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Ersatz für  
DIN EN 62541-7:2013-06  
Siehe Anwendungsbeginn

**OPC Unified Architecture –  
Teil 7: Profile  
(IEC 62541-7:2015);  
Englische Fassung EN 62541-7:2015**

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Part 7: Profiles  
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## **Anwendungsbeginn**

Anwendungsbeginn für die von CENELEC am 2015-04-29 angenommene Europäische Norm als DIN-Norm ist 2015-11-01.

Für DIN EN 62541-7:2013-06 besteht eine Übergangsfrist bis 2018-04-29.

## **Nationales Vorwort**

*Vorausgegangener Norm-Entwurf: E DIN EN 62541-7:2014-11.*

Für dieses Dokument ist das nationale Arbeitsgremium K 931 „Systemaspekte“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE ([www.dke.de](http://www.dke.de)) zuständig.

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Der Zusammenhang der zitierten Dokumente mit den entsprechenden Deutschen Dokumenten 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.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die Englische Fassung der EN 62541-7 veröffentlicht. Zu deren Abschnitt 1, der den Anwendungsbereich festlegt, und Abschnitt 3, der die Begriffe festlegt, wurde eine Übersetzung angefertigt und als Nationaler Anhang NA der vorliegenden Norm hinzugefügt. Für viele 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.

Das Original-Dokument enthält Bilder in Farbe, die in der Papierversion in einer Graustufen-Darstellung wiedergegeben werden. Elektronische Versionen dieses Dokuments enthalten die Bilder in der originalen Farbdarstellung.

## **Änderungen**

Gegenüber DIN EN 62541-7:2013-06 wurden folgende Änderungen vorgenommen:

- a) Ergänzung einer großen Anzahl zusätzlicher Facetten, um zusätzliche Anwendungsfelder von OPC-UA abzudecken. Die wichtigsten sind: Facetten für Zugriff auf historische Daten, Facetten für Aggregate, Facetten für HTTPs, neue Facetten für IT-Sicherheit, neue Facette für Benutzer-Token, die anonymen Zugriff unterstützt, Facetten, die sich in der Praxis bewährt haben;

- b) Neue Sicherheitsrichtlinie bei asymmetrischen Schlüssellängen größer als 2048.

## Frühere Ausgaben

DIN EN 62541-7: 2013-06

# Nationaler Anhang NA (informativ)

## 1 Anwendungsbereich

Dieser Teil der Normenreihe IEC 62541 legt die *Profile* (en: *Profiles*) der OPC Unified Architecture (OPC-UA) (vereinheitlichte Architektur der plattformunabhängigen Kommunikation) fest. Die *Profile* in diesem Dokument werden verwendet, um die Eigenschaften bezüglich Prüfungen von OPC-UA-Produkten und den Charakter der Prüfungen (basierend auf dem Werkzeug oder basierend auf dem Laboratorium) zu trennen. Dies umfasst die Prüfungen, welche durch das von der OPC-Organisation bereitgestellte OPC-UA-CTT (ein Selbstprüfungswerkzeug) und durch von der OPC-Organisation bereitgestellte unabhängige Prüflaboratorien zur Zertifizierung durchgeführt werden. Dies könnte sich gleichermaßen ebenso auf Prüfwerkzeuge beziehen, welche von einer anderen Organisation oder einem Prüflaboratorium einer anderen Organisation bereitgestellt werden. Wichtig ist das Konzept der automatisierten Prüfung basierend auf dem Werkzeug im Gegensatz zur Prüfung basierend auf dem Laboratorium. Der Anwendungsbereich dieser Norm umfasst die Festlegung der Funktionalität, welche nur in einem Prüflaboratorium geprüft werden kann, und der Festlegung der Gruppierung von Funktionalität, welche bei der Prüfung von OPC-UA-Produkten entweder in einem Laboratorium oder mit automatisierten Werkzeugen zu prüfen ist. Die Festlegung von tatsächlichen *Prüffällen* (en: *TestCases*) liegt nicht im Anwendungsbereich dieses Dokuments, aber die allgemeinen Kategorien von *Prüffällen* liegen im Anwendungsbereich dieses Dokuments.

Die meisten OPC-UA-Anwendungen stimmen mit vielen, aber nicht allen, dieser *Profile* überein.

## 3 Begriffe und Konventionen

### 3.1 Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach IEC/TR 62541-1, IEC/TR 62541-2, IEC 62541-3, IEC 62541-4, IEC 62541-6 und IEC 62541-8 und die folgenden Begriffe. Ein Überblick der in dieser Norm festgelegten Begriffe und ihrer Beziehung zueinander ist in Bild 1 zu sehen.

#### 3.1.1

##### Anwendung

(en: Application)

Programm, das Aspekte von OPC-UA umsetzt oder bearbeitet

ANMERKUNG 1 zum Begriff: Die Anwendung kann auf jeder Maschine laufen und jegliche Funktionalität ausführen. Die Anwendung kann eine Software- oder eine Hardware-Anwendung sein, die einzige Anforderung ist, dass sie OPC-UA umsetzt.

#### 3.1.2

##### KonformitätsEinheit

(en: ConformanceUnit)

definierte Menge von Eigenschaften, die als Einheit geprüft werden können

ANMERKUNG 1 zum Begriff: Eine *KonformitätsEinheit* kann eine Gruppe von Diensten, Teile von Diensten oder Informationsmodelle abdecken. Weitere Details werden in Abschnitt 5 beschrieben.

### 3.1.3

#### **KonformitätsGruppe**

(en: ConformanceGroup)

Gruppierung von *KonformitätsEinheiten* mit eigenständigen Namen

ANMERKUNG 1 zum Begriff: Die Gruppierung dient lediglich der Organisation von *KonformitätsEinheiten*. Typische *KonformitätsGruppen* beinhalten Gruppen für jeden Satz von Diensten in OPC-UA und jede der Informationsmodell-Spezifikationen.

### 3.1.4

#### **Facette**

(en: Facet)

*Profil*, welches einer spezifischen Eigenschaft zugeordnet ist, die ein *Server* oder *Client* benötigen kann

ANMERKUNG 1 zum Begriff: *Facetten* werden typischerweise zusammengefasst, um ein vollständiges *Profil* zu bilden. Die Verwendung des Begriffs *Facette* im Titel eines *Profils* zeigt an, dass das *Profil* nicht alleine eingesetzt werden kann.

### 3.1.5

#### **VollAusgestattetes Profil**

(en: FullFeatured Profile)

ein *Profil*, das alles festlegt, was zum Aufbau einer OPC-UA-Anwendung notwendig ist

ANMERKUNG 1 zum Begriff: Im Besonderen enthält ein voll ausgestattetes *Profil* Festlegungen aus der Transportschicht und zur IT-Sicherheit.

### 3.1.6

#### **ProfilKategorie**

(en: ProfileCategory)

eine Gruppierung von *Profilen* in wichtige funktionale Gruppen wie *Server* und *Client*

ANMERKUNG 1 zum Begriff: Diese Kategorien helfen Entwicklern und Benutzern, den Typ der *Anwendung* herauszufinden, in dem ein *Profil* verwendet werden kann. Weitere Details werden in 4.4 beschrieben.

