

# IEEE Standard for Service Composition Protocols of Next Generation Service Overlay Network

IEEE Communications Society

Sponsored by the  
Virtualized and Software Defined Networks and Services Standards Committee

# **IEEE Standard for Service Composition Protocols of Next Generation Service Overlay Network**

Sponsor

**Virtualized and Software Defined Networks and Services Standards Committee  
of the  
IEEE Communications Society**

Approved 6 December 2017

**IEEE-SA Standards Board**

**Abstract:** Protocols among service composition (SC) functional entity (FE), service discovery and negotiation (SDN) FE, context information management (CIM) FE, service routing (SR) FE, and service policy decision (SPD) FE to support service composition capabilities in a next generation service overlay network (NGSON) are specified in this standard. Service chaining and instantiation, specification interpretation, service brokering and execution, and context- aware and dynamically adaptive service composition are supported by the capabilities of service composition.

**Keywords:** context awareness, dynamic adaptation, IEEE Std 1903.2™, NGSON, self organization, service composition

---

The Institute of Electrical and Electronics Engineers, Inc.  
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2018 by The Institute of Electrical and Electronics Engineers, Inc.  
All rights reserved. Published 25 May 2018. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-1-5044-4305-0      STD22765  
Print: ISBN 978-1-5044-4306-7      STDPD22765

*IEEE prohibits discrimination, harassment, and bullying.*

*For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.*

*No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.*

## **Important Notices and Disclaimers Concerning IEEE Standards Documents**

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading “Important Notices and Disclaimers Concerning IEEE Standards Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

### **Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents**

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (“IEEE-SA”) Standards Board. IEEE (“the Institute”) develops its standards through a consensus development process, approved by the American National Standards Institute (“ANSI”), which brings together volunteers representing varied viewpoints and interests to achieve the final product. IEEE Standards are documents developed through scientific, academic, and industry-based technical working groups. Volunteers in IEEE working groups are not necessarily members of the Institute and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE Standards do not guarantee or ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. Implementers and users of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. IEEE standards documents are supplied “AS IS” and “WITH ALL FAULTS.”

Use of an IEEE standard is wholly voluntary. The existence of an IEEE standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

## **Translations**

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

## **Official statements**

A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, or be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position of IEEE.

## **Comments on standards**

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to comments or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in revisions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

Secretary, IEEE-SA Standards Board  
445 Hoes Lane  
Piscataway, NJ 08854 USA

## **Laws and regulations**

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

## **Copyrights**

IEEE draft and approved standards are copyrighted by IEEE under U.S. and international copyright laws. They are made available by IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

## Photocopies

Subject to payment of the appropriate fee, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

## Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE Xplore at <http://ieeexplore.ieee.org/> or contact IEEE at the address listed previously. For more information about the IEEE-SA or IEEE's standards development process, visit the IEEE-SA Website at <http://standards.ieee.org>.

## Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA Website at the following URL: <http://standards.ieee.org/findstds/errata/index.html>. Users are encouraged to check this URL for errata periodically.

## Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at <http://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

## Participants

At the time this IEEE standard was completed, the NGSON (1903) Working Group had the following membership:

**Mehmet Ulema, *Chair***  
**Ashutosh Dutta, *Vice Chair***  
**Niranth Amogh, *Chief Editor***

Koteeswara P.  
Arulprakasam  
Shan Chen  
Mark A. Dalle Valle  
David Hislop  
David Johnston  
Dmytro Karamshuk

Tae Yeon Kim  
Namkyung Lee  
Seung-Ik Lee  
Adel Ben Manouer  
Barbara Martini  
Federica Paganelli  
Anton Przybyl  
Sridhar Raghavan

Dan Romascanu  
Nishanth Sastry  
Reinhard Schrage  
Mohammad Shikh-  
Bahaei  
Myung Ki Shin  
Huangjia Yang

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Niranth Amogh  
Johann Amsenga  
Yesenia Cevallos  
Shan Chen  
Keith Chow  
Sourav Dutta  
Robert Fish  
Randall Groves  
Marco Hernandez  
David Hislop

