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### REVISION HISTORY

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<td>Apr, 2016</td>
<td>Original publication</td>
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<td>16.07</td>
<td>Jun, 2016</td>
<td>Small changes based on feedback received.</td>
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<td>Jul 8, 2016</td>
<td>Added G.711 and AAC RTP-Multicast tests for IPv4 and IPv6 (4.2.8, 4.2.9, 4.2.15, 4.2.16) Section 4.5 (Start and Stop Multicast streaming) deleted</td>
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<td>Review comments implemented.</td>
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<td>More comments and spelling errors.</td>
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<td>Sep, 2016</td>
<td>Added the test cases for H.264, H.265, G.711, and AAC streaming over HTTPS:</td>
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<td>Nov, 2016</td>
<td>Test IDs were updated according #1253.</td>
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<td>Jan 19, 2017</td>
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<td>All Video Streaming test cases were updated according to ticket #1306.</td>
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<td>updated according to ticket #1306.</td>
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### Scope/Real Time Streaming section was updated to include audio backchannel streaming.

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<td>Scope/Real Time Streaming section was updated to include metadata streaming.</td>
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| Apr 27, 2017 | Typo fixes according #1168. |

| May 26, 2017 | The following test cases were added according to #1322: |
| | - MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets) |
| | - MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets) |
| | - MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets, IPv6) |
| | - MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets, IPv6) |
| | - MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets) |

<p>| Jun 5, 2017 | The following test cases were added according to #1322: |
| | - MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets) |
| | - MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6) |</p>
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**Notes:**
- The test cases and Annexes were changed according to #1315.
- The specifications include support for various codecs (AAC, G.711) and protocols (RTP, RTSP, WebSockets, IPv6).
- The test cases cover streaming of H.264 and H.265, including unicast and multicast scenarios.
- The Annexes likely detail additional functionalities and configurations.

**Reference:**
- www.onvif.org
MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP)
MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP, IPv6)
MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)
MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP, IPv6)
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MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP)
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MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv6)
MEDIA2 STREAMING – AAC (RTP-Multicast, IPv4)
MEDIA2 STREAMING – AAC (RTP-Multicast, IPv6)

Annex A.40 Device Configuration for Video Streaming
Annex A.41 Device Configuration for Audio Streaming
Annex A.42 Backchannel Streaming over WebSocket
Annex A.43 Configuring HTTPS if Required was added according to #1315
Annex A.44 Removing Configurations from Media Profile was added according to #1315

18.06       Jun 21, 2018       Reformatting document using new template
17.12       Jul 10, 2017       The following Annexes were changed to check stream uri to #1346:
                               Annex A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming
                               Annex A.31 Media2 Service – Media Profile Configuration for Metadata Streaming
                               Annex A.40 Get Stream Uri
17.12       Aug 1, 2017       The following test cases and Annexes were added according to #1348:
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<td>Pre-Requisite of the following test cases and Annex were updated according to #1475:</td>
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MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP)
MEDIA2 AUDIO STREAMING – AAC (RTP/RTSP/TCP)
MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/UDP, IPv6)
MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)
MEDIA2 AUDIO STREAMING – AAC (RTP/RTSP/TCP, IPv6)
MEDIA2 AUDIO STREAMING – G.711 (RTP-Multicast, IPv4)
MEDIA2 AUDIO STREAMING – G.711 (RTP-Multicast, IPv6)
MEDIA2 AUDIO STREAMING – AAC (RTP-Multicast, IPv4)
MEDIA2 AUDIO STREAMING – AAC (RTP-Multicast, IPv6)
MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP)
MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP)
MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP, IPv6)
MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)
MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP, IPv6)
MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP)
MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP)
MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP)
MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP, IPv6)
MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)
MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP, IPv6)
MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast, IPv4)
MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast, IPv6)
MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast, IPv4)
MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast, IPv6)
The following test cases and Annexes were updated according to #1348:
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

MEDIA2_RTSS-5-1-1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP)
Annex A.10 Media Streaming over RTP-Unicast/UDP
Annex A.11 Media Streaming over RTP-Unicast/RTSP/HTTP/TCP
Annex A.12 Media Streaming over RTP/RTSP/TCP
Annex A.13 Media Streaming over RTP-Multicast
Annex A.47 Device Configuration for Video and Audio Streaming

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<td>The following test cases and Annexes were added according to #1501:</td>
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<td>BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)</td>
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<td>BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)</td>
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<tr>
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<td>BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)</td>
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<td>Annex A.50 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP</td>
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<td>METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP)</td>
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<td>Annex A.51 Metadata Streaming over RTP-Unicast/RTSP/HTTPS/TCP</td>
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<td>Annex A.52 Metadata Streaming over WebSocket</td>
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<td>Nov 29, 2017</td>
<td>The following test cases and Annexes were added according to #1409:</td>
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<td>MEDIA2_RTSS-1-1-23 VIDEO ENCODER INSTANCES</td>
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<td>MEDIA2_RTSS-1-1-24 VIDEO ENCODER INSTANCES - H.264</td>
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<td>MEDIA2_RTSS-1-1-25 VIDEO ENCODER INSTANCES - H.265</td>
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<td>Annex A.53 Remove all non-fixed Media Profiles and remove all</td>
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<tr>
<td></td>
<td>configurations from fixed Media Profiles was removed</td>
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<td>Annex A.55 Create New Media Profiles to Get Guaranteed Number of</td>
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<td>Media Profiles for Video Source Configuration</td>
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<td>Annex A.54 Get Video Source Configurations List</td>
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<td>Annex A.56 Concurrent Video Streaming over RTP-Unicast/UDP</td>
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<tr>
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<td>Annex A.57 Concurrent Video Streaming over RTP-Unicast/UDP</td>
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Annex A.58 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration for Specified Encoding

Annex A.41 Device Configuration for Video Streaming was updated according to #1536

The following were updated according to #1549:

- Annex A.37 Removing Video Encoder Configuration and Audio Encoder Configuration from Media Profile was removed
- Annex A.31 Media2 Service – Media Profile Configuration for Metadata Streaming was updated with (step 11 added).

MEDIA2_RTSS-4-2-1 METADATA STREAMING (RTP-Multicast/UDP) was updated (step 4 removed).

MEDIA2_RTSS-4-2-2 METADATA STREAMING (RTP-Multicast/UDP, IPv6) was updated (step 5 removed).

The following were updated according to #1555:

Annex A.39 Get Stream Uri

The following were updated according to #1568:

MEDIA2_RTSS-2-1-22 MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP) (removed)

MEDIA2_RTSS-2-1-23 MEDIA2 AUDIO STREAMING – G.711 (RTP/RTSP/TCP) (removed)

MEDIA2_RTSS-2-1-24 MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/UDP, IPv6) (removed)

MEDIA2_RTSS-2-1-25 MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (removed)

MEDIA2_RTSS-2-1-26 MEDIA2 AUDIO STREAMING – G.711 (RTP/RTSP/TCP, IPv6) (removed)

MEDIA2_RTSS-2-1-27 MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/UDP) (removed)

MEDIA2_RTSS-2-1-28 MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP) (removed)

MEDIA2_RTSS-2-1-29 MEDIA2 AUDIO STREAMING – AAC (RTP/RTSP/TCP) (removed)

MEDIA2_RTSS-2-1-30 MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/UDP, IPv6) (removed)

MEDIA2_RTSS-2-1-31 MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (removed)

MEDIA2_RTSS-2-1-32 MEDIA2 AUDIO STREAMING – AAC (RTP/RTSP/TCP, IPv6) (removed)

MEDIA2_RTSS-2-2-5 MEDIA2 AUDIO STREAMING – G.711 (RTP-Multicast, IPv4) (removed)

MEDIA2_RTSS-2-2-6 MEDIA2 AUDIO STREAMING – G.711 (RTP-Multicast, IPv6) (removed)
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<tr>
<td>Jan 24, 2018</td>
<td>Annex A.6 Media2 Service Profile Configuration for Video Streaming was updated according to #1554.</td>
</tr>
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</table>
| Feb 06, 2018 | The following were updated according to #1550:  
|           | - Annex A.46 Device Configuration for Video and Audio Streaming (Resolution and FrameRateLimit settings were updated for step 3)  
|           | - Annex A.40 Device Configuration for Video Streaming (Resolution and FrameRateLimit settings were updated for step 3) |
| Mar 15, 2018 | The following were updated according to #1562:  
|           | - timeout1 variable was renamed to operationDelay variable  
|           | - Annex A.15 Configuring HTTPS using Advanced Security (steps 1-3 were added) |
| Mar 15, 2018 | The following were updated according to #1586:  
|           | - Annex A.18 Create an RSA key pair (steps 6.1 and 7 were updated) |
| Apr 10, 2018 | Annex A.48 RTSP Authentication Check was updated according to #1590. |
| Apr 17, 2018 | The following were updated according to #1615:  
|           | - Annex A.38 Provide CA certificate (step 1 added, step 3 updated)  
|           | - Annex A.58 Determine RSA key length (added) |
| Apr 18, 2018 | The following were updated according to #1595:  
|           | - Annex A.30 Media Streaming over WebSocket (step 1 added)  
|           | - Annex A.59 Get WebSocket URI (added) |
| May 15, 2018 | The following were updated according to #1593:  
|           | - Annex A.16 Add server certificate assignment with corresponding certification path, self-signed certificate and RSA key pair (step 8 added, note added)  
|           | - Annex A.17 Add server certificate assignment with corresponding certification path, CA certificate and RSA key pair (step 12 added, note added) |
| Jun 21, 2018 | Reformating document using new template |
| Nov 15, 2018 | The following were updated according to #1653:  
|           | - Pre-Requisites for all test cases ("Advanced Security Service is received from the DUT, if TLS Server is supported by DUT." was replaced with "Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.")  
|           | - For all test cases Pre-Requisites were updated ("Advanced Security Service is received from the DUT." was replaced with "Security Configuration Service is received from the DUT." )
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<tr>
<td>18.12 Dec 21, 2018</td>
<td>Switching Hub description in 'Network Configuration for DUT' section was updated according to #1737</td>
</tr>
</tbody>
</table>
| 18.12 Dec 24, 2018 | The following annexes were updated to be consistency with implementation according to #1697:  
  A.22 Audio Backchannel over RTP-Unicast/RTSP/HTTP/TCP (step 9: connection2 was replaced with connection1)  
  A.49 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP (step 9: connection2 was replaced with connection1)  
  The following were added according to #1697:  
  A.60 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP  
  A.61 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP  
  BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4)  
  BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)  
  BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4)  
  BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)  
  BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)  
  BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)  
  BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)  
  BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)  
| 19.06 Apr 11, 2019 | The following annexes were updated according to #1764:  
  A.7 Media2 Service – Media Profile Configuration for Audio Streaming (step 3.3 and step 4.3.5.3 added)  
  A.41 Device Configuration for Audio Streaming (Returns parameters changed, step 3 added)  
  A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming (Returns parameters changed, step 3.7 added, step 4.3.9.3 added)  
  A.47 Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile (step 5.5.3 added)  
  A.46 Device Configuration for Video and Audio Streaming (Returns parameters changed, step 6 added) |
MEDIA2_RTSS-2-1-7 MEDIA2 STREAMING – AAC (RTP-Unicast/UDP) (step 3 and step 4 changed)

MEDIA2_RTSS-2-1-8 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP) (step 3 and step 4 changed)

MEDIA2_RTSS-2-1-9 MEDIA2 STREAMING – AAC (RTP/RTSP/TCP) (step 3 and step 4 changed)

MEDIA2_RTSS-2-1-10 MEDIA2 STREAMING – AAC (RTP-Unicast/UDP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-2-1-11 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-2-1-12 MEDIA2 STREAMING – AAC (RTP/RTSP/TCP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-2-1-14 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP) (step 4 and step 5 changed)

MEDIA2_RTSS-2-1-16 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 and step 6 changed)

MEDIA2_RTSS-2-1-18 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets) (step 3 and step 4 changed)

MEDIA2_RTSS-2-1-20 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-2-2-3 MEDIA2 STREAMING – AAC (RTP-Multicast, IPv4) (step 3 and step 4 changed)

MEDIA2_RTSS-2-2-4 MEDIA2 STREAMING – AAC (RTP-Multicast, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-3-1-8 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) (step 3 and step 4 changed)

MEDIA2_RTSS-3-1-7 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv4) (step 3 and step 4 changed)

MEDIA2_RTSS-3-1-8 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) (step 3 and step 4 changed)

MEDIA2_RTSS-3-1-9 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv4) (step 3 and step 4 changed)

MEDIA2_RTSS-3-1-10 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-3-1-11 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-3-1-12 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-3-1-14 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets) (step 3 and step 4 changed)

MEDIA2_RTSS-3-1-16 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) (step 4 and step 5 changed)

MEDIA2_RTSS-3-1-18 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) (step 4 and step 5 changed)
Note added in the following annexes according to #1869:

A.10 Media Streaming over RTP-Unicast/UDP
A.11 Media Streaming over RTP-Unicast/RTSP/HTTP/TCP
A.12 Media Streaming over RTP/RTSP/TCP
A.13 Media Streaming over RTP-Multicast
A.14 Media Streaming over RTP-Unicast/RTSP/HTTPS/TCP
A.21 Audio Backchannel streaming over RTP-Unicast/UDP
A.22 Audio Backchannel over RTP-Unicast/RTSP/HTTP/TCP
A.23 Audio Backchannel Streaming over RTP/RTSP/TCP
A.24 Audio Backchannel Streaming over RTP-Multicast
A.30 Media Streaming over WebSocket

A.42 Backchannel Streaming over WebSocket

A.49 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP

A.60 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP

A.61 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP

The following annexes were updated according to #1783:

Normative references: link to RFC 2326 added, link to IETF RFC 4566 added

A.39 Get Stream Uri (Input section updated, step 4 and step 5 added)

A.62 Check of IP address type in response to RTSP DESCRIBE (added)

MEDIA2_RTSS-3-1-4 BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-5 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-6 BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-10 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-11 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-12 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-15 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-16 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-19 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 updated)

MEDIA2_RTSS-3-1-20 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 updated)