### 3.1.7

#### **Prüffall**

(en: TestCase)

technische Beschreibung einer Menge von Schritten, die erforderlich sind, eine bestimmte Funktion oder ein bestimmtes Informationsmodell zu testen

ANMERKUNG 1 zum Begriff: *Prüffälle* bieten ausreichende Einzelheiten, um einem Entwickler die Umsetzung in Code zu ermöglichen. *Prüffälle* bieten auch eine genaue Zusammenfassung des (der) erwarteten Ergebnisse(s) bei der Ausführung der Implementierung und alle Vorbedingungen, die erfüllt werden müssen, bevor der *Prüffall* ausgeführt werden kann.

### 3.1.8

#### **Prüflabor**

(en: TestLab)

Ort, der dafür ausgestattet ist, Prüfdienste bereitzustellen

ANMERKUNG 1 zum Begriff: Diese Dienste umfassen direkt prüfendes Personal, automatisierte Prüfungen und einen formal wiederholbaren Prozess, sind aber nicht darauf beschränkt. Die OPC-Organisation stellt detaillierte Spezifikationen bereit, welche OPC-UA-Prüflaboratorien festlegen sowie die Prüfungen festlegen, welche diese durchführen müssen (siehe auch Compliance Part 8 UA *Server*, Compliance Part 9 UA *Client*).

English Version

OPC unified architecture - Part 7: Profiles  
(IEC 62541-7:2015)

Architecture unifiée OPC - Partie 7: Profils  
(IEC 62541-7:2015)

OPC Unified Architecture - Teil 7: Profile  
(IEC 62541-7:2015)

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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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Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## **Foreword**

The text of document 65E/378/CDV, future edition 2 of IEC 62541-7, 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 62541-7:2015.

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

This document supersedes EN 62541-7:2012.

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

## **Endorsement notice**

The text of the International Standard IEC 62541-7:2015 was approved by CENELEC as a European Standard without any modification.

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# OPC UNIFIED ARCHITECTURE –

## Part 7: Profiles

### 1 Scope

This part of IEC 62541 describes the OPC Unified Architecture (OPC UA) *Profiles*. The *Profiles* in this document are used to segregate features with regard to testing of OPC UA products and the nature of the testing (tool based or lab based). This includes the testing performed by the OPC Foundation provided OPC UA CTT (a self-test tool) and by the OPC Foundation provided Independent certification test labs. This could equally as well refer to test tools provided by another organization or a test lab provided by another organization. What is important is the concept of automated tool based testing versus lab based testing. The scope of this standard includes defining functionality that can only be tested in an a lab and defining the grouping of functionality that is to be used when testing OPC UA products either in a lab or using automated tools. The definition of actual *TestCases* is not within the scope of this document, but the general categories of TestCases are within the scope of this document.

Most OPC UA applications will conform to several, but not all of, the *Profiles*.

### 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 TR 62541-2, *OPC unified architecture – Part 2: Security model*

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 62541-6, *OPC unified architecture – Part 6: Mappings*

IEC 62541-8, *OPC unified architecture – Part 8: Data access*

IEC 62541-9, *OPC unified architecture – Part 9: Alarms and conditions*

IEC 62541-11<sup>1</sup>, *OPC unified architecture – Part 11: Historical access*

IEC 62541-13<sup>1</sup>, *OPC unified architecture – Part 13: Aggregates*

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<sup>1</sup> To be published.

### 3 Terms, definitions, and conventions

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TR 62541-1, IEC TR 62541-2, IEC 62541-3, IEC 62541-4, IEC 62541-6, and IEC 62541-8 as well as the following apply. An overview of the terms defined in this standard and their interaction can be viewed in Figure 1.

##### 3.1.1

##### **application**

software program that executes or implements some aspect of OPC UA

Note 1 to entry: The application could run on any machine and perform any function. The application could be software or it could be a hardware application, the only requirement is that it implements OPC UA.

##### 3.1.2

##### **ConformanceUnit**

specific set of OPC UA features that can be tested as a single entity

Note 1 to entry: A *ConformanceUnit* can cover a group of services, portions of services or information models. For additional detail see Clause 5.

##### 3.1.3

##### **ConformanceGroup**

group of *ConformanceUnits* that is given a name

Note 1 to entry: This grouping is only to assist in organizing *ConformanceUnits*. Typical *ConformanceGroups* include groups for each of the service sets in OPC UA and each of the Information Model standards.

##### 3.1.4

##### **Facet**

*Profile* dedicated to a specific feature that a *Server* or *Client* may require

Note 1 to entry: *Facets* are typically combined to form higher-level *Profiles*. The use of the term *Facet* in the title of a *Profile* indicates that the given *Profile* is not a standalone *Profile*.

##### 3.1.5

##### **FullFeatured Profile**

*Profile* that defines all features necessary to build a functional OPC UA *Application*

Note 1 to entry: A *FullFeatured Profile* in particular adds definitions of the transport and security requirements.

##### 3.1.6

##### **ProfileCategory**

arranges *Profiles* into application classes, such as *Server* or *Client*

Note 1 to entry: These categories help determine the type of *Application* that a given *Profile* would be used for. For additional details see 4.4.

##### 3.1.7

##### **TestCase**

technical description of a set of steps required to test a particular function or information model

Note 1 to entry: *TestCases* provide sufficient details to allow a developer to implement them in code. *TestCases* also provide a detailed summary of the expected result(s) from the execution of the implemented code and any precondition(s) that must be established before the *TestCase* can be executed.

##### 3.1.8

##### **TestLab**

facility that is designated to provide testing services

Note 1 to entry: These services include but are not limited to personal that directly perform testing, automated testing and a formal repeatable process. The OPC Foundation has provided detailed standard describing OPC UA TestLabs and the testing they are to provided (see Compliance Part 8 UA *Server*, Compliance Part 9 UA *Client*).

