
**Web Services for Management
(WS-Management) Specification**

*Spécification des services Web pour le management
(WS-Management)*

Sample Document

get full document from standards.iteh.ai

Sample Document

get full document from standards.iteh.ai



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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 17963 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 38, *Distributed application platforms and services (DAPS)*.

Sample Document

get full document from standards.iteh.ai

Sample Document

get full document from standards.iteh.ai



1
2
3
4

Document Number: DSP0226

Date: 2012-08-28

Version: 1.1.1

5
6

Web Services for Management (WS- Management) Specification

get full document from standards.iteh.ai

- 7 **Document Type: Specification**
- 8 **Document Status: DMTF Standard**
- 9 **Document Language: en-US**

10 Copyright Notice

11 Copyright © 2006–2012 Distributed Management Task Force, Inc. (DMTF). All rights reserved.

12 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems
13 management and interoperability. Members and non-members may reproduce DMTF specifications and
14 documents, provided that correct attribution is given. As DMTF specifications may be revised from time to
15 time, the particular version and release date should always be noted.

16 Implementation of certain elements of this standard or proposed standard may be subject to third party
17 patent rights, including provisional patent rights (herein "patent rights"). DMTF makes no representations
18 to users of the standard as to the existence of such rights, and is not responsible to recognize, disclose,
19 or identify any or all such third party patent right, owners or claimants, nor for any incomplete or
20 inaccurate identification or disclosure of such rights, owners or claimants. DMTF shall have no liability to
21 any party, in any manner or circumstance, under any legal theory whatsoever, for failure to recognize,
22 disclose, or identify any such third party patent rights, or for such party's reliance on the standard or
23 incorporation thereof in its product, protocols or testing procedures. DMTF shall have no liability to any
24 party implementing such standard, whether such implementation is foreseeable or not, nor to any patent
25 owner or claimant, and shall have no liability or responsibility for costs or losses incurred if a standard is
26 withdrawn or modified after publication, and shall be indemnified and held harmless by any party
27 implementing the standard from any and all claims of infringement by a patent owner for such
28 implementations.

29 For information about patents held by third-parties which have notified the DMTF that, in their opinion,
30 such patent may relate to or impact implementations of DMTF standards, visit
31 <http://www.dmtf.org/about/policies/disclosures.php>.

32

Sample Document
get full document from standards.iteh.ai

CONTENTS

34	Foreword.....	7
35	1 Scope.....	10
36	2 Normative References.....	10
37	3 Terms and Definitions.....	12
38	4 Symbols and Abbreviated Terms.....	15
39	5 Addressing.....	16
40	5.1 Management Addressing.....	16
41	5.2 Versions of Addressing.....	25
42	5.3 Requirements for Compatibility.....	25
43	5.4 Use of Addressing in WS-Management.....	27
44	6 WS-Management Control Headers.....	44
45	6.1 wsman:OperationTimeout.....	44
46	6.2 wsman:MaxEnvelopeSize.....	45
47	6.3 wsman:Locale.....	46
48	6.4 wsman:OptionSet.....	47
49	6.5 wsman:RequestEPR.....	50
50	7 Resource Access.....	51
51	7.1 General.....	51
52	7.2 Addressing Uniformity.....	53
53	7.3 Get.....	54
54	7.4 Put.....	55
55	7.5 Delete.....	59
56	7.6 Create.....	61
57	7.7 Fragment-Level Access.....	64
58	7.8 Fragment-Level Get.....	66
59	7.9 Fragment-Level Put.....	67
60	7.10 Fragment-Level Delete.....	70
61	7.11 Fragment-Level Create.....	71
62	8 Enumeration of Datasets.....	73
63	8.1 General.....	73
64	8.2 Enumerate.....	75
65	8.3 Filter Interpretation.....	82
66	8.4 Pull.....	84
67	8.5 Release.....	88
68	8.6 Ad-Hoc Queries and Fragment-Level Enumerations.....	90
69	8.7 Enumeration of EPRs.....	90
70	8.8 Renew.....	92
71	8.9 GetStatus.....	94
72	8.10 EnumerationEnd.....	94
73	9 Custom Actions (Methods).....	95
74	10 Notifications (Eventing).....	96
75	10.1 General.....	96
76	10.2 Subscribe.....	97
77	10.3 GetStatus.....	117
78	10.4 Unsubscribe.....	118
79	10.5 Renew.....	119
80	10.6 SubscriptionEnd.....	120
81	10.7 Acknowledgement of Delivery.....	122
82	10.8 Refusal of Delivery.....	123
83	10.9 Dropped Events.....	124
84	10.10 Access Control.....	125