MEDIA2_RTSS-3-1-22 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-24 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 updated)

MEDIA2_RTSS-3-1-27 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 updated)

MEDIA2_RTSS-3-1-28 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 updated)
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<td>METADATA STREAMING (RTP/RTSP/TCP, IPv6) (step 4 updated)</td>
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<td>METADATA STREAMING (RTP-Multicast/UDP, IPv6) (step 4 updated)</td>
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<td>MEDIA2_RTSS-1-1-4</td>
<td>MEDIA2 SET SYNCHRONIZATION POINT – H.264 (step 6 added)</td>
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<td>MEDIA2_RTSS-1-1-11</td>
<td>MEDIA2 SET SYNCHRONIZATION POINT – H.265 (step 6 added)</td>
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<td>MEDIA2_RTSS-4-1-4</td>
<td>METADATA STREAMING - SET SYNCHRONIZATION POINT (step 6 added)</td>
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<td>A.10</td>
<td>Media Streaming over RTP-Unicast/UDP (step 5 added)</td>
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<td>Media Streaming over RTP-Unicast/RTSP/HTTP/TCP (step 7 added)</td>
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<td>A.60 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP (step 6 added)</td>
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<td>A.61 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP (step 6 added)</td>
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<td>A.40 Device Configuration for Video Streaming (step 5 updated)</td>
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<td>A.41 Device Configuration for Audio Streaming (step 5 updated)</td>
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<tr>
<td>A.45 Device Configuration for Audio Streaming using Media Profile that contains only Audio Configurations (step 6 updated)</td>
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<td>A.46 Device Configuration for Video and Audio Streaming (step 10 updated)</td>
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<td>A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming (Input updated, step 7 updated)</td>
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<tr>
<td>A.31 Media2 Service – Media Profile Configuration for Metadata Streaming (Input updated, step 8 and step 12 updated)</td>
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**19.12 Oct 08, 2019**

Supporting of Metadata feature was added into Pre-Requisite of the following test cases according to #1894:

- MEDIA2_RTSS-4-1-1 METADATA STREAMING (RTP-Unicast/UDP)
- MEDIA2_RTSS-4-1-2 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP)
- MEDIA2_RTSS-4-1-3 METADATA STREAMING (RTP/RTSP/TCP)
- MEDIA2_RTSS-4-1-4 METADATA STREAMING - SET SYNCHRONIZATION POINT
- MEDIA2_RTSS-4-1-5 METADATA STREAMING (RTP-Unicast/UDP, IPv6)
- MEDIA2_RTSS-4-1-6 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6)
- MEDIA2_RTSS-4-1-7 METADATA STREAMING (RTP/RTSP/TCP, IPv6)
- MEDIA2_RTSS-4-1-8 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP)
- MEDIA2_RTSS-4-1-9 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)
- MEDIA2_RTSS-4-1-10 METADATA STREAMING (RTP-Unicast/RTSP/WebSockets)
<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 21, 2019</td>
<td>19.12</td>
<td>The following annexes were updated according to #1971:</td>
</tr>
<tr>
<td></td>
<td>MEDIA2_RTSS-4-1-1</td>
<td>METADATA STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6)</td>
</tr>
<tr>
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<td>MEDIA2_RTSS-4-2-1</td>
<td>METADATA STREAMING (RTP-Multicast/UDP)</td>
</tr>
<tr>
<td></td>
<td>MEDIA2_RTSS-4-2-2</td>
<td>METADATA STREAMING (RTP-Multicast/UDP, IPv6)</td>
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<td>Jul 31, 2020</td>
<td>20.12</td>
<td>The following annexes were changed according to #2072:</td>
</tr>
<tr>
<td></td>
<td>A.46</td>
<td>Device Configuration for Video and Audio Streaming</td>
</tr>
<tr>
<td></td>
<td>A.47</td>
<td>Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile</td>
</tr>
<tr>
<td>Sep 23, 2020</td>
<td>20.12</td>
<td>The following were added according to #2082:</td>
</tr>
<tr>
<td></td>
<td>MEDIA2_RTSS-6-1-1</td>
<td>MEDIA2 STREAMING – G.711 BACKCHANNEL AND H.26X VIDEO AND G.711/AAC AUDIO (RTP-Unicast/UDP)</td>
</tr>
<tr>
<td></td>
<td>A.65</td>
<td>Device Configuration for Audio Backchannel and Video and Audio Streaming</td>
</tr>
<tr>
<td></td>
<td>A.66</td>
<td>Media2 Service – Adding VideoSource, VideoEncoder, AudioSource and AudioEncoder configurations to Media Profile</td>
</tr>
<tr>
<td></td>
<td>A.67</td>
<td>Media2 Service – Adding AudioSource and AudioEncoder to Media Profile</td>
</tr>
<tr>
<td></td>
<td>A.68</td>
<td>Audio Backchannel and Media Streaming over RTP-Unicast/UDP</td>
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<td>Annex A.47 was renamed in the scope of #2082:</td>
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<tr>
<td></td>
<td>Old name: Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile</td>
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<td></td>
<td>New name: Media2 Service – Adding AudioSource and AudioEncoder with Specified Audio Encoder Value to Media Profile</td>
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<td>20.12</td>
<td>Annex A.48 RTSP Authentication Check was updated according to #2073</td>
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<td>Apr 09, 2021</td>
<td>21.06</td>
<td>The following annexes were updated according to #2124:</td>
</tr>
<tr>
<td></td>
<td>A.23</td>
<td>Turn on IPv6 network interface</td>
</tr>
<tr>
<td></td>
<td>A.24</td>
<td>Restore Network Settings</td>
</tr>
<tr>
<td>May 26, 2021</td>
<td>21.06</td>
<td>The following test cases and annexes were removed according to #2215:</td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-2 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-5 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-8 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-11 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)</td>
<td></td>
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</tr>
<tr>
<td>MEDIA2_RTSS-3-1-17 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)</td>
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</tr>
<tr>
<td>MEDIA2_RTSS-3-1-18 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-19 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEDIA2_RTSS-3-1-20 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)</td>
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</table>

The following test cases were updated according to #88:

**A.22 Audio Backchannel over RTP-Unicast/RTSP/HTTP/TCP**

**A.49 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP**

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| 23.06 | May 15, 2023 | The following test cases were updated according to #88: |
| MEDIA2_RTSS-1-1-4 MEDIA2 SET SYNCHRONIZATION POINT – H.264 (I-Frames checks were removed) |
| MEDIA2_RTSS-1-1-11 MEDIA2 SET SYNCHRONIZATION POINT – H.265 (I-Frames checks were removed) |
## Table of Contents

1 Introduction ...................................................................................................................... 30
   1.1 Scope ..................................................................................................................... 30
   1.2 Real Time Streaming .............................................................................................. 31

2 Normative references ...................................................................................................... 32

3 Terms and Definitions ..................................................................................................... 34
   3.1 Conventions ............................................................................................................ 34
   3.2 Definitions ............................................................................................................... 34
   3.3 Abbreviations .......................................................................................................... 34

4 Test Overview .................................................................................................................. 35
   4.1 Test Setup .............................................................................................................. 35
      4.1.1 Network Configuration for DUT ................................................................. 35
   4.2 Prerequisites ........................................................................................................... 36
   4.3 Test Policy .............................................................................................................. 36
      4.3.1 Real Time Streaming ................................................................................... 36

5 Real Time Streaming Test Cases ................................................................................... 38
   5.1 Video Streaming ..................................................................................................... 38
      5.1.1 Unicast ......................................................................................................... 38
         5.1.1.1 MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP) ......................... 38
         5.1.1.2 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP) ...... 39
         5.1.1.3 MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP) ............................ 40
         5.1.1.4 MEDIA2 SET SYNCHRONIZATION POINT – H.264 ......................... 42
         5.1.1.5 MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP, IPv6) ............... 44
         5.1.1.6 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) ................................................................................................................. 46
         5.1.1.7 MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP, IPv6) ..................... 47
         5.1.1.8 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP) .......................... 49
         5.1.1.9 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP) ...... 50
         5.1.1.10 MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP) .......................... 51
         5.1.1.11 MEDIA2 SET SYNCHRONIZATION POINT – H.265 ....................... 52
         5.1.1.12 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP, IPv6) .......... 55
5.1.1.13 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) ................................................................. 56
5.1.1.14 MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP, IPv6) ............... 58
5.1.1.15 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP) .................................................................................. 59
5.1.1.16 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP) .................................................................................. 61
5.1.1.17 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) .................................................................................. 62
5.1.1.18 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) .................................................................................. 64
5.1.1.19 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets) .................................................................................. 66
5.1.1.20 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets) .................................................................................. 67
5.1.1.21 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets, IPv6) .................................................................................. 68
5.1.1.22 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets, IPv6) .................................................................................. 70
5.1.1.23 VIDEO ENCODER INSTANCES .............................................. 71
5.1.1.24 VIDEO ENCODER INSTANCES - H.264 ........................................ 74
5.1.1.25 VIDEO ENCODER INSTANCES - H.265 ........................................ 76
5.1.2 Multicast .......................................................................................................... 79
5.1.2.1 MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv4) .................. 79
5.1.2.2 MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv6) ................. 80
5.1.2.3 MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv4) ................. 82
5.1.2.4 MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv6) ................. 83
5.2 Audio Streaming .................................................................................................. 85
5.2.1 Unicast ............................................................................................................ 85
5.2.1.1 MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP) .................... 85
5.2.1.2 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP) ...... 86
5.2.1.3  MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP) ................................. 87
5.2.1.4  MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP, IPv6) ............... 89
5.2.1.5  MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) ................................................................................................................. 90
5.2.1.6  MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP, IPv6) ................. 92
5.2.1.7  MEDIA2 STREAMING – AAC (RTP-Unicast/UDP) .......................... 93
5.2.1.8  MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP) ....... 94
5.2.1.9  MEDIA2 STREAMING – AAC (RTP/RTSP/TCP) ............................ 96
5.2.1.10 MEDIA2 STREAMING – AAC (RTP-Unicast/UDP, IPv6) ............... 97
5.2.1.11 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) ................................................................................................................. 98
5.2.1.12 MEDIA2 STREAMING – AAC (RTP/RTSP/TCP, IPv6) ................. 99
5.2.1.13 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP) ............................................................. 101
5.2.1.14 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) ................................................................................................................. 102
5.2.1.15 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) ............................................................................................................... 103
5.2.1.16 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) ............................................................................................................... 104
5.2.1.17 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets) ............................................................. 105
5.2.1.18 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) ............................................................................................................... 106
5.2.1.19 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6) ............................................................................................................... 107
5.2.1.20 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) ............................................................................................................... 108
5.2.1.21 MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/UDP) ......... 109
5.2.2  Multicast ............................................................................................... 111
5.2.2.1  MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv4) ................. 112
5.2.2.2  MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv6) ................. 113
5.2.2.3  MEDIA2 STREAMING – AAC (RTP-Multicast, IPv4) ..................... 114

www.onvif.org
5.2.2.4 MEDIA2 STREAMING – AAC (RTP-Multicast, IPv6) ....................... 119

5.3 Audio Backchannel ............................................................................................................................... 120

5.3.1 Unicast ............................................................................................................................................... 120

5.3.1.1 BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv4) ................................................. 120

5.3.1.2 BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv4) ............................................... 122

5.3.1.3 BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv6) ............................................ 123

5.3.1.4 BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv6) ............................................... 125

5.3.1.5 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv4) ............................................. 126

5.3.1.6 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv4) ................................................. 127

5.3.1.7 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv6) ............................................. 129

5.3.1.8 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv6) ................................................. 130

5.3.1.9 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets) ......................... 132

5.3.1.10 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets) ......................... 133

5.3.1.11 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6) .................. 135

5.3.1.12 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) .................. 136

5.3.1.13 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4) .................................................................................. 138

5.3.1.14 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) .................................................................................. 139

5.3.1.15 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) .................................................................................. 141

5.3.1.16 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) .................................................................................. 142

5.3.1.17 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) ................................................................................. 144

5.3.1.18 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) ................................................................................. 146

5.3.1.19 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) ................................................................................. 147

24 www.onvif.org
5.3.1.20 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) ................................................................. 149

5.4 Metadata Streaming .................................................................................................................. 151

5.4.1 Unicast .................................................................................................................................. 151

5.4.1.1 METADATA STREAMING (RTP-Unicast/UDP) ......................................................... 151
5.4.1.2 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP) ...................... 152
5.4.1.3 METADATA STREAMING (RTP/RTSP/TCP) ......................................................... 154
5.4.1.4 METADATA STREAMING - SET SYNCHRONIZATION POINT ...... 155
5.4.1.5 METADATA STREAMING (RTP-Unicast/UDP, IPv6) ....................................... 157
5.4.1.6 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6) .......... 159
5.4.1.7 METADATA STREAMING (RTP/RTSP/TCP, IPv6) ............................................. 160
5.4.1.8 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP) .............. 162
5.4.1.9 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) . 163
5.4.1.10 METADATA STREAMING (RTP-Unicast/RTSP/WebSockets) ...... 165
5.4.1.11 METADATA STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6) .............. 166
5.4.2 Multicast ............................................................................................................................ 168

5.4.2.1 METADATA STREAMING (RTP-Multicast/UDP) ............................................. 168
5.4.2.2 METADATA STREAMING (RTP-Multicast/UDP, IPv6) ................................. 169

5.5 Audio & Video Streaming ........................................................................................................ 171

5.5.1 Unicast .................................................................................................................................. 171

5.5.1.1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP) .............. 171
5.5.1.2 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP) ......................................................................................... 172
5.5.1.3 MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP) ...................... 174
5.5.1.4 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP, IPv6) .... 175
5.5.1.5 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) ......................................................................................... 177
5.5.1.6 MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP, IPv6) ........ 179
5.5.1.7 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP) ................. 180
5.5.1.8 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP) .......................................................... 182
5.5.1.9 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP) ................. 183
5.5.1.10 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP, IPv6) ..... 185
5.5.1.11 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) .......................................................... 186
5.5.1.12 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP, IPv6) ........ 188
5.5.2 Multicast .................................................................................................... 190
5.5.2.1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast/UDP) ........... 190
5.5.2.2 MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast/UDP, IPv6) ... 191
5.5.2.3 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP) .......... 193
5.5.2.4 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP, IPv6) ..... 194