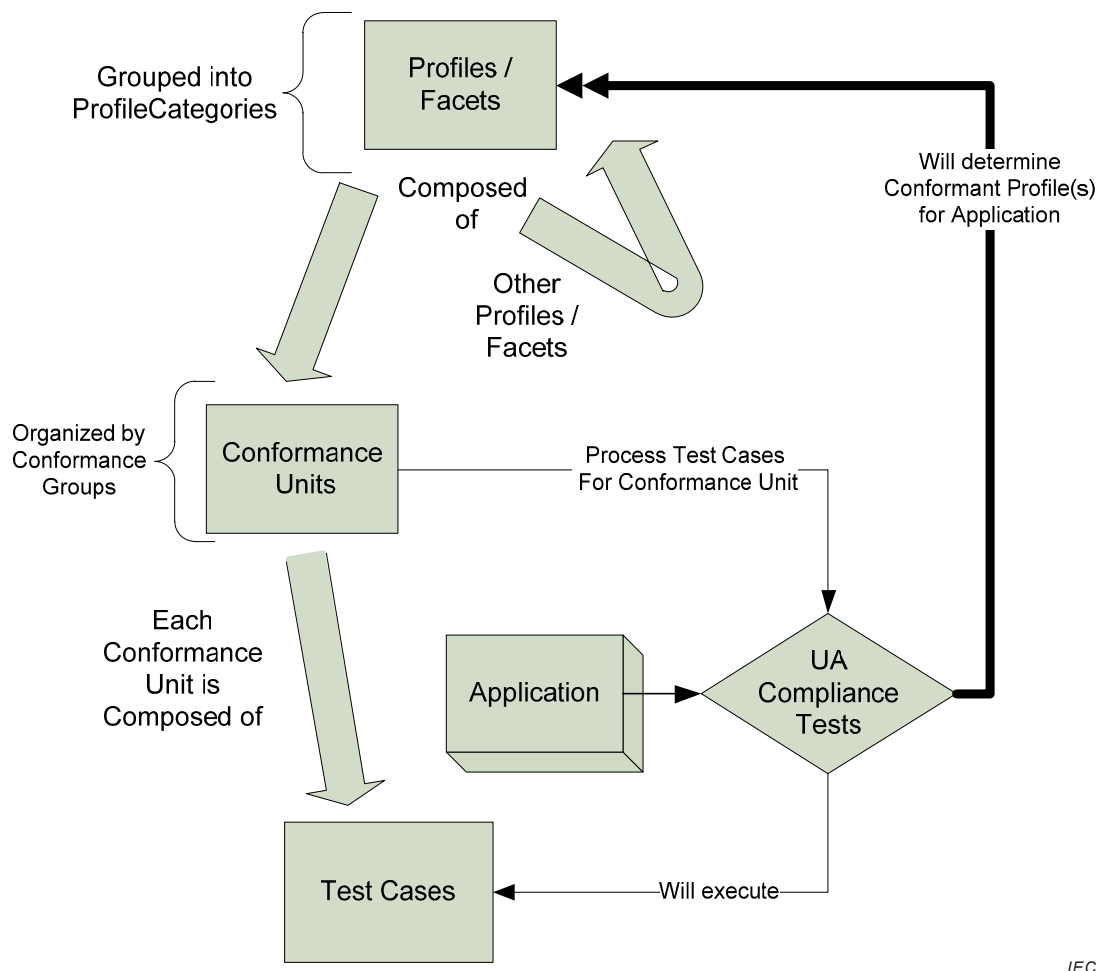
### 3.2 Abbreviations

|      |                                               |
|------|-----------------------------------------------|
| DA   | Data Access                                   |
| HA   | Historical Access                             |
| HMI  | Human Machine Interface                       |
| NIST | National Institute of Standard and Technology |
| PKI  | Public Key Infrastructure                     |
| RSA  | Rivest-Shamir-Adleman                         |
| UA   | Unified Architecture                          |

## 4 Overview

### 4.1 General

The OPC Unified architecture multipart standard describes a number of *Services* and a variety of information models. These *Services* and information models can be referred to as features of a *Server* or *Client*. *Servers* and *Clients* need to be able to describe which features they support and wish to have certified. This document provides a grouping of these features. The individual features are grouped into *ConformanceUnits* which are further grouped into *Profiles*. Figure 1 provides an overview of the interactions between *Profiles*, *ConformanceUnits* and *TestCases*. The large arrows indicate the components that are used to construct the parent. For example a *Profile* is constructed from *Profiles* and *ConformanceUnits*. The figure also illustrates a feature of the OPC UA Compliance Test Tool (CTT), in that it will test if a requested *Profile* passes all *ConformanceUnits*. It will also test all other *ConformanceUnits* and report any other *Profiles* that pass conformance testing. The individual *TestCases* are defined in separate documents see Compliance Part 8 UA *Server* and Compliance Part 9 UA *Client*. The *TestCases* are related back to the appropriate *ConformanceUnits* defined in this standard. This relationship is also displayed by the OPC UA Compliance Test Tool.



IEC

Figure 1 – Profile – ConformanceUnit – TestCases

## 4.2 ConformanceUnit

Each *ConformanceUnit* represents a specific set of features (e.g. a group of services, portions of services or information models) that can be tested as a single entity. *ConformanceUnits* are the building blocks of a *Profile*. Each *ConformanceUnit* can also be used as a test category. For each *ConformanceUnit*, there would be a number of *TestCases* that test the functionality described by the *ConformanceUnit*. The description of a *ConformanceUnit* is intended to provide enough information to illustrate the required functionality, but in many cases to obtain a complete understanding of the *ConformanceUnit* the reader may be required to also examine the appropriate part of IEC 62541. Additional Information regarding testing of a *ConformanceUnit* are provided in the Compliance Part 8 UA Server or Compliance Part 9 UA Client test standards.

The same features do not appear in more than one *ConformanceUnit*.

## 4.3 Profiles

A *Profile* is a named aggregation of *ConformanceUnits* and other *Profiles*. To support a *Profile*, an application has to support the *ConformanceUnits* and all aggregated *Profiles*. The definition of *Profiles* is an ongoing activity, in that it is expected that new *Profiles* will be added in the future.

An OPC UA Application will typically support multiple *Profiles*.

Multiple *Profiles* may include the same *ConformanceUnit*.

Testing of a *Profile* consists of testing the individual *ConformanceUnits* that comprise the *Profile*.

*Profiles* are named based on naming conventions (see 6.3 for details).

#### 4.4 Profile Categories

*Profiles* are grouped into categories to help vendors and end users understand the applicability of a *Profile*. A *Profile* can be assigned to more than one category.

Table 1 contains the list of currently defined *ProfileCategories*.

**Table 1 – ProfileCategories**

| Category  | Description                                                                                                                                                                                                                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client    | <i>Profiles</i> of this category specify functions of an OPC UA <i>Client</i> . The URI of such <i>Profiles</i> can be part of a Software <i>Certificate</i> passed in the ActivateSession request.                                                                                                            |
| Security  | <i>Profiles</i> of this category specify security related functions. Security policies are part of this category. The URI of security policies has to be part of an Endpoint Description returned from the GetEndpoints service. <i>Profiles</i> of this category apply to <i>Servers</i> and <i>Clients</i> . |
| Server    | <i>Profiles</i> of this category specify functions of an OPC UA <i>Server</i> . The URI of such <i>Profiles</i> can be part of a Software <i>Certificate</i> returned with the CreateSession service response and exposed in the server capabilities.                                                          |
| Transport | <i>Profiles</i> of this category specify specific protocol mappings. The URI of such <i>Profiles</i> has to be part of an Endpoint Description. These <i>Profiles</i> apply to <i>Servers</i> and <i>Clients</i> .                                                                                             |

## 5 ConformanceUnits

### 5.1 Overview

A *ConformanceUnit* represents an individually testable entity. For improved clarity, the large list of *ConformanceUnits* is arranged into named *ConformanceGroups*. These groups reflect the *Service Sets* in IEC 62541-4 and the OPC UA information models. Table 2 lists the *ConformanceGroups*. These groups and the *ConformanceUnits* that they describe are detailed in the Subclauses of Clause 5 starting with 5.2 *ConformanceGroups* have no impact on testing; they are used only for organizational reasons, i.e. to simplify the readability of this document.

