INTERNATIONAL STANDARD

ISO/IEC 19464

First edition
2014-05-01

Information technology — Advanced Message Queuing Protocol (AMQP) v1.0 specification

Technologies de l'information — Spécification du protocole avancé de mise en file d'attente de messages (AMPQ) v1.0

Reference number
ISO/IEC 19464:2014(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 19464 was prepared by the OASIS Advanced Message Queuing Protocol Technical Committee (as OASIS Advanced Message Queuing Protocol (AMQP) Version 1.0) and was adopted, under the PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by the national bodies of ISO and IEC.

OASIS

OASIS Advanced Message Queuing Protocol (AMQP) Version 1.0

OASIS Standard

29 October 2012

Specification URIs

This version:

http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-overview-v1.0-os.xml (Authoritative)
http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-overview-v1.0-os.html
http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-complete-v1.0-os.pdf

Previous version:

http://docs.oasis-open.org/amqp/core/v1.0/csprd01/amqp-core-overview-v1.0-csprd01.xml (Authoritative)
http://docs.oasis-open.org/amqp/core/v1.0/csprd01/amqp-core-overview-v1.0-csprd01.html
http://docs.oasis-open.org/amqp/core/v1.0/csprd01/amqp-core-complete-v1.0-csprd01.pdf

Latest version:

http://docs.oasis-open.org/amqp/core/v1.0/amqp-core-overview-v1.0.xml (Authoritative)
http://docs.oasis-open.org/amqp/core/v1.0/amqp-core-overview-v1.0.html
http://docs.oasis-open.org/amqp/core/v1.0/amqp-core-complete-v1.0.pdf

Technical Committee:

OASIS Advanced Message Queuing Protocol (AMQP) TC

Chairs:

Ram Jeyaraman (Ram.Jeyaraman@microsoft.com), Microsoft
Angus Telfer (angus.telfer@inetco.com), INETCO Systems

Editors:

Robert Godfrey (robert.godfrey@jpmorgan.com), JPMorgan Chase & Co.
David Ingham (David.Ingham@microsoft.com), Microsoft
Rafael Schloming (rafaels@redhat.com), Red Hat

Additional artifacts:

This specification consists of the following documents:

- Part 0: Overview - Overview of the AMQP specification
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-overview-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-overview-v1.0-os.html
- Part 1: Types - AMQP type system and encoding
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-types-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-types-v1.0-os.html
- Part 2: Transport - AMQP transport layer
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-transport-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-transport-v1.0-os.html
- Part 3: Messaging - AMQP Messaging Layer
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-messaging-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-messaging-v1.0-os.html
- Part 4: Transactions - AMQP Transactions Layer
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-transactions-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-transactions-v1.0-os.html
- Part 5: Security - AMQP Security Layers
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-security-v1.0-os.xml (Authoritative)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-security-v1.0-os.html
- XML Document Type Definition (DTD)
  http://docs.oasis-open.org/amqp/core/v1.0/os/amqp.dtd (Authoritative)

Related work:

This specification replaces or supersedes:

- AMQP v1.0 Final, 07 October 2011. http://www.amqp.org/specification/1.0/amqp-org-download

Abstract:

The Advanced Message Queuing Protocol (AMQP) is an open internet protocol for business messaging. It defines a binary wire-level protocol that allows for the reliable exchange of business messages between two parties. AMQP has a layered architecture and the specification is organized as a set of parts that reflects that architecture. Part 1 defines the AMQP type system and encoding. Part 2 defines the AMQP transport layer, an efficient, binary, peer-to-peer protocol for transporting messages between two processes over a network. Part 3 defines the AMQP message format, with a concrete encoding. Part 4 defines how interactions can be grouped within atomic transactions. Part 5 defines the AMQP security layers.

Status:

This document was last revised or approved by the membership of OASIS on the above date. The level of approval is also listed above. Check the “Latest version” location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committee’s email list. Others should send comments to the Technical Committee by using the “Send A Comment” button on the Technical Committee’s web page at `http://www.oasis-open.org/committees/amqp/`.