5.6 Audio Backchannel & Video & Audio Streaming ................................................... 196
5.6.1 Unicast ....................................................................................................... 196
5.6.1.1 MEDIA2 STREAMING – G.711 BACKCHANNEL AND H.26X VIDEO AND G.711/AAC AUDIO (RTP-Unicast/UDP) .......................................................... 196

A Helper Procedures and Additional Notes .................................................................... 199
A.1 Invalid RTP Header ......................................................................................... 199
A.2 I-frame insertion time interval .......................................................................... 199
A.3 Name and Token Parameters ............................................................................ 199
A.4 Turn on IPv6 network interface ........................................................................ 199
A.5 Restore Network Settings .................................................................................. 201
A.6 Media2 Service Profile Configuration for Video Streaming .............................. 202
A.7 Media2 Service – Media Profile Configuration for Audio Streaming .............. 207
A.8 Removing Video Encoder Configuration and Metadata Configuration from Media Profile ........................................................................................................ 211
A.9 Removing Audio Encoder Configuration and Metadata Configuration from Media Profile ........................................................................................................ 212
A.10 Media Streaming over RTP-Unicast/UDP ........................................................ 213
A.11 Media Streaming over RTP-Unicast/RTSP/HTTP/TCP .................................... 216
A.12 Media Streaming over RTP/RTSP/TCP .......................................................... 218
A.13 Media Streaming over RTP-Multicast ................................................................. 221
A.14 Media Streaming over RTP-Unicast/RTSP/HTTPS/TCP ................................. 223
A.15 Configuring HTTPS using Security Configuration Service ......................... 225
A.16 Add server certificate assignment with corresponding certification path, self-signed certificate and RSA key pair ............................................................................... 227
A.17 Add server certificate assignment with corresponding certification path, CA certificate and RSA key pair .............................................................. 228
A.18 Create an RSA key pair .................................................................................. 231
A.19 Subject for a server certificate ..................................................................... 232
A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming ......................................................................................................................... 232
A.21 Audio Backchannel streaming over RTP-Unicast/UDP ............................... 238
A.22 Audio Backchannel Streaming over RTP/RTSP/TCP ................................. 240
A.23 Audio Backchannel Streaming over RTP-Multicast .................................... 242
A.24 Removing Video Encoder Configuration, Audio Encoder Configuration and Metadata Configuration from Media Profile .......................................................... 244
A.25 Get Media2 Service Capabilities ................................................................. 246
A.26 Web Socket Handshake .................................................................................. 246
A.27 Sec-WebSocket-Key value generation ....................................................... 248
A.28 Basic TLS handshake .................................................................................... 249
A.29 Media Streaming over WebSocket ................................................................. 251
A.30 Media2 Service – Media Profile Configuration for Metadata Streaming .......................................................... 253
A.31 Media2 Service – Add PTZ Configuration to Media Profile ....................... 258
A.32 Media2 Service – Add Analytics Configuration to Media Profile ................ 259
A.33 Metadata Streaming over RTP-Unicast/UDP .............................................. 261
A.34 Metadata Streaming over RTP-Unicast/RTSP/HTTP/TCP ......................... 263
A.35 Metadata Streaming over RTP/RTSP/TCP .................................................... 266
A.36 Metadata Streaming over RTP-Unicast/UDP .............................................. 269
A.37 Provide CA certificate .................................................................................... 272
A.38 Get Stream Uri .............................................................................................. 273
A.39 Device Configuration for Video Streaming ................................................. 274
A.40 Device Configuration for Audio Streaming ................................................................. 277
A.41 Backchannel Streaming over WebSocket ............................................................... 279
A.42 Configuring HTTPS if Required ........................................................................... 282
A.43 Removing Configurations from Media Profile ...................................................... 282
A.44 Device Configuration for Audio Streaming using Media Profile that contains only Audio Configurations .............................................................................................. 285
A.45 Device Configuration for Video and Audio Streaming ......................................... 287
A.46 Media2 Service – Adding AudioSource and AudioEncoder with Specified Audio Encoder Value to Media Profile ................................................................. 293
A.47 RTSP Authentication Check ............................................................................... 296
A.48 Metadata Streaming over RTP-Unicast/RTSP/HTTPS/TCP ................................ 297
A.49 Metadata Streaming over WebSocket ................................................................ 300
A.50 Remove all non-fixed Media Profiles and remove all configurations from fixed Media Profiles ................................................................................................................ 303
A.51 Get Video Source Configurations List ................................................................ 304
A.52 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration ................................................................. 304
A.53 Concurrent Video Streaming over RTP-Unicast/UDP ......................................... 308
A.54 Concurrent Video Streaming over RTP-Unicast/UDP ......................................... 310
A.55 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration for Specified Encoding ....................................................... 310
A.56 Determine RSA key length ................................................................................. 314
A.57 Get WebSocket URI ........................................................................................... 314
A.58 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP ..................... 315
A.59 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP .................. 317
A.60 Check of IP address type in response to RTSP DESCRIBE .................................. 319
A.61 Set Video Encoder Configuration for Streaming .................................................. 321
A.62 Set Audio Encoder Configuration for Streaming .................................................. 323
A.63 Device Configuration for Audio Backchannel and Video and Audio Streaming .... 324
A.64 Media2 Service – Adding VideoSource, VideoEncoder, AudioSource and AudioEncoder configurations to Media Profile ................................................................. 329
A.65  Media2 Service – Adding AudioSource and AudioEncoder to Media Profile .......... 333
A.66  Audio Backchannel and Media Streaming over RTP-Unicast/UDP .................... 334
1 Introduction

The goal of the ONVIF test specification set is to make it possible to realize fully interoperable IP physical security implementation from different vendors. The set of ONVIF test specification describes the test cases need to verify the [ONVIF Network Interface Specs] and [ONVIF Conformance] requirements. In addition, the test cases are to be basic inputs for some Profile specification requirements. It also describes the test framework, test setup, pre-requisites, test policies needed for the execution of the described test cases.

This ONVIF Real Time Streaming using Media2 Device Test Specification acts as a supplementary document to the [ONVIF Network Interface Specs], illustrating test cases need to be executed and passed. And this specification acts as an input document to the development of test tool, which will be used to test the ONVIF device implementation conformance towards ONVIF standard. This test tool is referred as ONVIF Client hereafter.

1.1 Scope

This ONVIF Real Time Streaming using Media2 Device Test Specification defines and regulates the conformance testing procedure for the ONVIF conformant devices. Conformance testing is meant to be functional black-box testing. The objective of this specification is to provide test cases to test individual requirements of ONVIF devices according to ONVIF Media2 Service and Real-time Streaming Specification, which is defined in [ONVIF Network Interface Specs].

The principal intended purposes are:

- Provide self-assessment tool for implementations.
- Provide comprehensive test suite coverage for [ONVIF Network Interface Specs].

This specification does not address the following:

- Product use cases and non-functional (performance and regression) testing.
- SOAP Implementation Interoperability test i.e. Web Service Interoperability Basic Profile version 2.0 (WS-I BP 2.0).
- Network protocol implementation Conformance test for HTTP, HTTPS, RTP and RTSP protocol.
- Poor streaming performance test (audio/video distortions, missing audio/video frames, incorrect lib synchronization etc.).

Wi-Fi Conformance test
The set of ONVIF Test Specification will not cover the complete set of requirements as defined in [ONVIF Network Interface Specs]; instead, it would cover subset of it. The scope of this specification is to derive all the normative requirements of [ONVIF Network Interface Specs], which are related to ONVIF Media2 Service and Real-time Streaming and some of the optional requirements.

This ONVIF Real Time Streaming using Media2 Device Test Specification covers ONVIF Media2 Service and Real-time Streaming, which is a functional block of [ONVIF Network Interface Specs]. The following sections describe the brief overview of and scope of each functional block.

### 1.2 Real Time Streaming

Real Time Streaming using Media2 covers the test cases needed for the verification of real time streaming features using Media2 Service as mentioned in [ONVIF Network Interface Specs]. Real time streaming defines different media streaming options based on RTP for video, audio and metadata streams. Media control is done using RTSP protocol.

The scope of this specification covers the following real time streaming options for H.264 and H.265 video streams, and G.711, AAC Audio streams, Audio backchannel streams, and Metadata streams.

- RTSP control requests
- RTP Unicast over UDP
- RTP over RTSP over TCP
- RTP over RTSP over HTTP over TCP
- RTCP
2 Normative references

- [ONVIF Conformance] ONVIF Conformance Process Specification:
  https://www.onvif.org/profiles/conformance/

- [ONVIF Profile Policy] ONVIF Profile Policy:
  https://www.onvif.org/profiles/

- [ONVIF Network Interface Specs] ONVIF Network Interface Specification documents:
  https://www.onvif.org/profiles/specifications/

- [ONVIF Core Specs] ONVIF Core Specification:
  https://www.onvif.org/profiles/specifications/

- [ONVIF Media2 Spec] ONVIF Media 2 Service Specification:
  https://www.onvif.org/profiles/specifications/

- [ONVIF Streaming Spec] ONVIF Streaming Specification:
  https://www.onvif.org/profiles/specifications/

- [ONVIF Base Test] ONVIF Base Device Test Specification:
  https://www.onvif.org/profiles/conformance/device-test/

  http://www.iso.org/directives


- [SOAP 1.2, Part 1] W3C SOAP 1.2, Part 1, Messaging Framework:
  http://www.w3.org/TR/soap12-part1/

  http://www.w3.org/TR/xmlschema-1/

  http://www.w3.org/TR/xmlschema-2/


• IETF RFC 4566, SDP: Session Description Protocol

http://www.ietf.org/rfc/rfc4566.txt

• IETF RFC 2326, Real Time Streaming Protocol (RTSP)

http://www.ietf.org/rfc/rfc2326.txt
3 Terms and Definitions

3.1 Conventions

The key words "shall", "shall not", "should", "should not", "may", "need not", "can", "cannot" in this specification are to be interpreted as described in [ISO/IEC Directives Part 2].

3.2 Definitions

This section describes terms and definitions used in this document.

Profile

See ONVIF Profile Policy.

ONVIF Device

Computer appliance or software program that exposes one or multiple ONVIF Web Services.

ONVIF Client

Computer appliance or software program that uses ONVIF Web Services.

Configuration Entity

A network video device media abstract component that is used to produce a media stream on the network, i.e. video and/or audio stream.

Media Profile

A media profile maps a video and/or audio source to a video and/or an audio encoder, PTZ and analytics configurations.

SOAP

SOAP is a lightweight protocol intended for exchanging structured information in a decentralized, distributed environment. It uses XML technologies to define an extensible messaging framework providing a message construct that can be exchanged over a variety of underlying protocols.

Device Test Tool

ONVIF Device Test Tool that tests ONVIF Device implementation towards the ONVIF Test Specification set.

Media 2 Service

Services to determine the streaming properties of requested media streams.

3.3 Abbreviations

This section describes abbreviations used in this document.

HTTP

Hyper Text Transport Protocol.

AAC

Advanced Audio Coding.

URI

Uniform Resource Identifier.

WSDL

Web Services Description Language.

XML

eXtensible Markup Language.

TTL

Time To Live.
4 Test Overview

This section describes about the test setup and prerequisites needed, and the test policies that should be followed for test case execution.

4.1 Test Setup

4.1.1 Network Configuration for DUT

The generic test configuration for the execution of test cases defined in this document is as shown below (Figure 4.1).

Based on the individual test case requirements, some of the entities in the below setup may not be needed for the execution of those corresponding test cases.

Figure 4.1. Test Configuration for DUT

DUT: ONVIF device to be tested. Hereafter, this is referred to as DUT (Device Under Test).

ONVIF Client (Test Tool): Tests are executed by this system and it controls the behavior of the DUT. It handles both expected and unexpected behavior.

HTTP Proxy: provides facilitation in case of RTP and RTSP tunneling over HTTP.

Wireless Access Point: provides wireless connectivity to the devices that support wireless connection.
**DNS Server:** provides DNS related information to the connected devices.

**DHCP Server:** provides IPv4 Address to the connected devices.

**NTP Server:** provides time synchronization between ONVIF Client and DUT.

**Switching Hub:** provides network connectivity among all the test equipments in the test environment. All devices should be connected to the Switching Hub. When running multiple test instances in parallel on the same network, the Switching Hub should be configured to use filtering in order to avoid multicast traffic being flooded to all ports, because this may affect test stability.

**Router:** provides router advertisements for IPv6 configuration.

### 4.2 Prerequisites

The pre-requisites for executing the test cases described in this Test Specification are:

1. The DUT shall be configured with an IPv4 address.
2. The DUT shall be IP reachable [in the test configuration].
3. The DUT shall be able to be discovered by the Test Tool.
4. The DUT shall be configured with the time i.e. manual configuration of UTC time and if NTP is supported by DUT, then NTP time shall be synchronized with NTP Server.
5. The DUT time and Test tool time shall be synchronized with each other either manually or by common NTP server.

### 4.3 Test Policy

This section describes the test policies specific to the test case execution of each functional block.

The DUT shall adhere to the test policies defined in this section.

#### 4.3.1 Real Time Streaming

Real time streaming test case execution would need the successful execution of some of the Media Configuration test cases. So, Media Configuration features shall be implemented successfully in order to execute the Real Time Streaming test cases.

ONVIF Client shall explicitly specify the optional transport protocols supported by DUT.

ONVIF Client and DUT time should be synchronized for media streaming.
Real time streaming testing will test only one media stream at a time.

Poor streaming test is outside the scope of the ONVIF Test Specification

Please refer to Section 5 for Real Time Streaming Test Cases.
5 Real Time Streaming Test Cases

5.1 Video Streaming

5.1.1 Unicast

5.1.1.1 MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-1-1-1

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, H.264

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on RTP/UDP Unicast Transport.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters

   • in H264 - required video encoding

   • in RtspUnicast - Transport Protocol

   • in IPv4 - IP version

   • out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.2 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-1-1-2

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, H.264

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on HTTP Transport.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters

   • in H264 - required video encoding
   • in RtspOverHttp - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in video - media type
   • in H.264 - expected media stream encoding

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

   • DUT passes all assertions.