**Table 2 – ConformanceGroups**

| Group                    | Description                                                                                                                                                                                                          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Address Space Model      | Defines <i>ConformanceUnits</i> for various features of the OPC UA <i>AddressSpace</i> .                                                                                                                             |
| Aggregates               | All <i>ConformanceUnits</i> that are related to <i>Aggregates</i> , including individual <i>ConformanceUnits</i> for each supported <i>Aggregate</i> as described in IEC 62541-13.                                   |
| Alarms and Conditions    | All <i>ConformanceUnits</i> that are associated with the OPC UA information model for <i>Conditions</i> , acknowledgeable <i>Conditions</i> , confirmations and <i>Alarms</i> as specified in IEC 62541-9.           |
| Attribute Services       | Includes <i>ConformanceUnits</i> to read or write current or historical <i>Attribute</i> values.                                                                                                                     |
| Auditing                 | User level security includes support for security audit trails, with traceability between <i>Client</i> and <i>Server</i> audit logs.                                                                                |
| Base Information         | All information elements as defined in IEC 62541-5.                                                                                                                                                                  |
| Data Access              | <i>ConformanceUnits</i> specific to <i>Clients</i> and <i>Servers</i> that deal with the representation and use of automation data as specified in IEC 62541-8.                                                      |
| Discovery Services       | <i>ConformanceUnits</i> which focus on <i>Server Endpoint Discovery</i> .                                                                                                                                            |
| Historical Access        | Access to archived data of node <i>Attribute</i> values or <i>Events</i> .                                                                                                                                           |
| Method Services          | <i>Methods</i> represent the function calls of <i>Objects</i> . <i>Methods</i> are invoked and return only after completion (successful or unsuccessful).                                                            |
| Miscellaneous            | This group contains <i>ConformanceUnits</i> that cover miscellaneous subjects, such as recommended behaviours, documentation etc. These <i>ConformanceUnits</i> typically do not fit into any of the other groups.   |
| Monitored Item Services  | <i>Clients</i> define <i>MonitoredItems</i> to subscribe to data and <i>Events</i> . Each <i>MonitoredItem</i> identifies the item to be monitored and the <i>Subscription</i> to use to send <i>Notifications</i> . |
| Node Management Services | Bundles <i>ConformanceUnits</i> for all <i>Services</i> to add and delete OPC UA <i>AddressSpace Nodes</i> and <i>References</i> .                                                                                   |
| Protocol and Encoding    | Covers all transport and encoding combinations that are specified in IEC 62541-6.                                                                                                                                    |
| Query Services           | A Query may be used to provide advanced filtering and return a subset of data.                                                                                                                                       |
| Redundancy               | The design of OPC UA ensures that vendors can create redundant <i>Clients</i> and redundant <i>Servers</i> in a consistent manner. Redundancy may be used for high availability, fault tolerance and load balancing. |
| Security                 | Security related <i>ConformanceUnits</i> that can be profiled this includes all aspects of security.                                                                                                                 |
| Session Services         | An (OPC UA) <i>Session</i> is an application layer connection.                                                                                                                                                       |
| Subscription Services    | Subscriptions are used to report <i>Notifications</i> to the <i>Client</i> .                                                                                                                                         |
| View Services            | <i>Clients</i> use the View Service Set to navigate through the OPC UA <i>AddressSpace</i> or through a View (a subset) of the OPC UA <i>AddressSpace</i> .                                                          |

## 5.2 Services

Tables 3 to 10 describe *ConformanceUnits* for the *Services* specified in IEC 62541-4. The tables correlate with the *Service Sets*.

A single *ConformanceUnit* can reference several *Services* (e.g. CreateSession, ActivateSession and CloseSession) but can also refer to individual aspects of *Services* (e.g. the use of ActivateSession to impersonate a new user).

Each table includes a listing of the *Profile Category* to which a *ConformanceUnit* belongs, the title and description of the *ConformanceUnit* and a column that indicates if the *ConformanceUnit* is derived from another *ConformanceUnit*. A *ConformanceUnit* that is derived from another *ConformanceUnit* includes all of the same tests as its parent plus one or more additional TestCases. These TestCases can only further restrict the existing TestCases. An example would be one in which the number of connections is tested, where the TestCase of the parent required at least one connection and the derived *ConformanceUnit* would require a *TestCase* for at least five connections.

The *Discovery Service Set* is composed of multiple *ConformanceUnits* (see Table 3). All *Servers* provide some aspects of this functionality; see *Profiles* categorized as *Server Profiles* for details. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

**Table 3 – Discovery Services**

| Category | Title                                  | Description                                                                                                                                                                                    | Derived |
|----------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Discovery Get Endpoints                | Support the GetEndpoints <i>Service</i> to obtain all Endpoints of the <i>Server</i> . This includes filtering based on <i>Profiles</i> .                                                      |         |
| Server   | Discovery Find Servers Self            | Support the FindServers <i>Service</i> only for itself.                                                                                                                                        |         |
| Server   | Discovery Register                     | Call the RegisterServer <i>Service</i> to register itself (OPC UA <i>Server</i> ) with an external <i>Discovery Service</i> via a secure channel with a <i>SecurityMode</i> other than "None". |         |
| Server   | Discovery Configuration                | Allow configuration of the <i>Discovery Server</i> URL where the <i>Server</i> will register itself. Allow complete disabling of registration with a <i>Discovery Server</i> .                 |         |
| Client   | Discovery Client Find Servers Basic    | Uses the FindServers <i>Service</i> to obtain all <i>Servers</i> installed on a given platform.                                                                                                |         |
| Client   | Discovery Client Find Servers with URI | Use FindServers <i>Service</i> to obtain URLs for specific <i>Server</i> URIs.                                                                                                                 |         |
| Client   | Discovery Client Find Servers Dynamic  | Detect new <i>Servers</i> after an initial FindServers <i>Service</i> call.                                                                                                                    |         |
| Client   | Discovery Client Get Endpoints Basic   | Uses the GetEndpoints <i>Service</i> to obtain all Endpoints for a given <i>Server</i> URI.                                                                                                    |         |
| Client   | Discovery Client Get Endpoints Dynamic | Detect changes to the Endpoints after an initial GetEndpoints <i>Service</i> call.                                                                                                             |         |
| Client   | Discovery Client Configure Endpoint    | Allow specification of an Endpoint without going through the <i>Discovery Service Set</i> .                                                                                                    |         |

The *Session Service Set* is composed of multiple *ConformanceUnits* (see Table 4). The CreateSession, ActivateSession, and CloseSession services are supported as a single unit. All *Servers* and *Clients* provide this functionality.

**Table 4 – Session Services**

| Category | Title                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Derived |
|----------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Session General Service Behaviour        | Implement basic <i>Service</i> behaviour. This includes in particular:<br>– checking the authentication token<br>– returning the requestHandle in responses<br>– returning available diagnostic information as requested with the 'returnDiagnostics' parameter<br>– respecting a timeoutHint                                                                                                                                                                                               |         |
| Server   | Session Base                             | Support the <i>Session Service Set</i> (CreateSession, ActivateSession, CloseSession) except the use of ActivateSession to change the <i>Session</i> user. This includes correct handling of all parameters that are provided.<br>Note that for the CreateSession and ActivateSession services, if the SecurityMode = None then:<br>1) The Application <i>Certificate</i> and Nonce are optional.<br>2) The signatures are null/empty.<br>The details of this are described in IEC 62541-4. |         |
| Server   | Session Change User                      | Support the use of ActivateSession to change the <i>Session</i> user.                                                                                                                                                                                                                                                                                                                                                                                                                       |         |
| Server   | Session Cancel                           | Support the Cancel <i>Service</i> to cancel outstanding requests.                                                                                                                                                                                                                                                                                                                                                                                                                           |         |
| Server   | Session Minimum 1                        | Support minimum 1 <i>Session</i> (total).                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| Server   | Session Minimum 2 Parallel               | Support minimum 2 parallel Sessions (total for all <i>Clients</i> ).                                                                                                                                                                                                                                                                                                                                                                                                                        |         |
| Server   | Session Minimum 50 Parallel              | Support minimum 50 parallel Sessions (total for all <i>Clients</i> ).                                                                                                                                                                                                                                                                                                                                                                                                                       |         |
| Client   | Session Client General Service Behaviour | Implement basic <i>Service</i> behaviour. This includes in particular:<br>– including the proper authentication token of the <i>Session</i><br>– creating a requestHandle if needed<br>– requesting diagnostic information with the 'returnDiagnostics' parameter<br>– evaluate the serviceResult and operational results                                                                                                                                                                   |         |
| Client   | Session Client Base                      | Use the <i>Session Service Set</i> (CreateSession, ActivateSession, and CloseSession) except the use of ActivateSession to change the <i>Session</i> user. This includes correct handling of all parameters that are provided.<br>Note that for the CreateSession and ActivateSession services, if the SecurityMode = None then:<br>1) The Application <i>Certificate</i> and Nonce are optional.<br>2) The signatures are null/empty.                                                      |         |
| Client   | Session Client Multiple Connections      | Support unlimited connections (client side) with multiple <i>Servers</i> . Any limit on numbers of connections is from server side. May have a memory based limit, but not a software constraint limit.                                                                                                                                                                                                                                                                                     |         |