85	10.11 Implementation Considerations.....	126
86	10.12 Advertisement of Notifications.....	126
87	11 Metadata and Discovery.....	126
88	12 Security.....	129
89	12.1 General.....	129
90	12.2 Security Profiles.....	130
91	12.3 Security Considerations for Event Subscriptions.....	130
92	12.4 Including Credentials with a Subscription.....	131
93	12.5 Correlating Events with a Subscription.....	132
94	12.6 Transport-Level Authentication Failure.....	132
95	12.7 Security Implications of Third-Party Subscriptions.....	132
96	13 Transports and Message Encoding.....	133
97	13.1 SOAP.....	133
98	13.2 Lack of Response.....	134
99	13.3 Replay of Messages.....	134
100	13.4 Encoding Limits.....	134
101	13.5 Binary Attachments.....	135
102	13.6 Case-Sensitivity.....	135
103	14 Faults.....	136
104	14.1 Introduction.....	136
105	14.2 Fault Encoding.....	136
106	14.3 NotUnderstood Faults.....	137
107	14.4 Degenerate Faults.....	138
108	14.5 Fault Extensibility.....	138
109	14.6 Master Faults.....	139
110	ANNEX A (informative) Notational Conventions.....	160
111	A.1 XML Namespaces.....	160
112	ANNEX B (normative) Conformance.....	162
113	ANNEX C (normative) HTTP(S) Transport and Security Profile.....	163
114	C.1 General.....	163
115	C.2 HTTP(S) Binding.....	163
116	C.3 HTTP(S) Security Profiles.....	165
117	C.4 IPSec and HTTP.....	170
118	ANNEX D (informative) XPath Support.....	171
119	D.1 General.....	171
120	D.2 Level 1.....	172
121	D.3 Level 2.....	174
122	ANNEX E (normative) Selector Filter Dialect.....	177
123	ANNEX F (informative) Identify XML Schema.....	179
124	ANNEX G (informative) Resource Access Operations XML Schema and WSDL.....	182
125	ANNEX H (informative) Enumeration Operations XML Schema and WSDL.....	187
126	ANNEX I (informative) Notification Operations XML Schema and WSDL.....	196
127	ANNEX J (informative) Addressing XML Schema.....	204
128	ANNEX K (informative) WS-Management XML Schema.....	207
129	ANNEX L (informative) Change Log.....	217
130		

131 **Figures**

132	Figure 1 – Message Information Header Blocks	20
-----	--	----

133

134 **Tables**

135	Table 1 – Relationship Type	21
136	Table 2 – Interoperability Requirements	25
137	Table 3 – WSA Versions in Exchanges	26
138	Table 4 – wsa:Action URI Descriptions	42
139	Table 5 – wsman:AccessDenied	139
140	Table 6 – wsa:ActionNotSupported	140
141	Table 7 – wsman:AlreadyExists	140
142	Table 8 – wsmen:CannotProcessFilter	141
143	Table 9 – wsman:CannotProcessFilter	141
144	Table 10 – wsman:Concurrency	142
145	Table 11 – wsme:DeliveryModeRequestedUnavailable	142
146	Table 12 – wsman:DeliveryRefused	143
147	Table 13 – wsa:DestinationUnreachable	143
148	Table 14 – wsman:EncodingLimit	144
149	Table 15 – wsa:EndpointUnavailable	145
150	Table 16 – wsman:EventDeliverToUnusable	145
151	Table 17 – wsme:EventSourceUnableToProcess	146
152	Table 18 – wsmen:FilterDialectRequestedUnavailable	146
153	Table 19 – wsme:FilteringNotSupported	146
154	Table 20 – wsmen:FilteringNotSupported	147
155	Table 21 – wsme:FilteringRequestedUnavailable	147
156	Table 22 – wsman:FragmentDialectNotSupported	148
157	Table 23 – wsman:InternalError	148
158	Table 24 – wsman:InvalidBookmark	149
159	Table 25 – wsmen:InvalidEnumerationContext	149
160	Table 26 – wsme:InvalidExpirationTime	150
161	Table 27 – wsmen:InvalidExpirationTime	150
162	Table 28 – wsme:InvalidMessage	151
163	Table 29 – wsa:InvalidMessageInformationHeader	151
164	Table 30 – wsman:InvalidOptions	152
165	Table 31 – wsman:InvalidParameter	152
166	Table 32 – wsmt:InvalidRepresentation	153
167	Table 33 – wsman:InvalidSelectors	153
168	Table 34 – wsa:MessageInformationHeaderRequired	154
169	Table 35 – wsman:NoAck	154
170	Table 36 – wsman:QuotaLimit	154
171	Table 37 – wsman:SchemaValidationError	155