For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights section of the Technical Committee web page (`http://www.oasis-open.org/committees/amqp/ipr.php`).

Citation format:

When referencing this specification the following citation format should be used:

[amqp-core-complete-v1.0]

OASIS Advanced Message Queuing Protocol (AMQP) Version 1.0. 29 October 2012. OASIS Standard.
http://docs.oasis-open.org/amqp/core/v1.0/os/amqp-core-complete-v1.0-os.pdf.

Notices:

OASIS requests that any OASIS Party or any other party that believes it has patent claims that would necessarily be infringed by implementations of this OASIS Committee Specification or OASIS Standard, to notify OASIS TC Administrator and provide an indication of its willingness to grant patent licenses to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification.

OASIS invites any party to contact the OASIS TC Administrator if it is aware of a claim of ownership of any patent claims that would necessarily be infringed by implementations of this specification by a patent holder that is not willing to provide a license to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification. OASIS may include such claims on its website, but disclaims any obligation to do so.

OASIS takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on OASIS' procedures with respect to rights in any document or deliverable produced by an OASIS Technical Committee can be found on the OASIS website. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this OASIS Committee Specification or OASIS Standard, can be obtained from the OASIS TC Administrator. OASIS makes no representation that any information or list of intellectual property rights will at any time be complete, or that any claims in such list are, in fact, Essential Claims.

The name "OASIS" is a trademark of OASIS, the owner and developer of this specification, and should be used only to refer to the organization and its official outputs. OASIS welcomes reference to, and implementation and use of, specifications, while reserving the right to enforce its marks against misleading uses. Please see `http://www.oasis-open.org/policies-guidelines/trademark` for above guidance.

Contents

Part 0: Overview

0.1 Introduction

The Advanced Message Queuing Protocol is an open internet protocol for business messaging.

AMQP is comprised of several layers. The lowest level defines an efficient, binary, peer-to-peer protocol for transporting messages between two processes over a network. Above this, the messaging layer defines an abstract message format, with concrete standard encoding. Every compliant AMQP process MUST be able to send and receive messages in this standard encoding.

0.1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this specification are to be interpreted as described in IETF RFC 2119 [RFC2119].

The authoritative form of the AMQP specification consists of a set of XML source documents. These documents are transformed into PDF and HTML representations for readability. The machine readable version of the AMQP DTD describes the XML used for the authoritative source documents. This DTD includes the definition of the syntax used in the excerpts of XML presented in the PDF and HTML representations.

0.1.2 Normative References

[ASCII]
American National Standards Institute, Inc., *American National Standard for Information Systems, Coded Character Sets - 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII)*, ANSI X3.4-1986, March 26, 1986.

[BCP47]
A. Phillips, Ed., M. Davis, Ed., *Tags for Identifying Languages*. IETF BCP: 47, September 2009.
`http://www.ietf.org/rfc/bcp/bcp47.txt`

[IANAHTTPPARAMS]
IANA (Internet Assigned Numbers Authority), *Hypertext Transfer Protocol (HTTP) Parameters*.
`http://www.iana.org/assignments/http-parameters/http-parameters.xml`

[IANAPEN]
IANA (Internet Assigned Numbers Authority), *Private Enterprise Numbers*.
`http://www.iana.org/assignments/enterprise-numbers`

[IANASUBTAG]
IANA (Internet Assigned Numbers Authority), *Language Subtag Registry*.
`http://www.iana.org/assignments/language-subtag-registry`

[IEEE754]
Standard for Floating-Point Arithmetic. IEEE 754-2008, August 2008.
`http://ieeexplore.ieee.org/servlet/opac?punumber=4610933`

[IEEE1003]
The Single UNIX Specification, Version 4. IEEE Std 1003.1-2008, December 2008.
`http://www.unix.org/version4/`

[RFC1982]
R. Elz, R. Bush, *Serial Number Arithmetic*. IETF RFC 1982, August 1996.
http://www.ietf.org/rfc/rfc1982.txt

[RFC2046]
N. Freed, N. Borenstein, *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types*. IETF RFC 2046, November 1996.
http://www.ietf.org/rfc/rfc2046.txt