| Category | Title                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Derived |
|----------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Client   | Session Client Renew NodeIds   | This <i>ConformanceUnit</i> applies to <i>Clients</i> that allow persisting NodeIds.<br>Verify that the Namespace Table has not changed for NodeIds that the <i>Client</i> has persisted and is going to re-use beyond a <i>Session</i> lifetime. If changes occurred the <i>Client</i> has to recalculate the Namespace Indices of the respective NodeIds.                                                                                                    |         |
| Client   | Session Client Impersonate     | Uses <i>ActivateSession</i> to change the <i>Session</i> user (impersonation).                                                                                                                                                                                                                                                                                                                                                                                 |         |
| Client   | Session Client KeepAlive       | Make periodic requests to keep the <i>Session</i> alive.                                                                                                                                                                                                                                                                                                                                                                                                       |         |
| Client   | Session Client Detect Shutdown | Read or monitor the <i>ServerStatus/State Variable</i> to recognize a potential shutdown of the <i>Server</i> and clean up resources.                                                                                                                                                                                                                                                                                                                          |         |
| Client   | Session Client Cancel          | Use the <i>Cancel Service</i> to cancel outstanding requests.                                                                                                                                                                                                                                                                                                                                                                                                  |         |
| Client   | Session Client Auto Reconnect  | Automatic <i>Client</i> reconnect including:<br>– <i>ActivateSession</i> with new <i>SecureChannel</i> if <i>SecureChannel</i> is no longer valid but <i>Session</i> is still valid<br>– Creation of a new <i>Session</i> only if <i>Session</i> is no longer valid                                                                                                                                                                                            |         |
| Client   | Client Entry-Level Support     | The <i>Client</i> is able to interoperate with <i>Servers</i> with lowest level functionality. This includes the ability to operate with a single <i>Session</i> , a pre-knowledge of the OPC UA Types (the <i>Server</i> may not expose them in the <i>AddressSpace</i> ), and the ability to use <i>Read</i> vs. <i>Subscriptions</i> for monitoring.<br>There may be further restrictions provided by the <i>Server</i> via the <i>Server</i> capabilities. |         |

The *Node Management Service Set* is composed of multiple *ConformanceUnits* (see Table 5). *Servers* may provide some aspects of this functionality; see *Profiles* categorized as *Server Profiles* for details. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

**Table 5 – Node Management Services**

| Category | Title                       | Description                                                                                                                                               | Derived |
|----------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Node Management Add Node    | Support the <i>AddNodes Service</i> to add one or more <i>Nodes</i> into the OPC UA <i>AddressSpace</i> .                                                 |         |
| Server   | Node Management Delete Node | Support the <i>DeleteNodes Service</i> to delete one or more <i>Nodes</i> from the OPC UA <i>AddressSpace</i> .                                           |         |
| Server   | Node Management Add Ref     | Support the <i>AddReferences Service</i> to add one or more <i>References</i> to one or more <i>Nodes</i> in the OPC UA <i>AddressSpace</i> .             |         |
| Server   | Node Management Delete Ref  | Support the <i>DeleteReferences Service</i> to delete one or more <i>References</i> of a <i>Node</i> in the OPC UA <i>AddressSpace</i> .                  |         |
| Client   | Node Management Client      | Uses <i>Node Management Services</i> to add or delete <i>Nodes</i> and to add or delete <i>References</i> in <i>Server's</i> OPC UA <i>AddressSpace</i> . |         |

The View *Service* Set is composed of a multiple *ConformanceUnits* (see Table 6). All *Servers* support some aspects of this conformance group. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

**Table 6 – View Services**

| Category | Title                                 | Description                                                                                                                                                                                                                       | Derived |
|----------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | View Basic                            | Support the View <i>Service</i> Set (Browse, BrowseNext).                                                                                                                                                                         |         |
| Server   | View TranslateBrowsePath              | Support TranslateBrowsePathsToNodeIds <i>Service</i> .                                                                                                                                                                            |         |
| Server   | View RegisterNodes                    | Support the RegisterNodes and UnregisterNodes <i>Services</i> as a way to optimize access to repeatedly used <i>Nodes</i> in the <i>Server's</i> OPC UA <i>AddressSpace</i> .                                                     |         |
| Server   | View Minimum Continuation Point 01    | Support minimum 1 continuation point per <i>Session</i> .                                                                                                                                                                         |         |
| Server   | View Minimum Continuation Point 05    | Support minimum 5 continuation points per <i>Session</i> .<br>This number has to be supported for at least half of the minimum required sessions.                                                                                 |         |
| Client   | View Client Basic Browse              | Uses Browse and BrowseNext <i>Services</i> to navigate through the <i>Server's</i> OPC UA <i>AddressSpace</i> . Make use of the referenceTypeId and the nodeClassMask to specify the needed <i>References</i> .                   |         |
| Client   | View Client Basic ResultSet Filtering | Makes use of the resultMask parameter to optimize the result set to be returned by the <i>Server</i> .                                                                                                                            |         |
| Client   | View Client TranslateBrowsePath       | Uses the TranslateBrowsePathsToNodeIds <i>Service</i> to identify the NodeIds for <i>Nodes</i> where a starting <i>Node</i> and a BrowsePath is known. Makes use of bulk operations rather than multiple calls whenever possible. |         |
| Client   | View Client RegisterNodes             | Uses the RegisterNodes <i>Service</i> to optimize access for <i>Nodes</i> that are used repeatedly. Use UnregisterNodes when <i>Nodes</i> are not used anymore.                                                                   |         |

The *Attribute Service* Set is composed of multiple *ConformanceUnits* (see Table 7). The majority of the *Attribute* service set is a core functionality of OPC UA and as such is supported by most *Servers*. Most *Clients* will also support some aspects of the *Attribute Service* Set