FAIL –

   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.3 MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-1-1-3

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, H.264
**WSDL Reference:** None

**Test Purpose:** To verify H.264 media streaming based on RTP/RTSP/TCP using RTSP tunnel.

**Pre-Requisite:** Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
4. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding
5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

**Test Result:**

**PASS –**

- DUT passes all assertions.

**FAIL –**
• DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.1.1.4 MEDIA2 SET SYNCHRONIZATION POINT – H.264

**Test Case ID:** MEDIA2_RTSS-1-1-4

**Specification Coverage:** Set synchronization point.

**Feature Under Test:** SetSynchronizationPoint, H.264

**WSDL Reference:** media2.wsdl

**Test Purpose:** To request synchronization point from DUT for H.264 media stream.

**Pre-Requisite:** Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
4. ONVIF Client invokes RTSP DESCRIBE request to streamUri address.
5. The DUT responds with **200 OK** message with parameters
   - Response header =: responseHeader
   - SDP information =: sdp
6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

7. ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP;unicast;client_port=port1-port2

8. The DUT responds with 200 OK message with parameters
   - Transport
   - Session =: session

9. ONVIF Client invokes RTSP PLAY request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

10. The DUT responds with 200 OK message with parameters
    - Session
    - RTP-Info

11. If DUT does not send encoding RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes SetSynchronizationPoint request with parameters
    - ProfileToken := profile.@token

14. The DUT responds with SetSynchronizationPointResponse message.

15. ONVIF Client invokes RTSP TEARDOWN request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

16. The DUT responds with 200 OK message with parameters
• Session

17. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send 200 OK message for **RTSP DESCRIBE**.
• DUT did not send 200 OK message for **RTSP SETUP**.
• DUT did not send 200 OK message for **RTSP PLAY**.
• DUT did not send 200 OK message for **RTSP TEARDOWN**.
• DUT did not send SetSynchronizationPointResponse message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.5 MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-5

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, H.264, IPv6

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on RTP/UDP Unicast Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - **out initialNetworkSettings** - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - **in H264** - required video encoding
   - **in RtspUnicast** - Transport Protocol
   - **in IPv6** - IP version
   - **out streamUri** - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - **in streamUri** - Uri for media streaming
   - **in video** - media type
   - **in H.264** - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - **in initialNetworkSettings** - initial Network settings

**Test Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.
5.1.1.6 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-6

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, H.264, IPv6

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   • in H264 - required video encoding
   • in RtspOverHttp - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
• in streamUri - Uri for media streaming

• in video - media type

• in H.264 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.7 MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-7

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, H.264, IPv6

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on RTP/RTSP/TCP using RTSP tunnel for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:
1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in initialNetworkSettings - initial Network settings

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.
5.1.1.8 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP)

**Test Case ID:** MEDIA2_RTSS-1-1-8

**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

**Feature Under Test:** Streaming over RTP-Unicast/UDP, H.265

**WSDL Reference:** None

**Test Purpose:** To verify H.265 media streaming based on RTP/UDP Unicast Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H265 - required video encoding
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.265 - expected media stream encoding
5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.
Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.9 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-1-1-9

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, H.265

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on HTTP Transport.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H265 - required video encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters

- \textit{streamUri} - Uri for media streaming
- \textit{in video} - media type
- \textit{in H.265} - expected media stream encoding

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

\textbf{Test Result:}

\textbf{PASS –}

- DUT passes all assertions.

\textbf{FAIL –}

- DUT does not pass all assertions.

\textbf{Note:} See Annex A.3 for Name and Token Parameters Length limitations.

\textbf{5.1.1.10 MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP)}

\textbf{Test Case ID:} MEDIA2_RTSS-1-1-10

\textbf{Specification Coverage:} RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

\textbf{Feature Under Test:} Streaming over RTP/RTSP/TCP, H.265

\textbf{WSDL Reference:} None

\textbf{Test Purpose:} To verify H.265 media streaming based on RTP/RTSP/TCP using RTSP tunnel.

\textbf{Pre-Requisite:} Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

\textbf{Test Configuration:} ONVIF Client and DUT

\textbf{Test Procedure:}
1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H265 - required video encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.265 - expected media stream encoding

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.11 MEDIA2 SET SYNCHRONIZATION POINT – H.265

Test Case ID: MEDIA2_RTSS-1-1-11

Specification Coverage: Set synchronization point.

Feature Under Test: SetSynchronizationPoint, H.265
WSDL Reference: media2.wsdl

Test Purpose: To request synchronization point from DUT for H.265 media stream.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

4. ONVIF Client invokes RTSP DESCRIBE request to streamUri address.

5. The DUT responds with 200 OK message with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

7. ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

- Transport := RTP/AVP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message with parameters
   - Transport
   - Session := session

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

10. The DUT responds with **200 OK** message with parameters
    - Session
    - RTP-Info

11. If DUT does not send encoding RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes **SetSynchronizationPoint** request with parameters
    - ProfileToken := profile.@token

14. The DUT responds with **SetSynchronizationPointResponse** message.

15. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

16. The DUT responds with **200 OK** message with parameters
    - Session

17. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

**Test Result:**

PASS –

- DUT passes all assertions.
FAIL –

- DUT did not send 200 OK message for RTSP DESCRIBE.
- DUT did not send 200 OK message for RTSP SETUP.
- DUT did not send 200 OK message for RTSP PLAY.
- DUT did not send 200 OK message for RTSP TEARDOWN.
- DUT did not send SetSynchronizationPointResponse message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.12 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-12

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, H.265, IPv6

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on RTP/UDP Unicast Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
• in H265 - required video encoding
• in RtspUnicast - Transport Protocol
• in IPv6 - IP version
• out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

• in streamUri - Uri for media streaming
• in video - media type
• in H.265 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.13 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-13

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, H.265, IPv6
WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.265 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.14 MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-14

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, H.265, IPv6

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on RTP/RTSP/TCP using RTSP tunnel for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
• in H265 - required video encoding
• in RTSP - Transport Protocol
• in IPv6 - IP version
• out `streamUri` - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters

• in `streamUri` - Uri for media streaming
• in `video` - media type
• in H.265 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in `initialNetworkSettings` - initial Network settings

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.15 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-1-1-15

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, H.264
WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores HTTPS settings which was changed at step 3.
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.16 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-1-1-16

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, H.265

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

- in H265 - required video encoding
- in RtspOverHttp - Transport Protocol
- in IPv4 - IP version
- out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.265 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores HTTPS settings which was changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.17 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-17

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, H.264, IPv6

WSDL Reference: None
Test Purpose: To verify H.264 media streaming based on HTTPS Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings
4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.
5. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   • in H264 - required video encoding
   • in RtspOverHttp - Transport Protocol
   • in IPv6 - IP version
   • out streamUri - Uri for media streaming
6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in video - media type
   • in H.264 - expected media stream encoding
7. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 5.
8. ONVIF Client restores HTTPS settings which was changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.18 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-18

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, H.265, IPv6

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on HTTPS Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - `out initialNetworkSettings` - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - `in H265` - required video encoding
   - `in RtspOverHttp` - Transport Protocol
   - `in IPv6` - IP version
   - `out streamUri` - Uri for media streaming

6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   - `in streamUri` - Uri for media streaming
   - `in video` - media type
   - `in H.265` - expected media stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 5.

8. ONVIF Client restores HTTPS settings which was changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - `in initialNetworkSettings` - initial Network settings

**Test Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.1.19 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-1-1-19


Feature Under Test: Streaming over WebSocket, H.264

WSDL Reference: None

Test Purpose: To verify H.264 media streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   • in H264 - required video encoding
   • in RTSP - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in video - media type
5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.1.1.20 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-1-1-20


Feature Under Test: Streaming over WebSocket, H.265

WSDL Reference: None

Test Purpose: To verify H.265 media streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters

• in H265 - required video encoding
• in RTSP - Transport Protocol
• in IPv4 - IP version
• out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
• in streamUri - Uri for media streaming
• in video - media type
• in H.265 - expected media stream encoding

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

5.1.1.21 MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-1-1-21


Feature Under Test: Streaming over WebSocket, H.264, IPv6

WSDL Reference: None

Test Purpose: To verify H.264 media streaming over WebSocket for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT
Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RTSP - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.
5.1.1.22 MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/WebSockets, IPv6)

**Test Case ID:** MEDIA2_RTSS-1-1-22

**Specification Coverage:** Capabilities (ONVIF Media2 Service Specification), WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

**Feature Under Test:** Streaming over WebSocket, H.265, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify H.265 media streaming over WebSocket for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - **out initialNetworkSettings** - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - **in H265** - required video encoding
   - **in RTSP** - Transport Protocol
   - **in IPv6** - IP version
   - **out streamUri** - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
   - **in streamUri** - Uri for media streaming
6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in initialNetworkSettings - initial Network settings

**Test Result:**

PASS –

   • DUT passes all assertions.

FAIL –

   • DUT does not pass all assertions.

**5.1.1.23 VIDEO ENCODER INSTANCES**

**Test Case ID:** MEDIA2_RTSS-1-1-23

**Specification coverage:** Get video encoder instance information (Media2), Media Profile Management (Profile T), RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP

**Feature under test:** GetVideoEncoderInstances, Streaming over RTP-Unicast/UDP

**WSDL Reference:** media2.wsdl

**Test Purpose:** To verify that for each video source configuration DUT supports creation of as many Media Profiles and concurrent video streams as the number of instances, which is returned by GetVideoEncoderInstances for that video source configuration token.

**Pre-Requisite:** Media2 Service is received from the DUT. Real-time streaming is supported by DUT. Profile T is supported by DUT as indicated by receiving the GetScopesResponse.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client invokes **GetProfiles** request with parameters
   - Token skipped
   - Type[0] := All

4. DUT responds with **GetProfilesResponse** message with parameters
   - Profiles list =: profileList1

5. ONVIF Client retrieves Media2 Service Capabilities by following the procedure mentioned in **Annex A.25** with the following input and output parameters
   - out cap1 - Media2 Service Capabilities

6. ONVIF Client retrieves Video Source Configurations list by following the procedure mentioned in **Annex A.51** with the following input and output parameters
   - out videoSourceConfList1 - Video Source Configurations list

7. For each Video Source Configuration videoSourceConfig1 from videoSourceConfList1 repeat the following steps:
   7.1. ONVIF Client invokes **GetVideoEncoderInstances** request with parameters
       - ConfigurationToken := videoSourceConfig1.token
   7.2. DUT responds with **GetVideoEncoderInstancesResponse** message with parameters
       - Info = info1

8. ONVIF Client invokes **GetVideoEncoderConfigurations** request with parameters
   - ConfigurationToken - skipped
   - ProfileToken - skipped

9. The DUT responds with all video encoder configurations in **GetVideoEncoderConfigurationsResponse** with parameters
   - Configurations list =: videoEncoderConfList1

10. Set **numberOfProfilesToBeCreated**1 := sum of all Total values from infoList1 list.

11. Set **numberOfFixedProfiles**1 := number of items at profileList1 list with @fixed = true.
12. Set `numberOfVEC1` := number of items at `videoEncoderConfList1` list.

13. If `numberOfProfilesToBeCreated1 > cap1.ProfileCapabilities.MaximumNumberOfProfiles - numberOfFixedProfiles1`, FAIL the test and skip other steps.

14. If `numberOfProfilesToBeCreated1 > numberOfVEC1`, FAIL the test and skip other steps.

15. ONVIF Client removes all non-fixed Media Profiles and removes all configurations from fixed Media Profiles by following the procedure mentioned in Annex A.50 with the following input and output parameters
   - in `profileList1` - Media Profiles List

16. For each Video Source Configuration `videoSourceConfig1` from `videoSourceConfList1` repeat the following steps:
   16.1. ONVIF Client tries to create new Media Profiles to get number of profiles equal to `info.Total` by following the procedure mentioned in Annex A.52 with the following input and output parameters
       - in `videoSourceConfig1` - Video Source Configuration
       - in `infoList1[videoSourceConfig1.@token]` - information about guaranteed Encoder instances for Video Source Configuration
       - out `configuredProfilesList1` - list of configured Media Profiles for Video Source Configuration
   16.2. If number of Media Profiles with `@token = videoSourceConfig1.@token` in `configuredProfilesList1 < infoList1[videoSourceConfig1.@token].Total`, then FAIL the test and go to step 18.

17. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP for each configured media profile by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in `configuredProfilesList1` - Media Profiles list

18. ONVIF Client restores Media Profiles list if it was changed at steps 15, 16.1.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
• DUT did not send GetProfilesResponse message.

• DUT did not send GetVideoEncoderInstancesResponse message.

5.1.1.24 VIDEO ENCODER INSTANCES - H.264

Test Case ID: MEDIA2_RTSS-1-1-24

Specification coverage: Get video encoder instance information (Media2), Media Profile Management (Profile T), RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP

Feature under test: GetVideoEncoderInstances, Streaming over RTP-Unicast/UDP, H.264

WSDL Reference: media2.wsdl

Test Purpose: To verify that for each video source configuration DUT supports creation of as many Media Profiles and concurrent H.264 video streams as the number of instances for H.264, which is returned by GetVideoEncoderInstances for that video source configuration token.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. Profile T is supported by DUT as indicated by receiving the GetScopesResponse.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client invokes GetProfiles request with parameters
   • Token skipped
   • Type[0] := All

4. DUT responds with GetProfilesResponse message with parameters
   • Profiles list = : profileList1

5. ONVIF Client retrieves Media2 Service Capabilities by following the procedure mentioned in Annex A.25 with the following input and output parameters
   • out cap1 - Media2 Service Capabilities

6. ONVIF Client retrieves Video Source Configurations list by following the procedure mentioned in Annex A.51 with the following input and output parameters
7. For each Video Source Configuration videoSourceConfig1 from videoSourceConfList1 repeat the following steps:

7.1. ONVIF Client invokes GetVideoEncoderInstances request with parameters
   • ConfigurationToken := videoSourceConfig1.token

7.2. DUT responds with GetVideoEncoderInstancesResponse message with parameters
   • Info = info1


8. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters
   • ConfigurationToken - skipped
   • ProfileToken - skipped

9. The DUT responds with all video encoder configurations in GetVideoEncoderConfigurationsResponse with parameters
   • Configurations list =: videoEncoderConfList1

10. Set numberOfProfilesToBeCreated1 := sum of limitations for H.264 encoding for each item in the infoList1 list which calculates by following the procedure mentioned in Annex A.54.