[RFC2119]
S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*. IETF RFC 2119, March 1997.
http://www.ietf.org/rfc/rfc2119.txt

[RFC2234]
D. Crocker, Ed., P. Overell, *Augmented BNF for Syntax Specifications: ABNF*. IETF RFC 2234, November 1997.
http://www.ietf.org/rfc/rfc2234.txt

[RFC2616]
R. Fielding, J. Gettys, J. Mogul, H. Frystyk, L. Masinter, P. Leach, T. Berners-Lee, *Hypertext Transfer Protocol – HTTP/1.1*. IETF RFC 2616, June 1999.
http://www.ietf.org/rfc/rfc2616.txt

[RFC4122]
P. Leach, M. Mealling, R. Salz, *A Universally Unique IDentifier (UUID) URN Namespace*. IETF RFC 4122, July 2005.
http://www.ietf.org/rfc/rfc4122.txt

[RFC4366]
S. Blake-Wilson, M. Nystrom, D. Hopwood, J. Mikkelsen, T. Wright, *Transport Layer Security (TLS) Extensions*. IETF RFC 4366, April 2006.
http://www.ietf.org/rfc/rfc4366.txt

[RFC4422]
A. Melnikov, Ed., K. Zeilenga, Ed., *Simple Authentication and Security Layer (SASL)*. IETF RFC 4422, June 2006.
http://www.ietf.org/rfc/rfc4422.txt

[RFC4616]
K. Zeilenga, Ed., *The PLAIN Simple Authentication and Security Layer (SASL) Mechanism*. IETF RFC 4616, August 2006.
http://www.ietf.org/rfc/rfc4616.txt

[RFC5246]
T. Dierks, E. Rescorla., *The Transport Layer Security (TLS) Protocol Version 1.2*. IETF RFC 5246, August 2008.
http://www.ietf.org/rfc/rfc5246.txt

[RFC5646]
A. Phillips, Ed., M. Davis, Ed., *Tags for Identifying Languages*. IETF RFC 5646, September 2009.
http://www.ietf.org/rfc/rfc5646.txt

[RFC5802]
C. Newman, A. Menon-Sen, A. Melnikov, N. Williams, *Salted Challenge Response Authentication Mechanism (SCRAM) SASL and GSS-API Mechanisms*. IETF RFC 5802, July 2010.
http://www.ietf.org/rfc/rfc5802.txt

[UNICODE6]
The Unicode Consortium. The Unicode Standard, Version 6.0.0, (Mountain View, CA: The Unicode Consortium, 2011. ISBN 978-1-936213-01-6)
http://www.unicode.org/versions/Unicode6.0.0/

0.1.3 Non-normative References

[AMQPCONNCAP]
AMQP Capabilities Registry: Connection Capabilities
http://www.amqp.org/specification/1.0/connection-capabilities

[AMQPCONNPROP]
AMQP Capabilities Registry: Connection Properties
http://www.amqp.org/specification/1.0/connection-properties

[AMQPDELANN]
AMQP Capabilities Registry: Delivery Annotations
http://www.amqp.org/specification/1.0/delivery-annotations

[AMQPDISTMODE]
AMQP Capabilities Registry: Distribution Modes
http://www.amqp.org/specification/1.0/distribution-modes

[AMQPFILTERS]
AMQP Capabilities Registry: Filters
http://www.amqp.org/specification/1.0/filters

[AMQPFOOTER]
AMQP Capabilities Registry: Footer
http://www.amqp.org/specification/1.0/footer

[AMQPLINKCAP]
AMQP Capabilities Registry: Link Capabilities
http://www.amqp.org/specification/1.0/link-capabilities

[AMQPLINKPROP]
AMQP Capabilities Registry: Link Properties
http://www.amqp.org/specification/1.0/link-properties

[AMQPLINKSTATEPROP]
AMQP Capabilities Registry: Link State Properties
http://www.amqp.org/specification/1.0/link-state-properties

[AMQPMESSANN]
AMQP Capabilities Registry: Message Annotations
http://www.amqp.org/specification/1.0/message-annotations