Table 7 – Attribute Services

| Category | Title                                      | Description                                                                                                                                                                                                                                                                                                                                                                                                   | Derived |
|----------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Attribute Read                             | Supports the Read <i>Service</i> to read one or more <i>Attributes</i> of one or more <i>Nodes</i> . This includes support of the <i>IndexRange</i> parameter to read a single element or a range of elements when the <i>Attribute</i> value is an array.                                                                                                                                                    |         |
| Server   | Attribute Read Complex                     | Supports reading and encoding Values with Structured DataTypes.                                                                                                                                                                                                                                                                                                                                               |         |
| Server   | Attribute Write Values                     | Supports writing to values to one or more <i>Attributes</i> of one or more <i>Nodes</i> .                                                                                                                                                                                                                                                                                                                     |         |
| Server   | Attribute Write Complex                    | Supports writing and decoding Values with Structured DataTypes.                                                                                                                                                                                                                                                                                                                                               |         |
| Server   | Attribute Write StatusCode & Timestamp     | Supports writing of <i>StatusCode</i> and <i>Timestamps</i> along with the Value.                                                                                                                                                                                                                                                                                                                             |         |
| Server   | Attribute Write Index                      | Supports the <i>IndexRange</i> to write a single element or a range of elements when the <i>Attribute</i> value is an array.                                                                                                                                                                                                                                                                                  |         |
| Server   | Attribute Alternate Encoding               | Supports alternate Data Encoding when reading value <i>Attributes</i> .<br>By default, every <i>Server</i> has to support the Data Encoding of the currently used <i>Stack Profile</i> (i.e. binary with UA Binary Encoding and XML with XML Encoding). This <i>ConformanceUnit</i> – when supported – specifies that the other Data Encoding is supported in addition.                                       |         |
| Server   | Attribute Historical Read                  | Supports the <i>HistoryRead Service</i> . The details of what aspects of this service are used are listed in additional <i>ConformanceUnits</i> , but at least one of <i>ReadRaw</i> , <i>ReadProcessed</i> , <i>ReadModified</i> , <i>ReadAtTime</i> or <i>ReadEvents</i> must be supported.                                                                                                                 |         |
| Server   | Attribute Historical Update                | Supports the <i>HistoryUpdate service</i> . The details of the supported features of this service are described by additional <i>ConformanceUnits</i> , but at least one of the following must be supported: <i>InsertData</i> , <i>InsertEvents</i> , <i>ReplaceData</i> , <i>ReplaceEvents</i> , <i>UpdateData</i> , <i>UpdateEvents</i> , <i>DeleteData</i> , <i>DeleteEvents</i> or <i>DeleteAtTime</i> . |         |
| Client   | Attribute Client Read Base                 | Use the Read <i>Service</i> to read one or more <i>Attributes</i> of one or more <i>Nodes</i> . This includes use of an <i>IndexRange</i> to select a single element or a range of elements when the <i>Attribute</i> value is an array.<br><i>Clients</i> shall use bulk operations whenever possible to reduce the number of <i>Service</i> invocations.                                                    |         |
| Client   | Attribute Client Read with proper Encoding | This <i>ConformanceUnit</i> refers to the ability of a <i>Server</i> to support more than one Data Encoding for <i>Attribute</i> values. <i>Clients</i> can discover the available encodings and can explicitly choose one when calling the Read <i>Service</i> .                                                                                                                                             |         |

| Category | Title                                            | Description                                                                                                                                                                                                                                                                                                       | Derived |
|----------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Client   | Attribute Client<br>Read Complex                 | Read and decode Values with Structured DataTypes.                                                                                                                                                                                                                                                                 |         |
| Client   | Attribute Client<br>Write Base                   | Use the Write Service to write values to one or more Attributes of one or more Nodes. This includes use of an IndexRange to select a single element or a range of elements when the Attribute value is an array. Clients shall use bulk operations whenever possible to reduce the number of Service invocations. |         |
| Client   | Attribute Client<br>Write Complex                | Write and Encode Values with Structured DataTypes.                                                                                                                                                                                                                                                                |         |
| Client   | Attribute Client<br>Write Quality &<br>TimeStamp | Use the Write Service to also write StatusCode and/or Timestamps along with a Value.                                                                                                                                                                                                                              |         |
| Client   | Attribute Client<br>Historical Read              | The Client makes use of the HistoryRead service. The details of which aspect of this service are used are provided by additional ConformanceUnits, but at least one or more of the following is used ReadRaw, ReadAtTime, ReadProcessed, ReadModified or ReadEvents.                                              |         |
| Client   | Attribute Client<br>Historical Updates           | The Client makes use of the HistoryUpdate service. The details of this usage are provided by additional ConformanceUnits, but at least one or more of the following must be provided: InsertData, InsertEvent, ReplaceData, ReplaceEvent, UpdateData, UpdateEvents, DeleteData or DeleteEvents or DeleteAtTime.   |         |

The *Method Service Set* is composed of *ConformanceUnits* (see Table 8). The primary *ConformanceUnits* provide support for the call functionality. *Servers* may provide some aspects of this functionality; see *Profiles* categorized as *Server Profiles* for details. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

**Table 8 – Method Services**

| Category | Title                 | Description                                                                                      | Derived |
|----------|-----------------------|--------------------------------------------------------------------------------------------------|---------|
| Server   | Method Call           | Support the Call Service to call (invoke) a Method which includes support for Method Parameters. |         |
| Client   | Method Client<br>Call | Use the Call Service to call one or several Methods.                                             |         |

The *MonitoredItem Service Set* is composed of multiple *ConformanceUnits* (see Table 9). *Servers* may provide some aspects of this functionality; see *Profiles* categorized as *Server Profiles* for details. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

Table 9 – Monitored Item Services

| Category | Title                           | Description                                                                                                                                                                                                                                                                                                                                             | Derived |
|----------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Monitor Basic                   | Support the following <i>MonitoredItem</i> Services: CreateMonitoredItems, ModifyMonitoredItems, DeleteMonitoredItems and SetMonitoringMode.                                                                                                                                                                                                            |         |
| Server   | Monitor Value Change            | Support creation of <i>MonitoredItems</i> for <i>Attribute</i> value changes. This includes support of the <i>IndexRange</i> to select a single element or a range of elements when the <i>Attribute</i> value is an array.                                                                                                                             |         |
| Server   | Monitored Items Deadband Filter | Supports an absolute Deadband filter as a <i>DataChangeFilter</i> for numeric data types.                                                                                                                                                                                                                                                               |         |
| Server   | Monitor Aggregate Filter        | Support for Aggregate filters for <i>MonitoredItems</i> . The result of this <i>ConformanceUnit</i> includes a list of Aggregates that are supported as part of the <i>Profile Certificate</i> .                                                                                                                                                        |         |
| Server   | Monitor Alternate Encoding      | Support alternate encoding when monitoring value <i>Attributes</i> . By default, every <i>Server</i> has to support the encoding of the currently used <i>Stack Profile</i> (i.e. binary with UA Binary Encoding and XML with XML Encoding). This <i>ConformanceUnit</i> – when supported – specifies that the other encoding is supported in addition. |         |
| Server   | Monitor Items 2                 | Support at least 2 <i>MonitoredItems</i> per <i>Subscription</i> .                                                                                                                                                                                                                                                                                      |         |
| Server   | Monitor Items 10                | Support at least 10 <i>MonitoredItems</i> per <i>Subscription</i> .                                                                                                                                                                                                                                                                                     |         |
| Server   | Monitor Items 100               | Support at least 100 <i>MonitoredItems</i> per <i>Subscription</i> . This number has to be supported for at least half of the required <i>Subscriptions</i> for half of the required <i>Sessions</i> .                                                                                                                                                  |         |
| Server   | Monitor Items 500               | Support at least 500 <i>MonitoredItems</i> per <i>Subscription</i> . This number has to be supported for at least half of the required <i>Subscriptions</i> for half of the required <i>Sessions</i> .                                                                                                                                                  |         |
| Server   | Monitor QueueSize_1             | This <i>ConformanceUnit</i> does not require queuing when multiple value changes occur during a “publish period”. I.e. the latest change will be sent in the <i>Notification</i> .                                                                                                                                                                      |         |
| Server   | Monitor MinQueueSize_02         | Support at least 2 queue entries for <i>MonitoredItems</i> . <i>Servers</i> often will adapt the queue size to the number of currently <i>MonitoredItems</i> . However, it is expected that <i>Servers</i> support this minimum queue size for at least one third of the supported <i>MonitoredItems</i> .                                              |         |