172	Table 38 – wsmen:TimedOut	155
173	Table 39 – wsman:TimedOut	155
174	Table 40 – wsme:UnableToRenew	156
175	Table 41 – wsme:UnsupportedExpirationType	156
176	Table 42 – wsmen:UnsupportedExpirationType	156
177	Table 43 – wsman:UnsupportedFeature	157
178	Table 44 – wsme:UnsupportedExpirationType	158
179	Table 45 – wsmen:UnableToRenew	158
180	Table 46 – wsa:InvalidMessage	158
181	Table 47 – wsme:CannotProcessFilter	159
182	Table A-1 – Prefixes and XML Namespaces Used in This Specification	161
183	Table C-1 – Basic Authentication Sequence	165
184	Table C-2 – Digest Authentication Sequence	166
185	Table C-3 – Basic Authentication over HTTPS Sequence	166
186	Table C-4 – Digest Authentication over HTTPS Sequence	167
187	Table C-5 – HTTPS with Client Certificate Sequence	167
188	Table C-6 – Basic Authentication over HTTPS with Client Certificate Sequence	168
189	Table C-7 – SPNEGO Authentication over HTTPS Sequence	169
190	Table C-8 – SPNEGO Authentication over HTTPS with Client Certificate Sequence	169
191	Table D-1 – XPath Level 1 Terminals	173
192	Table D-2 – XPath Level 2 Terminals	175
193		

get full document from standards.iteh.ai

194

Foreword

195 The *Web Services for Management (WS-Management) Specification* (DSP0226) was prepared by the
196 WS-Management sub-group of the WBEM Infrastructure & Protocols Working Group.

197 This International Standard makes use of functionality similar to the following W3C
198 Recommendations:

- 199 • Web Services Eventing (WS-Eventing)
- 200 • Web Services Transfer (WS-Transfer)
- 201 • Web Services Enumeration (WS-Enumeration)

202 These W3C Recommendations were not available at the time WS-Management was defined, and
203 similar functionality was incorporated directly into provisions of the WS-Management specification.
204 Future revisions of WS-Management might incorporate these functions by External Reference to
205 these W3C Recommendations

206 DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and
207 systems management and interoperability.

208 Acknowledgements

209 The authors wish to acknowledge the following people.

210 Chairpersons:

- 211 • Josh Cohen – Microsoft
- 212 • Larry Lamers (Vice-Chairman) – VMware

213 Editors:

- 214 • Nathan Burkhart – Microsoft
- 215 • Doug Davis – IBM
- 216 • Raymond McCollum – Microsoft
- 217 • Bryan Murray – HP
- 218 • Brian Reistad – Microsoft

219 Authors:

- 220 • Akhil Arora – Sun Microsystems
- 221 • Vince Brunssen – IBM
- 222 • Mark Carlson – Sun Microsystems
- 223 • Jim Davis – WBEM Solutions
- 224 • Tony Dicenzo – Oracle
- 225 • Mike Dutch – Symantec
- 226 • Zulah Eckert – BEA Systems
- 227 • George Ericson – EMC
- 228 • Wassim Fayed – Microsoft
- 229 • Chris Ferris – IBM
- 230 • Bob Freund – Hitachi Ltd.
- 231 • Eugene Golovinsky – BMC Software
- 232 • Yasuhiro Hagiwara – NEC