[AMQPNODEPROP]
AMQP Capabilities Registry: Node Properties
http://www.amqp.org/specification/1.0/node-properties

[AMQPSESSCAP]
AMQP Capabilities Registry: Session Capabilities
http://www.amqp.org/specification/1.0/session-capabilities

[AMQPSESSPROP]
AMQP Capabilities Registry: Session Properties
http://www.amqp.org/specification/1.0/session-properties

[AMQPSOURCECAP]
AMQP Capabilities Registry: Source Capabilities
http://www.amqp.org/specification/1.0/source-capabilities

[AMQPTARGETCAP]
AMQP Capabilities Registry: Target Capabilities
http://www.amqp.org/specification/1.0/target-capabilities

0.2 Conformance

AMQP defines a wire level protocol for business messaging. The definition allows for all common business messaging behaviors. AMQP does not define a wire-level distinction between “clients” and “brokers”, the protocol is symmetric. It is expected and encouraged that implementations of AMQP will have different capabilities. Expectations of the capabilities of a “client library” are different from expectations of a “broker” which are themselves different from the capabilities of a “router”. As relevant profiles emerge (where appropriate and applicable) these will be formalised.

A conformant implementation MUST perform protocol negotiation (see Part 2: section 2.2), and then parse, process, and produce frames in accordance with the format and semantics defined in parts 1 through 5 of this specification.

Conformant implementations MUST NOT require the use of any extensions defined outside this document in order to interoperate with any other conformant implementation.

Part 1 of this document defines the type system and type encodings that every conformant implementation MUST implement.

Part 2 defines the peer-to-peer transport protocol which operates over TCP. Every conformant implementation of AMQP over TCP MUST implement Part 2. Future standards mapping AMQP to protocols other than TCP MAY modify or replace Part 2 when AMQP is being used over that protocol. A conformant implementation MUST implement Part 2 or a mapping of AMQP to some non-TCP protocol.

Part 2 admits behaviors that might not be appropriate for every implementation. For example a “client library” might not allow for its communication partner to spontaneously attempt to initiate a connection and request messages. Where an implementation does not allow for a behavior the implementation MUST respond according to the rules defined within Part 2 of the specification.

Part 3 of this document defines the AMQP Messaging Layer. Every conformant implementation which processes messages MUST implement this part of the specification.

Some implementations might not process messages (for example, an implementation acting as a “router” which looks only at the routing information carried by the AMQP Transport layer). Such implementations do not actively implement Part 3, but MUST NOT act in ways which violate the rules of this part of the specification.

The Messaging layer admits behaviors that might not be appropriate for all implementations (and within an implementation all behaviors might not be available for all configurations). Where a behavior is not admitted, the implementation MUST respond according to the rules defined within this specification.

Part 4 defines the requirements for transactional messaging. Transactional messaging defines two roles, that of the *transactional resource* and that of the *transaction controller*. A conformant implementation SHOULD be capable of operating in one of these roles but MAY be unable to operate in either (for instance a simplistic client library might have no ability to act as a transaction controller and would not be expected to act as a transactional resource).

It is RECOMMENDED that implementations designed to act as messaging intermediaries support the ability to act as a transactional resource. It is RECOMMENDED that implementations or re-usable libraries provide Application Programming Interfaces to enable them to act as transactional controllers.

Where a behavior is not admitted, the rules defined in part 4 regarding responses to non-admitted behaviors MUST be followed.

Part 5 defines Security Layers to provide an authenticated and/or encrypted transport. Implementations SHOULD allow the configuration of appropriate levels of security for the domain in which they are to be deployed.

Conformant implementations acting in the TCP server role are strongly RECOMMENDED to implement Part 5: section 5.2 (or Part 5: 5.2.1 Alternative Establishment). Implementations acting in the TCP server role are strongly RECOMMENDED to implement Part 5: section 5.3 and to support commonly used SASL mechanisms. In particular such implementations SHOULD support the PLAIN [RFC4616] and SCRAM-SHA1 [RFC5802] mechanisms.