| Category | Title                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Derived |
|----------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Monitor MinQueueSize_05         | Support at least 5 queue entries for <i>MonitoredItems</i> .<br><i>Servers</i> often will adapt the queue size to the number of currently <i>MonitoredItems</i> . However, it is expected that <i>Servers</i> support this minimum queue size for at least one third of the supported <i>MonitoredItems</i> .                                                                                                                                                                                                                                                                       |         |
| Server   | Monitor QueueSize_ServerMax     | This <i>ConformanceUnit</i> is for events. When the Client requests <i>queuesize=MAXUInt32</i> the <i>Server</i> is to return the maximum queue size that it can support for event notifications as the <i>revisedQueueSize</i> .                                                                                                                                                                                                                                                                                                                                                   |         |
| Server   | Monitor Triggering              | Support the <i>SetTriggering Service</i> to create and/or delete triggering links for a triggering item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| Server   | Monitor Events                  | Support creation of <i>MonitoredItems</i> for an " <i>EventNotifier Attribute</i> " for the purpose of <i>Event Notification</i> . The subscription includes supporting a filter that includes <i>SimpleAttribute Operands</i> and a select list of <i>Operators</i> . The list of <i>Operators</i> includes: <i>Equals</i> , <i>IsNull</i> , <i>GreaterThan</i> , <i>LessThan</i> , <i>GreaterThanorEqual</i> , <i>LessThatorEqual</i> , <i>Like</i> , <i>Not</i> , <i>Between</i> , <i>InList</i> , <i>And</i> , <i>Or</i> , <i>Cast</i> , <i>BitwiseAnd</i> , <i>BitwiseOr</i> . |         |
| Server   | Monitor Complex Event Filter    | Support for complex <i>Event</i> filters, where complex is defined as supporting the complex filter operator ( <i>TypeOf</i> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |
| Client   | Monitor Client Value Change     | Use the <i>MonitoredItem Service Set</i> to register items for changes in <i>Attribute</i> value.<br>Use <i>CreateMonitoredItems</i> to register the <i>Node/Attribute</i> tuple. Set proper sampling interval, <i>Deadband</i> filter and queuing mode.<br>Use disabling / enabling instead of deleting and re-creating a <i>MonitoredItem</i> .<br>Use bulk operations rather than individual service requests to reduce communication overhead.                                                                                                                                  |         |
| Client   | Monitor Client Deadband Filter  | Uses <i>Absolute Deadband</i> filters for subscriptions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| Client   | Monitor Client by Index         | Use the <i>IndexRange</i> to select a single element or a range of elements when the <i>Attribute</i> value is an array.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| Client   | Monitor Client Aggregate Filter | Uses <i>Aggregate</i> filters for Subscriptions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |
| Client   | Monitor Client Events           | Use the <i>MonitoredItem Service Set</i> to create <i>MonitoredItems</i> for <i>Event</i> notifications.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| Client   | Monitor Client Event Filter     | Use the <i>Event</i> filter when calling <i>CreateMonitoredItems</i> to filter the desired <i>Events</i> and to select the columns to be provided for each <i>Event Notification</i> .                                                                                                                                                                                                                                                                                                                                                                                              |         |

| Category | Title                               | Description                                                                                                                                                                                                                | Derived |
|----------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Client   | Monitor Client Complex Event Filter | Uses complex <i>Event</i> filters.                                                                                                                                                                                         |         |
| Client   | Monitor Client Modify               | Use <i>ModifyMonitoredItems Service</i> to change the configuration setting.<br>Use <i>SetMonitoringMode Service</i> to disable / enable sampling and / or publishing.                                                     |         |
| Client   | Monitor Client Trigger              | Use the Triggering Model if certain items are to be reported only if some other item triggers.<br>Use proper monitoring mode for these items.<br>Use <i>SetTriggering Service</i> to link these items to the trigger item. |         |

The *Subscription Service Set* is composed of multiple *ConformanceUnits* (see Table 10). *Servers* may provide some aspects of this functionality; see *Profiles* categorized as *Server Profiles* for details. *Clients* may support some aspects of this functionality; see *Profiles* categorized as *Client Profiles* for details.

**Table 10 – Subscription Services**

| Category | Title                               | Description                                                                                                                                                                                                                                                                                                                                               | Derived |
|----------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Server   | Subscription Basic                  | Support the following <i>Subscription Services</i> : CreateSubscription, ModifySubscription, DeleteSubscriptions, Publish, Republish and SetPublishingMode.                                                                                                                                                                                               |         |
| Server   | Subscription Minimum 1              | Support at least 1 Subscriptions per <i>Session</i> .<br>This number has to be supported for all of the minimum required sessions.                                                                                                                                                                                                                        |         |
| Server   | Subscription Minimum 02             | Support at least 2 Subscriptions per <i>Session</i> .<br>This number has to be supported for at least half of the minimum required sessions.                                                                                                                                                                                                              |         |
| Server   | Subscription Minimum 05             | Support at least 5 Subscriptions per <i>Session</i> .<br>This number has to be supported for at least half of the minimum required sessions.                                                                                                                                                                                                              |         |
| Server   | Subscription Publish Min 02         | Support at least 2 Publish <i>Service</i> requests per <i>Session</i> .<br>This number has to be supported for all of the minimum required sessions. Support of republish is optional and no notification retransmission queue has to be provided however the republish service must be provided and will return the appropriate operation level results. |         |
| Server   | Subscription Publish Min 05         | Support at least 5 Publish <i>Service</i> requests per <i>Session</i> .<br>This number has to be supported for at least half of the minimum required sessions. Support, as a minimum, the number of Publish requests per session as the size of the NotificationMessage retransmission queue for Republish.                                               |         |
| Server   | Subscription Publish Min 10         | Support at least 10 Publish <i>Service</i> requests per <i>Session</i> .<br>This number has to be supported for at least half of the minimum required sessions. Support as a minimum, the number of Publish requests per session as the size of the NotificationMessage retransmission queue for Republish.                                               |         |
| Server   | Subscription Publish Discard Policy | Respect the specified policy for discarding Publish <i>Service</i> requests. If the maximum number of Publish <i>Service</i> requests has been queued and a new Publish <i>Service</i> request arrives, the "oldest" Publish request has to be discarded by returning the proper error.                                                                   |         |
| Server   | Subscription Transfer               | Support TransferSubscriptions <i>Service</i> to transfer a <i>Subscription</i> from one <i>Session</i> to another.                                                                                                                                                                                                                                        |         |