- 233 • Steve Hand – Olocity
- 234 • Jackson He – Intel
- 235 • David Hines – Intel
- 236 • Reiji Inohara – NEC
- 237 • Christane Kämpfe – Fujitsu-Siemens Computers
- 238 • Paul Knight – Nortel Networks
- 239 • Vincent Kowalski – BMC Software
- 240 • Heather Kreger – IBM
- 241 • Vishwa Kumbalimutt – Microsoft
- 242 • Sunil Kunisetty – Oracle
- 243 • Richard Landau – Dell
- 244 • Paul Lipton – CA
- 245 • James Martin – Intel
- 246 • Milan Milenkovic – Intel
- 247 • Jeff Mischkinsky – Oracle
- 248 • Paul Montgomery – AMD
- 249 • Jishnu Mukurji – HP
- 250 • Alexander Nosov – Microsoft
- 251 • Abhay Padlia – Novell
- 252 • Gilbert Pilz – Oracle
- 253 • Roger Reich – Symantec
- 254 • Larry Russon – Novell
- 255 • Tom Rutt – Fujitsu Ltd.
- 256 • Jeffrey Schlimmer – Microsoft
- 257 • Dr. Hemal Shah – Broadcom
- 258 • Sharon Smith – Intel
- 259 • Enoch Suen – Dell
- 260 • Vijay Tewari – Intel
- 261 • William Vambenepe – HP
- 262 • Andrea Westerinen – CA, Inc.
- 263 • Kirk Wilson – CA, Inc.
- 264 • Dr. Jerry Xie – Intel

265 Contributors:

- 266 • Paul C. Allen – Microsoft
- 267 • Rodrigo Bomfim – Microsoft
- 268 • Don Box – Microsoft
- 269 • Jerry Duke – Intel
- 270 • David Filani – Intel
- 271 • Kirill Gavrylyuk – Microsoft
- 272 • Omri Gazitt – Microsoft
- 273 • Frank Gorishek – AMD
- 274 • Lawson Guthrie – Intel
- 275 • Arvind Kumar – Intel
- 276 • Brad Lovering – Microsoft

- 277 • Pat Maynard – Intel
- 278 • Steve Millet – Microsoft
- 279 • Matthew Senft – Microsoft
- 280 • Barry Shilmover – Microsoft
- 281 • Tom Slaight – Intel
- 282 • Marvin Theimer – Microsoft
- 283 • Dave Tobias – AMD
- 284 • John Tollesrud – Sun
- 285 • Anders Vinberg – Microsoft
- 286 • Megan Wallent – Microsoft

Sample Document

get full document from standards.iteh.ai

287
288

Web Services for Management (WS-Management) Specification

289 1 Scope

290 The *Web Services for Management (WS-Management) Specification* describes a Web services
291 protocol based on SOAP for use in management-specific domains. These domains include the
292 management of entities such as PCs, servers, devices, Web services and other applications, and
293 other manageable entities. Services can expose only a WS-Management interface or compose the
294 WS-Management service interface with some of the many other Web service specifications.

295 A crucial application for these services is in the area of systems management. To promote
296 interoperability between management applications and managed resources, this specification
297 identifies a core set of Web service specifications and usage requirements that expose a common set
298 of operations central to all systems management. This includes the ability to do the following:

- 299 • Get, put (update), create, and delete individual resource instances, such as settings and
300 dynamic values
- 301 • Enumerate the contents of containers and collections, such as large tables and logs
- 302 • Subscribe to events emitted by managed resources
- 303 • Execute specific management methods with strongly typed input and output parameters

304 In each of these areas of scope, this specification defines minimal implementation requirements for
305 conformant Web service implementations. An implementation is free to extend beyond this set of
306 operations, and to choose not to support one or more of the preceding areas of functionality if that
307 functionality is not appropriate to the target device or system.

308 This specification intends to meet the following requirements:

- 309 • Constrain Web services protocols and formats so that Web services can be implemented
310 with a small footprint in both hardware and software management services.
- 311 • Define minimum requirements for compliance without constraining richer implementations.
- 312 • Ensure backward compatibility and interoperability with WS-Management version 1.0.
- 313 • Ensure composability with other Web services specifications.

314 2 Normative References

315 The following referenced documents are indispensable for the application of this document. For dated
316 references, only the edition cited applies. For undated references, the latest edition of the referenced
317 document (including any amendments) applies.

