OPC UA Specification organization	11
Figure 2 – OPC UA Target applications	14
Figure 3 – OPC UA System architecture	18
Figure 4 – OPC UA Client architecture	18
Figure 5 – OPC UA Server architecture	19
Figure 6 – Peer-to-peer interactions between Servers.....	21
Figure 7 – Chained Server example	22
Figure 8 – SecureChannel and Session Services.....	23

IECNORM.COM : Click to view the full PDF of IEC/TR 62541 1 ed 2.0:2016

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPC UNIFIED ARCHITECTURE –**Part 1: Overview and concepts**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62541-1, which is a technical report, 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 technical report is based on the following documents:

Enquiry draft	Report on voting
65E/414/DTR	65E/463/RVC

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