| Category | Title                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Derived |
|----------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Client   | Subscription Basic                | Use the <i>Subscription</i> and <i>MonitoredItem</i> Service Set as an efficient means to detect changes of <i>Attribute</i> values and / or to receive <i>Event</i> occurrences.<br>Set appropriate intervals for publishing, keep alive notifications and total <i>Subscription</i> lifetime.<br>Supply a sufficient number of Publish requests to the <i>Server</i> so that <i>Notifications</i> can be sent whenever a publish timer expires.<br>Acknowledge received <i>Notifications</i> with subsequent Publish requests. |         |
| Client   | Subscription Republish            | Evaluate the sequence number in <i>Notifications</i> to detect lost <i>Notifications</i> .<br>Use Republish to request missing <i>Notifications</i> .                                                                                                                                                                                                                                                                                                                                                                            |         |
| Client   | Subscription Modify               | Allow modification of the <i>Subscription</i> configuration using the <i>ModifySubscription</i> Service.                                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| Client   | Subscription Transfer             | The <i>Client</i> supports transferring <i>Subscription</i> from other <i>Clients</i> . This <i>ConformanceUnit</i> is used as part of redundant <i>Clients</i> .                                                                                                                                                                                                                                                                                                                                                                |         |
| Client   | Subscription Multiple             | Use multiple Subscriptions to reduce the payload of individual <i>Notifications</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| Client   | Subscription Publish Configurable | Send multiple Publish Service requests to assure that the <i>Server</i> is always able to send <i>Notifications</i> .<br>The number of parallel Publish Service requests per <i>Session</i> shall be configurable.                                                                                                                                                                                                                                                                                                               |         |

### 5.3 Transport and communication related features

Table 11 describes security related *ConformanceUnits*. All of these *ConformanceUnits* apply equally to both *Clients* and *Servers*, where a *Client* uses the related security unit and a *Server* supports the use of it. These items are defined in detail in IEC 62541-6. It is recommended that a *Server* and *Client* support as many of these options as possible in order to achieve increased levels of interoperability. It is the task of an administrator to determine which of these *ConformanceUnits* are exposed in a given deployed *Server* or *Client* application.

**Table 11 – Security**

| Category | Title                                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Derived |
|----------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Security | Security Certificate Validation           | A certificate will be validated as specified in IEC 62541-4. This includes among others structure and signature examination. Allowing for some validation errors to be suppressed by administration directive.                                                                                                                                                                                                                                                                       |         |
| Security | Security None                             | A suite of algorithms that does NOT provide any security settings:<br>-> SymmetricSignatureAlgorithm – Not Used<br>-> SymmetricEncryptionAlgorithm – Not Used<br>-> AsymmetricSignatureAlgorithm – Not Used<br>-> SymmetricKeyWrapAlgorithm – Not Used<br>-> AsymmetricEncryptionAlgorithm – Not Used<br>-> KeyDerivationAlgorithm – Not Used<br>-> DerivedSignatureKeyLength – 0<br>The use of this suite of algorithms must be able to be enabled or disabled by an administrator. |         |
| Security | Security CreateSession<br>ActivateSession | None<br>When SecurityPolicy=None, the CreateSession and ActivateSession service allow for a NULL/empty signature and do not require Application <i>Certificates</i> or a Nonce.                                                                                                                                                                                                                                                                                                      |         |

| Category | Title                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Derived |
|----------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Security | Security Basic 128Rsa15 | <p>A suite of algorithms that uses RSA15 as Key-Wrap-algorithm and 128-Bit for encryption algorithms.</p> <p>-&gt; SymmetricSignatureAlgorithm – HmacSha1 –<br/>(<a href="http://www.w3.org/2000/09/xmlsig#hmac-sha1">http://www.w3.org/2000/09/xmlsig#hmac-sha1</a>).</p> <p>-&gt; SymmetricEncryptionAlgorithm – Aes128 –<br/>(<a href="http://www.w3.org/2001/04/xmlenc#aes128-cbc">http://www.w3.org/2001/04/xmlenc#aes128-cbc</a>).</p> <p>-&gt; AsymmetricSignatureAlgorithm – RsaSha1 –<br/>(<a href="http://www.w3.org/2000/09/xmlsig#rsa-sha1">http://www.w3.org/2000/09/xmlsig#rsa-sha1</a>).</p> <p>-&gt; AsymmetricKeyWrapAlgorithm – KwRsa15 –<br/>(<a href="http://www.w3.org/2001/04/xmlenc#rsa-1_5">http://www.w3.org/2001/04/xmlenc#rsa-1_5</a>).</p> <p>-&gt; AsymmetricEncryptionAlgorithm – Rsa15 –<br/>(<a href="http://www.w3.org/2001/04/xmlenc#rsa-1_5">http://www.w3.org/2001/04/xmlenc#rsa-1_5</a>).</p> <p>-&gt; KeyDerivationAlgorithm – PSha1 –<br/>(<a href="http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/dk/p_sha1">http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/dk/p_sha1</a>)</p> <p>.</p> <p>-&gt; DerivedSignatureKeyLength – 128.</p> <p>-&gt; MinAsymmetricKeyLength – 1024</p> <p>-&gt; MaxAsymmetricKeyLength – 2048</p> <p>-&gt; CertificateSignatureAlgorithm – Sha1</p> |         |

| Category | Title              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Derived |
|----------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| Security | Security Basic 256 | <p>A suite of algorithms that are for 256-Bit encryption, algorithms include:</p> <ul style="list-style-type: none"> <li>-&gt; SymmetricSignatureAlgorithm – HmacSha1<br/>(<a href="http://www.w3.org/2000/09/xmlsig#hmac-sha1">http://www.w3.org/2000/09/xmlsig#hmac-sha1</a>).</li> <li>-&gt; SymmetricEncryptionAlgorithm – Aes256<br/>(<a href="http://www.w3.org/2001/04/xmlenc#aes256-cbc">http://www.w3.org/2001/04/xmlenc#aes256-cbc</a>).</li> <li>-&gt; AsymmetricSignatureAlgorithm – RsaSha1<br/>(<a href="http://www.w3.org/2000/09/xmlsig#rsa-sha1">http://www.w3.org/2000/09/xmlsig#rsa-sha1</a>).</li> <li>-&gt; AsymmetricKeyWrapAlgorithm – KwRsaOaep<br/>(<a href="http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1p">http://www.w3.org/2001/04/xmlenc#rsa-oaep-mgf1p</a>).</li> <li>-&gt; AsymmetricEncryptionAlgorithm – RsaOaep<br/>(<a href="http://www.w3.org/2001/04/xmlenc#rsa-oaep">http://www.w3.org/2001/04/xmlenc#rsa-oaep</a>).</li> <li>-&gt; KeyDerivationAlgorithm – PSha1<br/>(<a href="http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/dk/p_sha1">http://docs.oasis-open.org/ws-sx/ws-secureconversation/200512/dk/p_sha1</a>)</li> <li>.</li> <li>-&gt; DerivedSignatureKeyLength – 192.</li> <li>-&gt; MinAsymmetricKeyLength – 1024</li> <li>-&gt; MaxAsymmetricKeyLength – 2048</li> <li>-&gt; CertificateSignatureAlgorithm – Sha1</li> </ul> |         |