11. Set numberOfFixedProfiles1 := number of items at profileList1 list with @fixed = true.

12. Set numberOfVEC1 := number of items at videoEncoderConfList1 list.

13. If numberOfProfilesToBeCreated1 > cap1.ProfileCapabilities.MaximumNumberOfProfiles - numberOfFixedProfiles1, FAIL the test and skip other steps.

14. If numberOfProfilesToBeCreated1 > numberOfVEC1, FAIL the test and skip other steps.

15. ONVIF Client removes all non-fixed Media Profiles and removes all configurations from fixed Media Profiles by following the procedure mentioned in Annex A.50 with the following input and output parameters
   • in profileList1 - Media Profiles List

16. For each Video Source Configuration videoSourceConfig1 from videoSourceConfList1 repeat the following steps:
16.1. ONVIF Client tries to create new Media Profiles to get number of profiles equal to limitation for specified encoder by following the procedure mentioned in Annex A.55 with the following input and output parameters

- in $videoSourceConfig1$ - Video Source Configuration
- in $infoList1[videoSourceConfig1.@token]$ - information about guaranteed Encoder instances for Video Source Configuration
- in H264 - encoding
- out $configuredProfilesList1$ - list of configured Media Profiles for Video Source Configuration

16.2. If number of Media Profiles with @token = $videoSourceConfig1.@token$ in $configuredProfilesList1$ < limitation for H.264 encoding from $infoList1[videoSourceConfig1.@token]$ which calculates by following the procedure mentioned in Annex A.54, then FAIL the test and go to step 18.

17. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP for each configured media profile by following the procedure mentioned in Annex A.53 with the following input and output parameters

- in $configuredProfilesList1$ - Media Profiles list

18. ONVIF Client restores Media Profiles list if it was changed at steps 15, 16.1.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send $GetProfilesResponse$ message.
- DUT did not send $GetVideoEncoderInstancesResponse$ message.

5.1.1.25 VIDEO ENCODER INSTANCES - H.265

Test Case ID: MEDIA2_RTSS-1-1-25

Specification coverage: Get video encoder instance information (Media2), Media Profile Management (Profile T), RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP
Feature under test: GetVideoEncoderInstances, Streaming over RTP-Unicast/UDP, H.265

WSDL Reference: media2.wsdl

Test Purpose: To verify that for each video source configuration DUT supports creation of as many Media Profiles and concurrent H.265 video streams as the number of instances for H.264, which is returned by GetVideoEncoderInstances for that video source configuration token.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. Profile T is supported by DUT as indicated by receiving the GetScopesResponse.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client invokes GetProfiles request with parameters
   - Token skipped
   - Type[0] := All
4. DUT responds with GetProfilesResponse message with parameters
   - Profiles list =: profileList1
5. ONVIF Client retrieves Media2 Service Capabilities by following the procedure mentioned in Annex A.25 with the following input and output parameters
   - out cap1 - Media2 Service Capabilities
6. ONVIF Client retrieves Video Source Configurations list by following the procedure mentioned in Annex A.51 with the following input and output parameters
   - out videoSourceConfList1 - Video Source Configurations list
7. For each Video Source Configuration videoSourceConfig1 from videoSourceConfList1 repeat the following steps:
   7.1. ONVIF Client invokes GetVideoEncoderInstances request with parameters
       - ConfigurationToken := videoSourceConfig1.token
   7.2. DUT responds with GetVideoEncoderInstancesResponse message with parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

• Info = info1


8. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters

• ConfigurationToken - skipped

• ProfileToken - skipped

9. The DUT responds with all video encoder configurations in GetVideoEncoderConfigurationsResponse with parameters

• Configurations list =: videoEncoderConfList1

10. Set numberOfProfilesToBeCreated1 := sum of limitations for H.265 encoding for each item in the infoList1 list which calculates by following the procedure mentioned in Annex A.54.

11. Set numberOfFixedProfiles1 := number of items at profileList1 list with @fixed = true.

12. Set numberOfVEC1 := number of items at videoEncoderConfList1 list.

13. If numberOfProfilesToBeCreated1 > cap1.ProfileCapabilities.MaximumNumberOfProfiles - numberOfFixedProfiles1, FAIL the test and skip other steps.

14. If numberOfProfilesToBeCreated1 > numberOfVEC1, FAIL the test and skip other steps.

15. ONVIF Client removes all non-fixed Media Profiles and removes all configurations from fixed Media Profiles by following the procedure mentioned in Annex A.50 with the following input and output parameters

• in profileList1 - Media Profiles List

16. For each Video Source Configuration videoSourceConfig1 from videoSourceConfList1 repeat the following steps:

16.1. ONVIF Client tries to create new Media Profiles to get number of profiles equal to limitation for specified encoder by following the procedure mentioned in Annex A.55 with the following input and output parameters

• in videoSourceConfig1 - Video Source Configuration

• in infoList1[videoSourceConfig1.@token] - information about guaranteed Encoder instances for Video Source Configuration

• in H265 - encoding
• out configuredProfilesList1 - list of configured Media Profiles for Video Source Configuration

16.2. If number of Media Profiles with @token = videoSourceConfig1.@token in configuredProfilesList1 < limitation for H.265 encoding from infoList1[videoSourceConfig1.@token] which calculates by following the procedure mentioned in Annex A.54, then FAIL the test and go to step 18.

17. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP for each configured media profile by following the procedure mentioned in Annex A.53 with the following input and output parameters

• in configuredProfilesList1 - Media Profiles list

18. ONVIF Client restores Media Profiles list if it was changed at steps 15, 16.1.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send GetProfilesResponse message.

• DUT did not send GetVideoEncoderInstancesResponse message.

5.1.2 Multicast

5.1.2.1 MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv4)

Test Case ID: MEDIA2_RTSS-1-2-1

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Multicast, H.264

WSDL Reference: None

Test Purpose: To verify H.264 media streaming based on RTP-Multicast/UDP Transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.
Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspMulticast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding
   - in IPv4 - IP version for multicast streaming

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.2.2 MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv6)

Test Case ID: MEDIA2_RTSS-1-2-2
**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

**Feature Under Test:** Streaming over RTP-Multicast, H.264, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify H.264 media streaming based on RTP-Multicast/UDP Transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. H.264 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT. IPv6 is supported by DUT. A media profile with H.264 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in H264 - required video encoding
   - in RtspMulticast - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming
5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - media type
   - in H.264 - expected media stream encoding
   - in IPv6 - IP version for multicast streaming
6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in initialNetworkSettings - initial Network settings

**Test Result:**

**PASS –**

• DUT passes all assertions.

**FAIL –**

• DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.1.2.3 MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv4)

**Test Case ID:** MEDIA2_RTSS-1-2-3

**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

**Feature Under Test:** Streaming over RTP-Multicast, H.265

**WSDL Reference:** None

**Test Purpose:** To verify H.265 media streaming based on RTP-Multicast/UDP Transport for IPv4.

**Pre-Requisite:** Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
• in H265 - required video encoding
• in RtspMulticast - Transport Protocol
• in IPv4 - IP version
• out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
• in streamUri - Uri for media streaming
• in video - media type
• in H.265 - expected media stream encoding
• in IPv4 - IP version for multicast streaming

5. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.1.2.4 MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv6)

Test Case ID: MEDIA2_RTSS-1-2-4

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Multicast, H.265, IPv6

WSDL Reference: None

Test Purpose: To verify H.265 media streaming based on RTP-Multicast/UDP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. H.265 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT.
IPv6 is supported by DUT. A media profile with H.265 video encoder configuration is configured on the Device.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out `initialNetworkSettings` - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.39 with the following input and output parameters
   - in `H264` - required video encoding
   - in `RtspMulticast` - Transport Protocol
   - in `IPv6` - IP version
   - out `streamUri` - Uri for media streaming
5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in `video` - media type
   - in `H.265` - expected media stream encoding
   - in `IPv6` - IP version for multicast streaming
6. ONVIF Client restores settings of Video Encoder Configuration and Media Profile changed at step 4.
7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in `initialNetworkSettings` - initial Network settings

**Test Result:**
PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2 Audio Streaming

5.2.1 Unicast

5.2.1.1 MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-2-1-1

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, G.711

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP-Unicast/UDP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in PCMU - required audio encoding

   • in RtspUnicast - Transport Protocol

   • in IPv4 - IP version
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.2 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-2-1-2

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, G.711

WSDL Reference: None

Test Purpose: To verify G7.11 media streaming based on HTTP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:
1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.3 MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-2-1-3

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, G.711
WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP/RTSP/TCP using RTSP tunnel.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.
5.2.1.4 MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-4

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP/UDP Unicast Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in PCMU - required audio encoding

   • in RtspUnicast - Transport Protocol

   • in IPv6 - IP version

   • out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

   • in streamUri - Uri for media streaming
6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in \texttt{initialNetworkSettings} - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.5 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-5

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - `out initialNetworkSettings` - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - `in PCMU` - required audio encoding
   - `in rtspOverHttp` - Transport Protocol
   - `in IPv6` - IP version
   - `out streamUri` - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - `in streamUri` - Uri for media streaming
   - `in audio` - media type
   - `in G.711` - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - `in initialNetworkSettings` - initial Network settings

Test Result:

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.
5.2.1.6 MEDIA2 STREAMING – G.711 (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-6

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP/RTSP/TCP using RTSP tunnel for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RTSP - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in initialNetworkSettings - initial Network settings

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.7 MEDIA2 STREAMING – AAC (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-2-1-7

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, AAC

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP-Unicast/UDP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
• in AAC - required audio encoding
• in RtspUnicast - Transport Protocol
• in IPv4 - IP version
• out streamUri - Uri for media streaming
• out aacEncoding - AAC audio encoding that is set in profile

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

• in streamUri - Uri for media streaming
• in audio - media type
• in aacEncoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.8 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-2-1-8

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, AAC

WSDL Reference: None

Test Purpose: To verify G7.11 media streaming based on HTTP Transport.
**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in AAC - required audio encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
   - out aacEncoding - AAC audio encoding that is set in profile

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in aacEncoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

**Test Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.
5.2.1.9 MEDIA2 STREAMING – AAC (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-2-1-9

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, AAC

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP/RTSP/TCP using RTSP tunnel.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in AAC - required audio encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
   - out aacEncoding - AAC audio encoding that is set in profile

4. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in aacEncoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.10 MEDIA2 STREAMING – AAC (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-10

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, AAC, IPv6

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP/UDP Unicast Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in AAC - required audio encoding
   • in RtspUnicast - Transport Protocol
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

- in streamUri - Uri for media streaming
- in audio - media type
- in aacEncoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in initialNetworkSettings - initial Network settings

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.11 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-11

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, AAC, IPv6

WSDL Reference: None
Test Purpose: To verify AAC media streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in AAC - required audio encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming
   - out aacEncoding - AAC audio encoding that is set in profile

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in aacEncoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.12 MEDIA2 STREAMING – AAC (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-12

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: None

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP/RTSP/TCP using RTSP tunnel for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

• out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
5. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters

- in streamUri - Uri for media streaming
- in audio - media type
- in aacEncoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in initialNetworkSettings - initial Network settings

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.13 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-2-1-13

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.
Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, G.711

WSDL Reference: None

Test Purpose: To verify G7.11 media streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in G.711 - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores HTTPS settings which was changed at step 3.
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.14 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-2-1-14

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTPS/TCP, AAC

WSDL Reference: None

Test Purpose: To verify G7.11 media streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters

- in `streamUri` - Uri for media streaming
- in `audio` - media type
- in `aacEncoding` - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores HTTPS settings which was changed at step 3.

**Test Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.2.1.15 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

**Test Case ID:** MEDIA2_RTSS-2-1-15

**Specification Coverage:** RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

**Feature Under Test:** Streaming over RTP-Unicast/RTSP/HTTPS/TCP, G.711, IPv6
**WSDL Reference:** None

**Test Purpose:** To verify G.711 media streaming based on HTTPS Transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   
   • `out initialNetworkSettings` - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   
   • `in PCMU` - required audio encoding
     
   • `in RtspOverHttp` - Transport Protocol
     
   • `in IPv6` - IP version
     
   • `out streamUri` - Uri for media streaming

6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters
   
   • `in streamUri` - Uri for media streaming
     
   • `in audio` - media type
     
   • `in G.711` - expected media stream encoding
7. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 5.

8. ONVIF Client restores HTTPS settings which was changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.16 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-16

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature Under Test: None

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on HTTPS Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:
1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in AAC - required audio encoding
   • in RtspOverHttp - Transport Protocol
   • in IPv6 - IP version
   • out streamUri - Uri for media streaming
   • out aacEncoding - AAC audio encoding that is set in profile

6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.14 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in audio - media type
   • in aacEncoding - expected media stream encoding

7. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 5.

8. ONVIF Client restores HTTPS settings which was changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in initialNetworkSettings - initial Network settings

Test Result:
PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.1.17 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-2-1-17


Feature Under Test: Streaming over WebSocket

WSDL Reference: None

Test Purpose: To verify G.711 media streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

• in PCMU - required audio encoding

• in RTSP - Transport Protocol

• in IPv4 - IP version

• out streamUri - Uri for media streaming
4. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters

- in `streamUri` - Uri for media streaming
- in `audio` - media type
- in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

5.2.1.18 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-2-1-18


Feature Under Test: Streaming over WebSocket

WSDL Reference: None

Test Purpose: To verify AAC media streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   • in AAC - required audio encoding
   • in RTSP - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming
   • out aacEncoding - AAC audio encoding that is set in profile

4. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in audio - media type
   • in aacEncoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

5.2.1.19 MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-19


WSDL Reference: None
**Test Purpose:** To verify G.711 media streaming over WebSocket for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. IPv6 is supported by DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out *initialNetworkSettings* - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in *PCMU* - required audio encoding
   - in *RTSP* - Transport Protocol
   - in *IPv6* - IP version
   - out *streamUri* - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.29 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in *audio* - media type
   - in *G.711* - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in *initialNetworkSettings* - initial Network settings
Test Result:

PASS –
  • DUT passes all assertions.