318 IETF RFC 2616, R. Fielding et al, *Hypertext Transfer Protocol (HTTP 1.1)*, June 1999,
319 <http://www.ietf.org/rfc/rfc2616.txt>

320 IETF RFC 2818, E. Rescorla, *HTTP over TLS (HTTPS)*, May 2000, <http://www.ietf.org/rfc/rfc2818.txt>

321 IETF, RFC 3986, T. Berners-Lee et al, *Uniform Resource Identifiers (URI): Generic Syntax*, August
322 1998, <http://www.ietf.org/rfc/rfc3986.txt>

- 323 IETF, RFC 4122, P. Leach et al, *A Universally Unique Identifier (UUID) URN Namespace*, July 2005,
324 <http://www.ietf.org/rfc/rfc4122.txt>
- 325 IETF RFC 4178, L. Zhu et al, *The Simple and Protected Generic Security Service Application
326 Program Interface (GSS-API) Negotiation Mechanism*, October 2005,
327 <http://www.ietf.org/rfc/rfc4178.txt>
- 328 IETF, RFC 4559, K. Jaganathan et al, *SPNEGO-based Kerberos and NTLM HTTP Authentication in
329 Microsoft Windows*, June 2006, <http://www.ietf.org/rfc/rfc4559.txt>
- 330 IETF RFC 5646, A. Phillips et al, *Tags for Identifying Languages*, September 2009,
331 <http://tools.ietf.org/rfc/rfc5646.txt>
- 332 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,
333 <http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtype>
- 334 OASIS, A. Nadalin et al, *Web Services Security Username Token Profile 1.0*, March 2004,
335 <http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-username-token-profile-1.0.pdf>
- 336 OASIS, A. Nadalin et al, *Web Services Security: SOAP Message Security 1.0 (WS-Security 2004)*,
337 March 2004, <http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-soap-message-security-1.0.pdf>
338
- 339 OASIS, S. Anderson et al, *Web Services Trust Language (WS-Trust)*, December 2005,
340 <http://schemas.xmlsoap.org/ws/2005/02/trust>
- 341 The Unicode Consortium, *The Unicode Standard Version 3.0*, January 2000,
342 <http://www.unicode.org/book/u2.html>
- 343 The Unicode Consortium, *Byte Order Mark (BOM) FAQ*,
344 http://www.unicode.org/faq/utf_bom.html#BOM
- 345 W3C, M. Gudgin, et al, *SOAP Version 1.2 Part 1: Messaging Framework*, June 2003,
346 <http://www.w3.org/TR/soap12-part1/>
- 347 W3C, M. Gudgin, et al, *SOAP Version 1.2 Part 2: Adjuncts*, June 2003,
348 <http://www.w3.org/TR/2003/REC-soap12-part2-20030624>
- 349 W3C, M. Gudgin, et al, *SOAP Message Transmission Optimization Mechanism (MTOM)*,
350 November 2004, <http://www.w3.org/TR/2004/PR-soap12-mtom-20041116/>
- 351 W3C, J. Clark et al, *XML Path Language Version 1.0 (XPath 1.0)*, November 1999,
352 <http://www.w3.org/TR/1999/REC-xpath-19991116>
- 353 W3C, J. Cowan et al, *XML Information Set Second Edition (XML Infoset)*, February 2004,
354 <http://www.w3.org/TR/2004/REC-xml-infoset-20040204/>
- 355 W3C, H. Thompson et al, *XML Schema Part 1: Structures (XML Schema 1)*, May 2001,
356 <http://www.w3.org/TR/xmlschema-1/>
- 357 W3C, P. Biron et al, *XML Schema Part 2: Datatypes (XML Schema 2)*, May 2001,
358 <http://www.w3.org/TR/xmlschema-2/>
- 359 W3C, *Web Services Addressing 1.0 – Core*, W3C Recommendation, May 2006,
360 <http://www.w3.org/TR/2006/REC-ws-addr-core-20060509/>
- 361 W3C, *Web Services Addressing 1.0 – SOAP Binding*, W3C Recommendation, May 2006,
362 <http://www.w3.org/TR/2006/REC-ws-addr-soap-20060509/>
- 363 W3C, *Web Services Addressing 1.0 – Metadata*, W3C Recommendation, September 2007,
364 <http://www.w3.org/TR/2007/REC-ws-addr-metadata-20070904/>
- 365 W3C, *Extensible Markup Language (XML) 1.0*, W3C Recommendation, October 2000,
366 <http://www.w3.org/TR/2000/REC-xml-20001006>