ISO/IEC 29341-1-1:2011-09 (E)

Information technology - UPnP Device Architecture - Part 1-1: UPnP Device Architecture Version 1.1

Contents

Page

Introduction 4
0 Addressing 10
0.1 Determining whether to use Auto-IP 10
0.2 Choosing an address 10
0.3 Testing the address 11
0.4 Forwarding rules 11
0.5 Periodic checking for dynamic address availability 12
0.6 Device naming and DNS interaction 12
0.7 Name to IP address resolution 12
0.8 References 12
1 Discovery 13
1.1 SSDP message format 16
1.1.1 SSDP Start-line 16
1.1.2 SSDP message header fields 16
1.1.3 SSDP header field extensions 16
1.1.4 UUID format and RECOMMENDED generation algorithms 17
1.1.5 SSDP processing rules 17
1.2 Advertisement 17
1.2.1 Advertisement protocols and standards 18
1.2.2 Device available - NOTIFY with ssdp:alive 18
1.2.3 Device unavailable -- NOTIFY with ssdp:byebye 24
1.2.4 Device Update – NOTIFY with ssdp:update 25
1.3 Search 27
1.3.1 Search protocols and standards 27
1.3.2 Search request with M-SEARCH 28
1.3.3 Search response 31
1.4 References 33
2 Description 33
2.1 Generic requirements on HTTP usage 36
2.2 Generic requirements on XML usage 38
2.3 Device description 38
2.4 UPnP Device Template 43
2.5 Service description 43
2.5.1 Defining and processing extended data types 50
2.5.2 String equivalents of extended data types 51
2.5.3 Generic requirements 52
2.5.4 Ordering of Elements 52
2.5.5 Versioning 53
2.6 UPnP Service Template 53
2.7 Non-standard vendor extensions and limitations 53
2.7.1 Placement of Additional Elements and Attributes 55
2.8 UPnP Device Schema 55
2.9 UPnP Service Schema 55
2.10 UPnP Datatype Schema 55
2.11 Retrieving a description using HTTP 55

2.12 References 59
3 Control 59
3.1 Control protocols 62
3.1.1 SOAP Profile 62
3.2 Actions 65
3.2.1 Action invocation 65
3.2.2 Action Response 68
3.2.3 UPnP Action Schema 70
3.2.4 Recommendations and additional requirements 71
3.2.5 Action error response 71
3.2.6 UPnP Error Schema 74
3.3 Query for variable 74
3.4 References 75
4 Eventing 75
4.1 Unicast eventing 75
4.1.1 Subscription 77
4.1.2 SUBSCRIBE with NT and CALLBACK 79
4.1.3 Renewing a subscription with SUBSCRIBE with SID 81
4.1.4 Canceling a subscription with UNSUBSCRIBE 82
4.2 Multicast Eventing 84
4.3 Event messages 85
4.3.1 Error Cases 86
4.3.2 Unicast eventing: Event messages: NOTIFY 86
4.3.3 Multicast Eventing: Event messages: NOTIFY 89
4.4 UPnP Event Schema 92
4.5 Augmenting the UPnP Device and Service Schemas 92
4.6 References 93
5 Presentation 93
5.1 References 94
Annex A (normative) IP Version 6 Support 95
A.1 Introduction 95
A.2 General Principles 95
A.2.1 Device operation 96
A.2.2 Control point operation 96
A.3 Addressing 96
A.3.1 Summary of boot/startup process 96
A.3.2 Short overview of protocol specified by RFC 2462 97
A.4 Discovery 97
A.4.1 Advertisement 98
A.4.2 Advertisement: Device unavailable 98
A.4.3 Advertisement: Device update 99
A.4.4 Search 99
A.4.5 Search response 99
A.5 Description 100
A.6 Control 100
A.7 Eventing 100
A.8 Presentation 100
A.9 References 101

Annex B (informative) Schemas 102
B.1 UPnP Device Schema 102
B.2 UPnP Service Schema 106
B.3 UPnP Control Schema 110
B.4 UPnP Error Schema 111
B.5 UPnP Event Schema 112
B.6 Schema references 113

Figure 1: — Protocol stack 5
Figure 1-1: — Discovery architecture 13
Figure 1-2: — Advertisement protocol stack 18
Figure 1-3: — Initial and repeat announcements, no announcement spreading 20
Figure 1-4: — Initial and repeat announcements, message spreading of repeat announcements 20
Figure 1-5: — Search protocol stack 27
Figure 2-1: — Description architecture 33
Figure 2-2: — Description retrieval protocol stack 56
Figure 3-1: — Control architecture 59
Figure 3-2: — Control protocol stack 62
Figure 4-1: — Unicast eventing architecture 75
Figure 4-2: — Unicast eventing protocol stack 76
Figure 4-3: — Multicast eventing architecture 84
Figure 4-4: — Mulitcast eventing protocol stack 85
Figure 5-1: — Presentation architecture 93
Figure 5-2: — Presentation protocol stack 94

Table 1 — Acronyms 7
Table 1-1: — Root device discovery messages 19
Table 1-2: — Embedded device discovery messages 19
Table 1-3: — Service discovery messages 19
Table 2-1: — Vendor extensions 53
Table 3-1: — SOAP 1.1 UPnP Profile 62
Table 3-2: — `mustUnderstand` attribute 64
Table 3-3: — UPnP Defined Action error codes 73
Table 4-4: — HTTP Status Codes indicating a Subscription Error 81
Table 4-5: — HTTP Status Codes indicating a Resubscription Error 82
Table 4-6: — HTTP Status Codes indicating a Cancel Subscription Error 83
Table 4-7: — HTTP Status Codes indicating a Notify Error 89
Table 4-8: — Multicast event levels 91