FAIL –
  • DUT does not pass all assertions.

5.2.1.20 MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-20


WSDL Reference: None

Test Purpose: To verify AAC media streaming over WebSocket for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. IPv6 is supported by DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   • in AAC - required audio encoding
• in RTSP - Transport Protocol
• in IPv6 - IP version
• out streamUri - Uri for media streaming
• out aacEncoding - AAC audio encoding that is set in profile

5. ONVIF Client tries to start and decode media streaming over WebSocket by following the
procedure mentioned in Annex A.29 with the following input and output parameters
• in streamUri - Uri for media streaming
• in audio - media type
• in aacEncoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed
at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5
with the following input and output parameters
• in initialNetworkSettings - initial Network settings

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

5.2.1.21 MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-2-1-21

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, G.711

WSDL Reference: None
Test Purpose: To verify G.711 media streaming based on RTP-Unicast/UDP Transport for case if there is only Audio Source Configuration and Audio encoder Configuration in Media Profile.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in G.711 - expected media stream encoding
5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT does not pass all assertions.
Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.2 Multicast

5.2.2.1 MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv4)

Test Case ID: MEDIA2_RTSS-2-2-1

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Multicast, G.711

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP-Multicast/UDP Transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in PCMU - required audio encoding
   • in RtspMulticast - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming

4. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in audio - media type
5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.2.2 MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv6)

Test Case ID: MEDIA2_RTSS-2-2-2

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Multicast, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify G.711 media streaming based on RTP-Multicast/UDP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

• out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   • in PCMU - required audio encoding
   • in RtspMulticast - Transport Protocol
   • in IPv6 - IP version
   • out streamUri - Uri for media streaming

5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in audio - media type
   • in G.711 - expected media stream encoding
   • in IPv6 - IP version for multicast streaming

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.2.3 MEDIA2 STREAMING – AAC (RTP-Multicast, IPv4)

Test Case ID: MEDIA2_RTSS-2-2-3

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.
Feature Under Test: Streaming over RTP-Multicast, AAC

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP-Multicast/UDP Transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters
   - in AAC - required audio encoding
   - in RtspMulticast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
   - out aacEncoding - AAC audio encoding that is set in profile
4. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in audio - media type
   - in aacEncoding - expected media stream encoding
   - in IPv4 - IP version for multicast streaming
5. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.2.2.4 MEDIA2 STREAMING – AAC (RTP-Multicast, IPv6)

Test Case ID: MEDIA2_RTSS-2-2-4

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Multicast, AAC, IPv6

WSDL Reference: None

Test Purpose: To verify AAC media streaming based on RTP-Multicast/UDP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.40 with the following input and output parameters

   • in AAC - required audio encoding

   • in RtspMulticast - Transport Protocol

   • in IPv6 - IP version

   • out streamUri - Uri for media streaming
5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters

- in `streamUri` - Uri for media streaming
- in `mediaType` - media type
- in `aacEncoding` - expected media stream encoding
- in `IPv6` - IP version for multicast streaming

6. ONVIF Client restores settings of Audio Encoder Configuration and Media Profile changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in `initialNetworkSettings` - initial Network settings

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.3 Audio Backchannel

5.3.1 Unicast

5.3.1.1 BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-1

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel G.711, RTP-Unicast/UDP, IPv4
**WSDL Reference:** None

**Test Purpose:** To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/UDP transport for IPv4.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in PCMU - required audio decoding
   - in RtspUnicast - transport protocol
   - out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out streamUri - Uri for media streaming

4. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.21 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

**Test Result:**

PASS –

- DUT passes all assertions.
FAIL –

- DUT does not pass all assertions.

5.3.1.2 BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-3

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel G.711, RTP/RTSP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming using RTP/RTSP/TCP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in PCMU - required audio decoding
   - in RTSP - transport protocol
   - out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out streamUri - Uri for media streaming
4. ONVIF Client tries to start audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.22 with the following input and output parameters
• in `streamUri` - Uri for media streaming

• in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with `@token = profile.Configurations.AudioDecoder.@token` if it was changed at step 3.

6. ONVIF Client restores Media Profile with `@token = profile.@token` if it was changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.3 BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-4

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel G.711, RTP-Unicast/UDP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/UDP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out \textit{initialNetworkSettings} - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only \texttt{www.onvif.org/ver20/HalfDuplex/Server} value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in PCMU - required audio decoding
   - in RtspUnicast - transport protocol
   - in IPv6 - IP Type
   - out \textit{profile} - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out \textit{streamUri} - Uri for media streaming

5. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.21 with the following input and output parameters
   - in \textit{streamUri} - Uri for media streaming
   - in G.711 - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with @token = \textit{profile}.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = \textit{profile}.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in \textit{initialNetworkSettings} - initial Network settings

\textbf{Test Result:}

\textbf{PASS –}
- DUT passes all assertions.

\textbf{FAIL –}
- DUT does not pass all assertions.
5.3.1.4 BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-6

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel G.711, RTP/RTSP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming using RTP/RTSP/TCP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters

   • in PCMU - required audio decoding

   • in RTSP - transport protocol

   • in IPv6 - IP Type

   • out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding

   • out streamUri - Uri for media streaming
5. ONVIF Client tries to start audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.22 with the following input and output parameters

- in `streamUri` - Uri for media streaming
- in G.711 - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with `@token = profile.Configurations.AudioDecoder.@token` if it was changed at step 4.

7. ONVIF Client restores Media Profile with `@token = profile.@token` if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in `initialNetworkSettings` - initial Network settings

**Test Result:**

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

5.3.1.5 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv4)

**Test Case ID:** MEDIA2_RTSS-3-1-7

**Specification coverage:** Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

**Feature under test:** Audio Backchannel AAC, RTP-Unicast/UDP, IPv4

**WSDL Reference:** None

**Test Purpose:** To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/UDP transport for IPv4.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**
1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a Media Profile which supports a required audio decoding and sends primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters

   • in AAC - required audio decoding
   • in RtspUnicast - transport protocol
   • out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   • out streamUri - Uri for media streaming
   • out aacDecoding - AAC audio decoding that is set in profile

4. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.21 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in aacDecoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.6 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-9
Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel AAC, RTP/RTSP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP/RTSP/TCP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters

   • in AAC - required audio decoding
   • in RTSP - transport protocol
   • out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   • out streamUri - Uri for media streaming
   • out aacDecoding - AAC audio decoding that is set in profile

4. ONVIF Client tries to start audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.22 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in aacDecoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 3.
6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

5.3.1.7 BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-10

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel AAC, RTP-Unicast/UDP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/UDP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
• in AAC - required audio decoding
• in RtspUnicast - transport protocol
• in IPv6 - IP Type
• out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
• out streamUri - Uri for media streaming
• out aacDecoding - AAC audio decoding that is set in profile

5. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.21 with the following input and output parameters
• in streamUri - Uri for media streaming
• in aacDecoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
• in initialNetworkSettings - initial Network settings

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

5.3.1.8 BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-12

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming).
Feature under test: Audio Backchannel AAC, RTP/RTSP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP/RTSP/TCP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   
   • in AAC - required audio decoding
   • in RTSP - transport protocol
   • in IPv6 - IP Type
   • out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   • out streamUri - Uri for media streaming
   • out aacDecoding - AAC audio decoding that is set in profile

5. ONVIF Client tries to start audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.22 with the following input and output parameters
   
   • in streamUri - Uri for media streaming
   • in aacDecoding - expected media stream encoding
6. ONVIF Client restores settings of Audio Decoder Configuration with \( @\text{token} = \text{profile}.\text{Configurations}.\text{AudioDecoder}.@\text{token} \) if it was changed at step 4.

7. ONVIF Client restores Media Profile with \( @\text{token} = \text{profile}.@\text{token} \) if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - \( \text{in initialNetworkSettings} \) - initial Network settings

Test Result:

PASS –
- DUT passes all assertions.

FAIL –
- DUT does not pass all assertions.

5.3.1.9 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-3-1-13

Specification coverage: Back Channel Connection (Streaming), Capabilities (ONVIF Media2 Service Specification), WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

Feature under test: Audio Backchannel G.711 over WebSocket, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming over WebSocket for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters

- in PCMU - required audio decoding
- in RTSP - transport protocol
- out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
- out streamUri - Uri for media streaming

4. ONVIF Client tries to start an audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.41 with the following input and output parameters

- in streamUri - Uri for media streaming
- in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –
- DUT passes all assertions.

FAIL –
- DUT does not pass all assertions.

5.3.1.10 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-3-1-14

Specification coverage: Back Channel Connection (Streaming), Capabilities (ONVIF Media2 Service Specification), WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).
Feature under test: Audio Backchannel AAC over WebSocket, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming over WebSocket for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in AAC - required audio decoding
   - in RTSP - transport protocol
   - out `profile` - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out `streamUri` - Uri for media streaming
   - out `aacDecoding` - AAC audio decoding that is set in profile

4. ONVIF Client tries to start an audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.41 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in `aacDecoding` - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with `@token = profile.Configurations.AudioDecoder.@token` if it was changed at step 3.

6. ONVIF Client restores Media Profile with `@token = profile.@token` if it was changed at step 3.
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.11 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-15

Specification coverage: Back Channel Connection (Streaming), Capabilities (ONVIF Media2 Service Specification), WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

Feature under test: Audio Backchannel G.711 over WebSocket, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming over WebSocket for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   • in PCMU - required audio decoding
• in RTSP - transport protocol

• in IPv6 - IP Type

• out *profile* - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding

• out *streamUri* - Uri for media streaming

5. ONVIF Client tries to start an audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.41 with the following input and output parameters

• in *streamUri* - Uri for media streaming

• in G.711 - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with @token = *profile*.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = *profile*.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in *initialNetworkSettings* - initial Network settings

**Test Result:**

**PASS** –

• DUT passes all assertions.

**FAIL** –

• DUT does not pass all assertions.

5.3.1.12 BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets, IPv6)

**Test Case ID:** MEDIA2_RTSS-3-1-16

**Specification coverage:** Back Channel Connection (Streaming), Capabilities (ONVIF Media2 Service Specification), WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).
**Feature under test:** Audio Backchannel AAC over WebSocket, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify DUT Backchannel for AAC audio streaming over WebSocket for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. WebSocket is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out `initialNetworksettings` - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in AAC - required audio decoding
   - in RTSP - transport protocol
   - in IPv6 - IP Type
   - out `profile` - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out `streamUri` - Uri for media streaming
   - out `aacDecoding` - AAC audio decoding that is set in profile

5. ONVIF Client tries to start an audio backchannel streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.41 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in `aacDecoding` - expected media stream encoding
6. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   - in initialNetworkSettings - initial Network settings

**Test Result:**

**PASS** –
   - DUT passes all assertions.

**FAIL** –
   - DUT does not pass all assertions.

**5.3.1.13 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4)**

**Test Case ID:** MEDIA2_RTSS-3-1-21

**Specification coverage:** Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

**Feature under test:** Audio Backchannel G.711, RTP-Unicast/RTSP/HTTP/TCP, IPv4

**WSDL Reference:** None

**Test Purpose:** To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/RTSP/HTTP/TCP transport for IPv4.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client configures a Media Profile which supports a required audio decoding and send
primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI
for required transport protocol by following the procedure mentioned in Annex A.20 with the
following input and output parameters

• in PCMU - required audio decoding

• in RtspOverHttp - transport protocol

• out profile - Media Profile with Audio Output Configuration and Audio Decoder
  Configuration with the required audio decoding

• out streamUri - Uri for media streaming

4. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/
HTTP/TCP by following the procedure mentioned in Annex A.58 with the following input and
output parameters

• in streamUri - Uri for media streaming

• in G.711 - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token =
profile.Configurations.AudioDecoder.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step
3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.14 BACKCHANNEL STREAMING BY POST – G.711 (RTP-
Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-22

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming),
Connection setup for a bi-directional connection (Streaming).
**Feature under test:** Audio Backchannel G.711, RTP-Unicast/RTSP/HTTP/TCP, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/RTSP/HTTP/TCP transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. G.711 decoder is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   
   • in PCMU - required audio decoding
   
   • in RtspOverHttp - transport protocol
   
   • in IPv6 - IP Type
   
   • out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   
   • out streamUri - Uri for media streaming

5. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.58 with the following input and output parameters
   
   • in streamUri - Uri for media streaming
   
   • in G.711 - expected media stream encoding
6. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

5.3.1.15 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-23

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming).

Feature under test: Audio Backchannel AAC, RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/RTSP/HTTP/TCP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client configures a Media Profile which supports a required audio decoding and send
primitiy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI
for required transport protocol by following the procedure mentioned in Annex A.20 with the
following input and output parameters

- in AAC - required audio decoding
- in RtspOverHttp - transport protocol
- out profile - Media Profile with Audio Output Configuration and Audio Decoder
  Configuration with the required audio decoding
- out streamUri - Uri for media streaming
- out aacDecoding - AAC audio decoding that is set in profile

4. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/
HTTP/TCP by following the procedure mentioned in Annex A.58 with the following input and
output parameters

- in streamUri - Uri for media streaming
- in aacDecoding - expected media stream encoding

5. ONVIF Client restores settings of Audio Decoder Configuration with @token =
profile.Configurations.AudioDecoder.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step
3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.16 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-24

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming),
Connection setup for a bi-directional connection (Streaming).
Feature under test: Audio Backchannel AAC, RTP-Unicast/RTSP/HTTP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/RTSP/HTTP/TCP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. AAC decoder is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in AAC - required audio decoding
   - in RtspOverHttp - transport protocol
   - in IPv6 - IP Type
   - out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out streamUri - Uri for media streaming
   - out aacDecoding - AAC audio decoding that is set in profile

5. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.58 with the following input and output parameters
   - in streamUri - Uri for media streaming
6. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

5.3.1.17 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-25

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming), RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature under test: Audio Backchannel G.711, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/RTSP/HTTPS/TCP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by the DUT. G.711 decoder is supported by the DUT. Real-time streaming is supported by the DUT. RTP/RTSP/HTTPS/TCP feature is supported by the DUT. HTTPS is configured on the DUT, if TLS Server is not supported by the DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.
Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in PCMU - required audio decoding
   - in RtspOverHttp - transport protocol
   - out \textit{profile} - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out \textit{streamUri} - Uri for media streaming

5. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.59 with the following input and output parameters
   - in \textit{streamUri} - Uri for media streaming
   - in G.711 - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with \texttt{@token = profile.Configurations.AudioDecoder.@token} if it was changed at step 4.

