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Specification —**

**Part 1:
Core specification**

*Technologies de l'information — Spécification de la Fondation pour la
connectivité ouverte (Fondation OCF) —*

Partie 1: Spécification du cœur



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1 Scope

The OCF specifications are divided into two sets of documents:

- Core Specification documents: The Core Specification documents specify the Framework, i.e., the OCF core architecture, interfaces, protocols and services to enable OCF profiles implementation for Internet of Things (IoT) usages and ecosystems.
- Vertical Profiles Specification documents: The Vertical Profiles Specification documents specify the OCF profiles to enable IoT usages for different market segments such as smart home, industrial, healthcare, and automotive. The Application Profiles Specification is built upon the interfaces and network security of the OCF core architecture defined in the Core Specification.

This document is the OCF Core specification which specifies the Framework and core architecture.

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.

ISO 8601, *Data elements and interchange formats – Information interchange –Representation of dates and times*, International Standards Organization, December 3, 2004

IEEE 754, *IEEE Standard for Floating-Point Arithmetic*, August 2008

IETF RFC 1981, *Path MTU Discovery for IP version 6*, August 1996
<https://tools.ietf.org/rfc/rfc1981.txt>

IETF RFC 2460, *Internet Protocol, version 6 (IPv6)*, December, 1998
<https://tools.ietf.org/rfc/rfc2460.txt>

IETF RFC 2616, *Hypertext Transfer Protocol – HTTP/1.1*, June 1999.
<http://www.ietf.org/rfc/rfc2616.txt>

IETF RFC 3810, *Multicast Listener Discovery Version 2 (MLDv2) for IPv6*, June 2004
<http://www.ietf.org/rfc/rfc3810.txt>

IETF RFC 3986, *Uniform Resource Identifier (URI): General Syntax*, January 2005.
<http://www.ietf.org/rfc/rfc3986.txt>

IETF RFC 4122, *A Universally Unique IDentifier (UUID) URN Namespace*, July 2005
<http://www.ietf.org/rfc/rfc4122.txt>

IETF RFC 4287, *The Atom Syndication Format*, December 2005,
<http://www.ietf.org/rfc/rfc4287.txt>

IETF RFC 4193, *Unique Local IPv6 Unicast Addresses*, October 2005
<http://www.ietf.org/rfc/rfc4193.txt>

IETF RFC 4291, *IP Version 6 Addressing Architecture*, February 2006
<http://www.ietf.org/rfc/rfc4291.txt>

IETF RFC 4443, *Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification*, March 2006
<http://www.ietf.org/rfc/rfc4443.txt>

IETF RFC 4861, *Neighbor Discovery for IP version 6 (IPv6)*, September 2007
<http://www.ietf.org/rfc/rfc4861.txt>

IETF RFC 4862, *IPv6 Stateless Address Autoconfiguration*, September 2007
<http://www.ietf.org/rfc/rfc4862.txt>

IETF RFC 4941, *Privacy Extensions for Stateless Address Autoconfiguration in IPv6*, September 2007
<http://www.ietf.org/rfc/rfc4941.txt>

IETF RFC 4944, *Transmission of IPv6 Packets over IEEE 802.15.4 Networks*, September 2007
<http://www.ietf.org/rfc/rfc4944.txt>

IETF RFC 5646, *Tags for Identifying Languages*, September 2009
<http://www.ietf.org/rfc/rfc5646.txt>

IETF RFC 5988, *Web Linking: General Syntax*, October 2010
<http://www.ietf.org/rfc/rfc5988.txt>

IETF RFC 6434, *IPv6 Node Requirements*, December 2011
<http://www.ietf.org/rfc/rfc6434.txt>

IETF RFC 6455, *The WebSocket Protocol*, December 2011
<https://www.ietf.org/rfc/rfc6455.txt>

IETF RFC 6573, *The Item and Collection Link Relations*, April 2012
<http://www.ietf.org/rfc/rfc6573.txt>

IETF RFC 6690, *Constrained RESTful Environments (CoRE) Link Format*, August 2012
<http://www.ietf.org/rfc/rfc6690.txt>

IETF RFC 6762, *Multicast DNS* February 2013
<http://www.ietf.org/rfc/rfc6762.txt>

IETF RFC 6763, *DNS-Based Service Discovery*, February 2013
<http://www.ietf.org/rfc/rfc6763.txt>

IETF RFC 6775, *Neighbor Discovery Optimization for IPv6 over Low-Power Wireless Personal Area Networks (6LoWPANs)*, November 2012
<http://www.ietf.org/rfc/rfc6775.txt>

IETF RFC 7049, *Concise Binary Object Representation (CBOR)*, October 2013
<http://www.ietf.org/rfc/rfc7049.txt>

IETF RFC 7084, *Basic Requirements for IPv6 Customer Edge Routers*, November 2013
<http://www.ietf.org/rfc/rfc7084.txt>

IETF RFC 7159, *The JavaScript Object Notation (JSON) Data Interchange Format*, March 2014
<http://tools.ietf.org/rfc/rfc7159.txt>

IETF RFC 7252, *The Constrained Application Protocol (CoAP)*, June 2014
<http://tools.ietf.org/rfc/rfc7252.txt>

IETF RFC 7301, *Transport Layer Security (TLS) Application-Layer Protocol Negotiation Extension*, July 2014
<https://tools.ietf.org/html/rfc7301>

IETF RFC 7428, *Transmission of IPv6 Packets over ITU-T G.9959 Networks*, February 2015
<http://www.ietf.org/rfc/rfc7428.txt>

IETF RFC 7641, *Observing Resources in the Constrained Application Protocol (CoAP)*, September 2015
<https://tools.ietf.org/html/rfc7641>

IETF RFC 7668, *IPv6 over BLUETOOTH(r) Low Energy*, October 2015
<https://tools.ietf.org/html/rfc7668>

IETF RFC 7721, *Security and Privacy Considerations for IPv6 Address Generation Mechanisms*, March 20016
<https://tools.ietf.org/html/rfc7721>

IETF RFC 7959, *Block-Wise Transfers in the Constrained Application Protocol (CoAP)*, August 2016
<https://tools.ietf.org/html/rfc7959>

IETF draft-ietf-core-coap-tcp-tls-07, *CoAP over TCP, TLS, and WebSockets*, June 10 2015
<https://datatracker.ietf.org/doc/draft-ietf-core-coap-tcp-tls/>

ECMA-4-4, *The JSON Data Interchange Format*, October 2013.
<http://www.ecma-international.org/publications/files/ECMA-ST/ECMA-404.pdf>

OCF Security, *Open Connectivity Foundation Security Capabilities*, Version 1.0,

IANA IPv6 Multicast Address Space Registry
<http://www.iana.org/assignments/ipv6-multicast-addresses/ipv6-multicast-addresses.xhtml>

IANA Media Types Assignment, March 2017
<http://www.iana.org/assignments/media-types/media-types.xhtml>

OpenAPI specification, *fka Swagger RESTful API Documentation Specification*
<https://github.com/OAI/OpenAPI-Specification/blob/master/versions/2.0.md>

OCF Resource Type Definitions, *API Definition Language for OCF Resource Type Definitions*,
Release OCF-v1.0.0
<https://github.com/openconnectivityfoundation/core>

W3C XML character escaping, *Extensible Markup Language (XML) 1.0*, November 2008
<http://www.w3.org/TR/2008/REC-xml-20081126/#syntax>