Werner Hoelzl  
Noriyuki Ikeuchi  
Christian Jacquenet  
Piotr Karocki  
Stuart Kerry  
Bruce Kraemer  
Thomas Kurihara  
Elvis Maculuba  
Michael Newman  
Arumugam Paventhan

Venkatesha Prasad  
Maximilian Riegel  
Robert Robinson  
Reinhard Schrage  
Thomas Starai  
Walter Struppler  
Mehmet Ulema  
Dmitri Varsanofiev  
John Vergis  
Oren Yuen

When the IEEE-SA Standards Board approved this standard on 6 December 2017, it had the following membership:

**Jean-Philippe Faure, *Chair***  
**Gary Hoffman, *Vice Chair***  
**John D. Kulick, *Past Chair***  
**Konstantinos Karachalios, *Secretary***

Chuck Adams  
Masayuki Ariyoshi  
Ted Burse  
Stephen Dukes  
Doug Edwards  
J. Travis Griffith  
Michael Janezic

Thomas Koshy  
Joseph L. Koepfinger\*  
Kevin Lu  
Daleep Mohla  
Damir Novosel  
Ronald C. Petersen  
Annette D. Reilly

Robby Robson  
Dorothy Stanley  
Adrian Stephens  
Mehmet Ulema  
Phil Wennblom  
Howard Wolfman  
Yu Yuan

\*Member Emeritus

## Introduction

This introduction is not part of IEEE Std 1903.2-2017, IEEE Standard for Service Composition Protocols of Next Generation Service Overlay Network.

This standard specifies service composition protocols for Next Generation Service Overlay Network (NGSON). NGSON supports service composition of different base services. An end-user requests a service to NGSON and receives the service response from NGSON. The services are provided by service (or content) providers and NGSON authorizes them. NGSON receives a service request from an end-user, and makes service provision and consumption with service compositions by the deployment of context-aware, dynamic adaptation, and self-organizing networking capabilities.

## Contents

1. Overview .....	9
1.1 Scope .....	9
1.2 Purpose .....	9
2. Normative references .....	9
3. Definitions, acronyms, and abbreviations .....	10
3.1 Definitions .....	10
3.2 Acronyms and abbreviations .....	10
4. General introduction.....	11
5. Service composition entities and their protocol operations .....	13
5.1 General description.....	13
5.2 Reference points .....	16
5.3 Protocol operations.....	17
6. Protocol specification.....	23
6.1 Messages .....	23
6.2 Message parameters .....	24
6.3 Message formats.....	26
6.4 Parameters Format.....	36
7. Procedures.....	44
7.1 Procedure description .....	44
8. Security aspects for service composition.....	47
8.1 Authentication for centralized SC model.....	47
8.2 Authentication for distributed SC model .....	47
Annex A (informative) Use cases .....	48
Annex B (normative) Data type specifications .....	50

# IEEE Standard for Service Composition Protocols of Next Generation Service Overlay Network

## 1. Overview

### 1.1 Scope

This standard specifies protocols among service composition (SC) functional entity (FE), service discovery and negotiation (SDN) FE, context information management (CIM) FE, service routing (SR) FE, and service policy decision (SPD) FE to support service composition capabilities in a Next Generation Service Overlay Network (NGSON). The capabilities of service composition aim to support service chaining and instantiation, specification interpretation, service brokering and execution, and context-aware and dynamically adaptive service composition.

### 1.2 Purpose

The purpose of this standard is to enable network operators, service/content providers, and end users to provide and consume composite services based on advanced service composition capability of NGSON with context-aware and dynamically adaptive features. This standard provides interoperability of composite services between network operators and service providers.

## 2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

3GPP TR 22.808, Study on Flexible Mobile Service Steering (FMSS)<sup>1</sup>

3GPP TR 22.853, Study on Service Exposure and Enablement Support (SEES) Requirements.

3GPP TR 29.817, Study on eXtensible Markup Language (XML) based access of the Application Function (AF) to the Policy and Charging Rules Function (PCRF), V12.0.

3GPP TS 23.203, Policy and charging control architecture.

---

<sup>1</sup>3GPP publications are available from 3<sup>rd</sup> Generation Partnership Project ([www.3gpp.org/](http://www.3gpp.org/)).