7. ONVIF Client restores Media Profile with \texttt{@token = profile.@token} if it was changed at step 4.

8. ONVIF Client restores HTTPS settings which was changed at step 3.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –
5.3.1.18 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-26

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming), RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature under test: Audio Backchannel AAC, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/RTSP/HTTPS/TCP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by the DUT. AAC decoder is supported by the DUT. Real-time streaming is supported by the DUT. RTP/RTSP/HTTPS/TCP feature is supported by the DUT. HTTPS is configured on the DUT, if TLS Server is not supported by the DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

4. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in AAC - required audio decoding
   - in RtspOverHttp - transport protocol
• out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding

• out streamUri - Uri for media streaming

• out aacDecoding - AAC audio decoding that is set in profile

5. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.59 with the following input and output parameters

• in streamUri - Uri for media streaming

• in aacDecoding - expected media stream encoding

6. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores HTTPS settings which was changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

5.3.1.19 BACKCHANNEL STREAMING BY POST – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-27

Specification coverage: Back Channel Connection (Streaming), RTSP Require-Tag (Streaming), Connection setup for a bi-directional connection (Streaming), RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature under test: Audio Backchannel G.711, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv6

WSDL Reference: None
Test Purpose: To verify DUT Backchannel for G.711 audio streaming using RTP-Unicast/RTSP/HTTPS/TCP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by the DUT. G.711 decoder is supported by the DUT. Real-time streaming is supported by the DUT. RTP/RTSP/HTTPS/TCP feature is supported by the DUT. HTTPS is configured on the DUT, if TLS Server is not supported by the DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client configures a Media Profile which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - in PCMU - required audio decoding
   - in RtspOverHttp - transport protocol
   - in IPv6 - IP Type
   - out profile - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - out streamUri - Uri for media streaming

6. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.59 with the following input and output parameters
   - in streamUri - Uri for media streaming
7. ONVIF Client restores settings of Audio Decoder Configuration with @token = profile.Configurations.AudioDecoder.@token if it was changed at step 5.

8. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 5.

9. ONVIF Client restores HTTPS settings which was changed at step 4.

10. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
    • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

5.3.1.20 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-28

Specification coverage: Back Channel Connection (Streaming), RTSP Require- Tag (Streaming), Connection setup for a bi-directional connection (Streaming), RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP, RTSP over HTTPS.

Feature under test: Audio Backchannel AAC, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for AAC audio streaming using RTP-Unicast/RTSP/HTTPS/TCP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by the DUT. AAC decoder is supported by the DUT. Real-time streaming is supported by the DUT. RTP/RTSP/HTTPS/TCP feature is supported by the DUT. HTTPS is configured on the DUT, if TLS Server
is not supported by the DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT. IPv6 is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - `out initialNetworkSettings` - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client configures a Media Profile which supports a required audio decoding and sends primacy with not only `www.onvif.org/ver20/HalfDuplex/Server` value and gets stream URI for required transport protocol by following the procedure mentioned in Annex A.20 with the following input and output parameters
   - `in AAC` - required audio decoding
   - `in RtspOverHttp` - transport protocol
   - `in IPv6` - IP Type
   - `out profile` - Media Profile with Audio Output Configuration and Audio Decoder Configuration with the required audio decoding
   - `out streamUri` - Uri for media streaming
   - `out aacDecoding` - AAC audio decoding that is set in profile

6. ONVIF Client tries to start audio backchannel streaming by POST over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.59 with the following input and output parameters
   - `in streamUri` - Uri for media streaming
   - `in aacDecoding` - expected media stream encoding

7. ONVIF Client restores settings of Audio Decoder Configuration with `@token = profile.Configurations.AudioDecoder.@token` if it was changed at step 5.
8. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 5.

9. ONVIF Client restores HTTPS settings which was changed at step 4.

10. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

5.4 Metadata Streaming

5.4.1 Unicast

5.4.1.1 METADATA STREAMING (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-4-1-1

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP-Unicast/UDP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata streaming based on RTP/UDP Unicast Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.

3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters

   • in RtspUnicast - Transport protocol
   • out profile - Media Profile with Metadata Configuration
   • out streamUri - Uri for media streaming
   • out metadataConfiguration - Metadata Configuration

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.33 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in metadataConfiguration - Metadata Configuration

5. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.2 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-4-1-2

Specification Coverage: RTP/RTSP/HTTP/TCP, RTSP over HTTP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None
Test Purpose: To verify metadata streaming based on HTTP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   - in RtspOverHttp - Transport protocol
   - out profile - Media Profile with Metadata Configuration
   - out streamUri - Uri for media streaming
   - out metadataConfiguration - Metadata Configuration

4. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.34 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in metadataConfiguration - Metadata Configuration

5. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.
5.4.1.3 METADATA STREAMING (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-4-1-3

Specification Coverage: RTP/RTSP/TCP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP/RTSP/TCP

WSDL Reference: None

Test Purpose: To verify metadata streaming based on RTP/RTSP/TCP Unicast Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/TCP is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   
   • in RTSP - Transport protocol
   
   • out profile - Media Profile with Metadata Configuration
   
   • out streamUri - Uri for media streaming
   
   • out metadataConfiguration - Metadata Configuration

4. ONVIF Client tries to start and decode media streaming over RTSP by following the procedure mentioned in Annex A.35 with the following input and output parameters
   
   • in streamUri - Uri for media streaming
   
   • in metadataConfiguration - Metadata Configuration

5. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.
Test Result:

PASS –
  • DUT passes all assertions.

FAIL –
  • DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.4 METADATA STREAMING - SET SYNCHRONIZATION POINT

Test Case ID: MEDIA2_RTSS-4-1-4


Feature Under Test: Synchronization Points for Metadata Streaming

WSDL Reference: None

Test Purpose: To request synchronization point from DUT for metadata streaming.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   • in RtspUnicast - Transport protocol
   • out profile - Media Profile with Metadata Configuration
   • out streamUri - Uri for media streaming
   • out metadataConfiguration - Metadata Configuration

4. ONVIF Client invokes RTSP DESCRIBE request to streamUri address.
5. The DUT responds with **200 OK** message with parameters
   
   - Response header =: responseHeader
   - SDP information =: sdp

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

7. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to 'application' media type with 'vnd.onvif.metadata' encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   
   - Transport := RTP/AVP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message with parameters
   
   - Transport
   - Session =: session

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   
   - Session := session

10. The DUT responds with **200 OK** message with parameters
    
    - Session
    - RTP-Info

11. If DUT does not send Metadata RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes **SetSynchronizationPoint** request with parameters
    
    - ProfileToken := profile.@token

14. The DUT responds with **SetSynchronizationPointResponse** message.
15. If DUT does not close previous XML document and does not start new XML document, FAIL the test and skip other steps.

16. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

- Session := session

17. The DUT responds with **200 OK** message with parameters

- Session

18. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

19. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

**Test Result:**

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **SetSynchronizationPointResponse** message.

- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP**, **RTSP PLAY** and **RTSP TEARDOWN** requests.

- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.4.1.5 METADATA STREAMING (RTP-Unicast/UDP, IPv6)

**Test Case ID:** MEDIA2_RTSS-4-1-5

**Specification Coverage:** RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

**Feature Under Test:** Metadata Streaming, RTP-Unicast/UDP, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify metadata streaming based on RTP/UDP Unicast Transport for IPv6.
**Pre-Requisite:** Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   
   - in RtspUnicast - Transport protocol
   
   - in IPv6 - IP type
   
   - out profile - Media Profile with Metadata Configuration
   
   - out streamUri - Uri for media streaming
   
   - out metadataConfiguration - Metadata Configuration

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.33 with the following input and output parameters
   
   - in streamUri - Uri for media streaming
   
   - in metadataConfiguration - Metadata Configuration

6. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
   
   - in initialNetworkSettings - initial Network settings

**Test Result:**
PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.6 METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-6

Specification Coverage: RTP/RTSP/HTTP/TCP, RTSP over HTTP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP-Unicast/RTSP/HTTP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   
   • in RtspOverHttp - Transport protocol
   
   • in IPv6 - IP type
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.34 with the following input and output parameters

- **in streamUri** - Uri for media streaming
- **in metadataConfiguration** - Metadata Configuration

6. ONVIF Client restores settings of Metadata Configuration with @token = `profile`.Configurations.Metadata.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = `profile`.@token if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- **in initialNetworkSettings** - initial Network settings

**Test Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.4.1.7 METADATA STREAMING (RTP/RTSP/TCP, IPv6)

**Test Case ID:** MEDIA2_RTSS-4-1-7

**Specification Coverage:** RTP/RTSP/TCP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

**Feature Under Test:** Metadata Streaming, RTP/RTSP/TCP, IPv6

**WSDL Reference:** None
**Test Purpose:** To verify metadata streaming based on RTP/RTSP/TCP Unicast Transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/TCP is supported by DUT. IPv6 is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out `initialNetworkSettings` - initial Network settings
4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   - in `RTSP` - Transport protocol
   - in `IPv6` - IP type
   - out `profile` - Media Profile with Metadata Configuration
   - out `streamUri` - Uri for media streaming
   - out `metadataConfiguration` - Metadata Configuration
5. ONVIF Client tries to start and decode media streaming over RTSP by following the procedure mentioned in Annex A.35 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in `metadataConfiguration` - Metadata Configuration
6. ONVIF Client restores settings of Metadata Configuration with @token = `profile`.Configurations.Metadata.@token if it was changed at step 4.
7. ONVIF Client restores Media Profile with @token = `profile`.@token if it was changed at step 4.
8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.8 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-4-1-8

Specification Coverage: RTP/RTSP/HTTPS/TCP, RTSP over HTTP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream, RTSP over HTTPS

Feature Under Test: Metadata Streaming, Streaming over RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.
4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
• in RtspOverHttp - Transport protocol

• out profile - Media Profile with Metadata Configuration

• out streamUri - Uri for media streaming

• out metadataConfiguration - Metadata Configuration

5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.48 with the following input and output parameters

• in streamUri - Uri for media streaming

• in metadataConfiguration - Metadata Configuration

6. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.

8. ONVIF Client restores HTTPS settings which was changed at step 3.

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.9 METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-9

Specification Coverage: RTP/RTSP/HTTPS/TCP, RTSP over HTTP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream, RTSP over HTTPS

Feature Under Test: Metadata Streaming, Streaming over RTP-Unicast/RTSP/HTTP/TCP, IPv6
WSDL Reference: None

Test Purpose: To verify metadata streaming based on HTTPS Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures HTTPS if required by following the procedure mentioned in Annex A.42.

5. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   - in RtspOverHttp - Transport protocol
   - in IPv6 - IP type
   - out profile - Media Profile with Metadata Configuration
   - out streamUri - Uri for media streaming
   - out metadataConfiguration - Metadata Configuration

6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP by following the procedure mentioned in Annex A.48 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in metadataConfiguration - Metadata Configuration

7. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 5.
8. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 5.

9. ONVIF Client restores HTTPS settings which was changed at step 4.

10. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

    • in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.10 METADATA STREAMING (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-4-1-10


Feature Under Test: Metadata Streaming, Streaming over WebSocket, IPv4

WSDL Reference: None

Test Purpose: To verify metadata streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters:
   - in RTSP - Transport protocol
   - out profile - Media Profile with Metadata Configuration
   - out streamUri - Uri for media streaming
   - out metadataConfiguration - Metadata Configuration

4. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.49 with the following input and output parameters:
   - in streamUri - Uri for media streaming
   - in metadataConfiguration - Metadata Configuration

5. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.1.11 METADATA STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-11


Feature Under Test: Metadata Streaming, Streaming over WebSocket, IPv6

WSDL Reference: None
**Test Purpose:** To verify metadata streaming over WebSocket for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. WebSocket is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   - `out initialNetworkSettings` - initial Network settings

4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters

   - `in RTSP` - Transport protocol
   - `in IPv6` - IP type
   - `out profile` - Media Profile with Metadata Configuration
   - `out streamUri` - Uri for media streaming
   - `out metadataConfiguration` - Metadata Configuration

5. ONVIF Client tries to start and decode media streaming over WebSocket by following the procedure mentioned in Annex A.49 with the following input and output parameters

   - `in streamUri` - Uri for media streaming
   - `in metadataConfiguration` - Metadata Configuration

6. ONVIF Client restores settings of Metadata Configuration with `@token = profile.Configurations.Metadata.@token` if it was changed at step 4.

7. ONVIF Client restores Media Profile with `@token = profile.@token` if it was changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.2 Multicast

5.4.2.1 METADATA STREAMING (RTP-Multicast/UDP)

Test Case ID: MEDIA2_RTSS-4-2-1

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP-Multicast/UDP, IPv4

WSDL Reference: None


Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP-Multicast/UDP is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters

   • in RtspMulticast - Transport protocol
• in IPv4 - IP version of Multicast streaming

• out profile - Media Profile with Metadata Configuration

• out streamUri - Uri for media streaming

• out metadataConfiguration - Metadata Configuration

4. ONVIF Client tries to start and decode media streaming over RTP-Multicast/UDP by following the procedure mentioned in Annex A.36 with the following input and output parameters

• in streamUri - Uri for media streaming

• in IPv4 - IP version for multicast streaming

• in metadataConfiguration - Metadata Configuration

5. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 3.

6. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.4.2.2 METADATA STREAMING (RTP-Multicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-4-2-2

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata Streaming, RTP-Multicast/UDP, IPv6

WSDL Reference: None

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Real-time streaming is supported by DUT. RTP-Multicast/UDP is supported by DUT. IPv6 is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings

4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.30 with the following input and output parameters
   • in RtspMulticast - Transport protocol
   • in IPv6 - IP type
   • out profile - Media Profile with Metadata Configuration
   • out streamUri - Uri for media streaming
   • out metadataConfiguration - Metadata Configuration

5. ONVIF Client tries to start and decode media streaming over RTP-Multicast/UDP by following the procedure mentioned in Annex A.36 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in IPv6 - IP version for multicast streaming
   • in metadataConfiguration - Metadata Configuration

6. ONVIF Client restores settings of Metadata Configuration with @token = profile.Configurations.Metadata.@token if it was changed at step 4.

7. ONVIF Client restores Media Profile with @token = profile.@token if it was changed at step 4.
8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5
   with the following input and output parameters

   - in *initialNetworkSettings* - initial Network settings

   **Test Result:**

   **PASS** –
   - DUT passes all assertions.

   **FAIL** –
   - DUT did not pass all assertions.

   **Note:** See Annex A.3 for Name and Token Parameters Length limitations.

5.5 Audio & Video Streaming

5.5.1 Unicast

5.5.1.1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP)

   **Test Case ID:** MEDIA2_RTSS-5-1-1

   **Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

   **Feature Under Test:** Streaming over RTP-Unicast/UDP, G.711

   **WSDL Reference:** None

   **Test Purpose:** To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on
   RTP-Unicast/UDP Transport.

   **Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT.
   H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT.
   Real-time streaming is supported by DUT.

   **Test Configuration:** ONVIF Client and DUT

   **Test Procedure:**

   1. Start an ONVIF Client.

   2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters

- in PCMU - required audio encoding
- in RtspUnicast - Transport Protocol
- in IPv4 - IP version
- out streamUri - Uri for media streaming


5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

- in \textit{streamUri} - Uri for media streaming
- in video - 1st media type
- in audio - 2nd media type
- in \textit{videoEncoding} - expected video stream encoding
- in G.711 - expected audio stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

\textbf{Test Result:}

\textbf{PASS} –

- DUT passes all assertions.

\textbf{FAIL} –

- DUT does not pass all assertions.

\textbf{Note:} See Annex A.3 for Name and Token Parameters Length limitations.

\textbf{5.5.1.2 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP)}

\textbf{Test Case ID:} MEDIA2_RTSS-5-1-2
**Specification Coverage:** RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

**Feature Under Test:** Streaming over RTP-Unicast/RTSP/HTTP/TCP, G.711

**WSDL Reference:** None

**Test Purpose:** To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP-Unicast/RTSP/HTTP/TCP Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RtspOverHttp - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in video - 1st media type
   - in audio - 2nd media type
   - in `videoEncoding` - expected video stream encoding
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

6. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.3 MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-5-1-3

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, G.711

WSDL Reference: None

Test Purpose: To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP/RTSP/TCP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
• in PCMU - required audio encoding

• in RTSP - Transport Protocol

• in IPv4 - IP version

• out streamUri - Uri for media streaming


5. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters

• in streamUri - Uri for media streaming

• in video - 1st media type

• in audio - 2nd media type

• in videoEncoding - expected video stream encoding

• in G.711 - expected audio stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.4 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-4

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, G.711, IPv6
**Test Purpose:** To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP-Unicast/UDP Transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in PCMU - required audio encoding
   - in RtspUnicast - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming
6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - 1st media type
   - in audio - 2nd media type
   - in videoEncoding - expected video stream encoding
   - in G.711 - expected audio stream encoding
7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.5 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-5

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP-Unicast/RTSP/HTTP/TCP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   • out `initialNetworkSettings` - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters

   • in `PCMU` - required audio encoding
   • in `RtspOverHttp` - Transport Protocol
   • in `IPv6` - IP version
   • out `streamUri` - Uri for media streaming


6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters

   • in `streamUri` - Uri for media streaming
   • in `video` - 1st media type
   • in `audio` - 2nd media type
   • in `videoEncoding` - expected video stream encoding
   • in `G.711` - expected audio stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   • in `initialNetworkSettings` - initial Network settings

**Test Result:**

**PASS –**

• DUT passes all assertions.

**FAIL –**
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.6 MEDIA2 STREAMING – H.26X/G.711 (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-6

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, G.711, IPv6

WSDL Reference: None

Test Purpose: To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP/RTSP/TCP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   • out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   • in PCMU - required audio encoding
   • in RTSP - Transport Protocol
   • in IPv6 - IP version
   • out streamUri - Uri for media streaming
5. Set \texttt{videoEncoding} := \texttt{profile.Configurations.VideoEncoder.Encoding}

6. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in \texttt{Annex A.12} with the following input and output parameters
   \begin{itemize}
   \item in \texttt{streamUri} - Uri for media streaming
   \item in \texttt{video} - 1st media type
   \item in \texttt{audio} - 2nd media type
   \item in \texttt{videoEncoding} - expected video stream encoding
   \item in \texttt{G.711} - expected audio stream encoding
   \end{itemize}

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in \texttt{Annex A.5} with the following input and output parameters
   \begin{itemize}
   \item in \texttt{initialNetworkSettings} - initial Network settings
   \end{itemize}

\textbf{Test Result:}

\textbf{PASS} –
   \begin{itemize}
   \item DUT passes all assertions.
   \end{itemize}

\textbf{FAIL} –
   \begin{itemize}
   \item DUT does not pass all assertions.
   \end{itemize}

\textbf{Note:} See \texttt{Annex A.3} for Name and Token Parameters Length limitations.

### 5.5.1.7 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP)

\textbf{Test Case ID:} MEDIA2_RTSS-5-1-7

\textbf{Specification Coverage:} RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

\textbf{Feature Under Test:} Streaming over RTP-Unicast/UDP, AAC

\textbf{WSDL Reference:} None

\textbf{Test Purpose:} To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Unicast/UDP Transport.
**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in AAC - required audio encoding
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
   - out profile - Media profile with required configurations


6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in video - 1st media type
   - in audio - 2nd media type
   - in `videoEncoding` - expected video stream encoding
   - in `audioEncoding` - expected audio stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

**Test Result:**

PASS –
• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.8 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-5-1-8

Specification Coverage: RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

Feature Under Test: Streaming over RTP-Unicast/RTSP/HTTP/TCP, AAC

WSDL Reference: None

Test Purpose: To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Unicast/RTSP/HTTP/TCP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters

   • in AAC - required audio encoding
   • in RtspOverHttp - Transport Protocol
   • in IPv4 - IP version
   • out streamUri - Uri for media streaming
• out profile - Media profile with required configurations


6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in video - 1st media type
   • in audio - 2nd media type
   • in videoEncoding - expected video stream encoding
   • in audioEncoding - expected audio stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.9 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-5-1-9

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, AAC

WSDL Reference: None

Test Purpose: To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP/RTSP/TCP Transport.
### Pre-Requisite

Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding or H.265 encoding is supported by DUT. AAC encoding is supported by DUT. RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT.

### Test Configuration

ONVIF Client and DUT

### Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in AAC - required audio encoding
   - in RTSP - Transport Protocol
   - in IPv4 - IP version
   - out `streamUri` - Uri for media streaming
   - out `profile` - Media profile with required configurations


6. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in video - 1st media type
   - in audio - 2nd media type
   - in `videoEncoding` - expected video stream encoding
   - in `audioEncoding` - expected audio stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

### Test Result:

PASS –
5.5.1.10 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-10

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP-Unicast/UDP, AAC, IPv6

WSDL Reference: None

Test Purpose: To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Unicast/UDP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out initialNetworkSettings - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in AAC - required audio encoding
   - in RtspUnicast - Transport Protocol
• in IPv6 - IP version
• out streamUri - Uri for media streaming
• out profile - Media profile with required configurations


7. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.10 with the following input and output parameters

• in streamUri - Uri for media streaming
• in video - 1st media type
• in audio - 2nd media type
• in videoEncoding - expected video stream encoding
• in audioEncoding - expected audio stream encoding

8. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.11 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-11
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

**Specification Coverage:** RTP/RTSP/HTTP/TCP, RTP, RTCP, Stream control, RTSP, RTSP over HTTP.

**Feature Under Test:** Streaming over RTP-Unicast/RTSP/HTTP/TCP, AAC, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Unicast/RTSP/HTTP/TCP Transport for IPv6.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - `out initialNetworkSettings` - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - `in AAC` - required audio encoding
   - `in RtspOverHttp` - Transport Protocol
   - `in IPv6` - IP version
   - `out streamUri` - Uri for media streaming
   - `out profile` - Media profile with required configurations
7. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.11 with the following input and output parameters
• in streamUri - Uri for media streaming

• in video - 1st media type

• in audio - 2nd media type

• in videoEncoding - expected video stream encoding

• in audioEncoding - expected audio stream encoding

8. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.1.12 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-5-1-12

Specification Coverage: RTP/RTSP/TCP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Streaming over RTP/RTSP/TCP, AAC, IPv6

WSDL Reference: None

Test Purpose: To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP/RTSP/TCP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT.
RTP/RTSP/TCP is supported by DUT. Real-time streaming is supported by DUT. IPv6 is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - out `initialNetworkSettings` - initial Network settings
4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - in `AAC` - required audio encoding
   - in `RTSP` - Transport Protocol
   - in `IPv6` - IP version
   - out `streamUri` - Uri for media streaming
   - out `profile` - Media profile with required configurations
7. ONVIF Client tries to start and decode media streaming over RTP/RTSP/TCP by following the procedure mentioned in Annex A.12 with the following input and output parameters
   - in `streamUri` - Uri for media streaming
   - in `video` - 1st media type
   - in `audio` - 2nd media type
   - in `videoEncoding` - expected video stream encoding
   - in `audioEncoding` - expected audio stream encoding
8. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.
9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

- in `initialNetworkSettings` - initial Network settings

**Test Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

### 5.5.2 Multicast

#### 5.5.2.1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast/UDP)

**Test Case ID:** MEDIA2_RTSS-5-2-1

**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

**Feature Under Test:** Streaming over RTP-Multicast, G.711

**WSDL Reference:** None

**Test Purpose:** To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP-Multicast/UDP Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters

---

www.onvif.org
• in PCMU - required audio encoding
• in RtspMulticast - Transport Protocol
• in IPv4 - IP version
• out streamUri - Uri for media streaming


5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
   • in streamUri - Uri for media streaming
   • in video - 1st media type
   • in audio - 2nd media type
   • in videoEncoding - expected video stream encoding
   • in G.711 - expected audio stream encoding

6. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.2.2 MEDIA2 STREAMING – H.26X/G.711 (RTP-Multicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-5-2-2


Feature Under Test: Streaming over RTP-Multicast, G.711, IPv6

WSDL Reference: None
Test Purpose: To verify H.264/G.711 or H.265/G.711 video and audio media streaming based on RTP-Multicast/UDP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. G.711 encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT. IPv6 is supported by the DUT.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters

   - out initialNetworkSettings - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters

   - in PCMU - required audio encoding
   - in RtspMulticast - Transport Protocol
   - in IPv6 - IP version
   - out streamUri - Uri for media streaming


6. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters

   - in streamUri - Uri for media streaming
   - in video - 1st media type
   - in audio - 2nd media type
   - in videoEncoding - expected video stream encoding
   - in G.711 - expected audio stream encoding
7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

8. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

   - in `initialNetworkSettings` - initial Network settings

**Test Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT does not pass all assertions.

**Note:** See Annex A.3 for Name and Token Parameters Length limitations.

5.5.2.3 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP)

**Test Case ID:** MEDIA2_RTSS-5-2-3

**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

**Feature Under Test:** Streaming over RTP-Multicast, AAC

**WSDL Reference:** None

**Test Purpose:** To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Multicast/UDP Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
• in AAC - required audio encoding
• in RtspMulticast - Transport Protocol
• in IPv4 - IP version
• out streamUri - Uri for media streaming
• out profile - Media profile with required configurations


6. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters

   • in streamUri - Uri for media streaming
   • in video - 1st media type
   • in audio - 2nd media type
   • in videoEncoding - expected video stream encoding
   • in audioEncoding - expected audio stream encoding

7. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.

Test Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.5.2.4 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-5-2-4
**Specification Coverage:** RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP, IPv6.

**Feature Under Test:** Streaming over RTP-Multicast, AAC, IPv6

**WSDL Reference:** None

**Test Purpose:** To verify H.264/AAC or H.265/AAC video and audio media streaming based on RTP-Multicast/UDP Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT. H.264 encoding OR H.265 encoding is supported by DUT. AAC encoding is supported by DUT. Real-time streaming is supported by DUT. RTP-Multicast transport protocol is supported by DUT. IPv6 is supported by the DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.

2. Start the DUT.

3. ONVIF Client configures IPv6 address to use it for the next test steps by following the procedure mentioned in Annex A.4 with the following input and output parameters
   - **out initialNetworkSettings** - initial Network settings

4. ONVIF Client configures a media profile and retrieves a stream uri for video and audio streaming by following the procedure mentioned in Annex A.45 with the following input and output parameters
   - **in AAC** - required audio encoding
   - **in RtspMulticast** - Transport Protocol
   - **in IPv6** - IP version
   - **out streamUri** - Uri for media streaming
   - **out profile** - Media profile with required configurations


7. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.13 with the following input and output parameters
• in streamUri - Uri for media streaming
• in video - 1st media type
• in audio - 2nd media type
• in videoEncoding - expected video stream encoding
• in audioEncoding - expected audio stream encoding

8. ONVIF Client restores settings of Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 4.

9. ONVIF Client restores network settings by following the procedure mentioned in Annex A.5 with the following input and output parameters

• in initialNetworkSettings - initial Network settings

Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

5.6 Audio Backchannel & Video & Audio Streaming

5.6.1 Unicast

5.6.1.1 MEDIA2 STREAMING – G.711 BACKCHANNEL AND H.26X VIDEO AND G.711/AAC AUDIO (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-6-1-1

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP.

Feature Under Test: Audio Backchannel G.711 with Video and Audio streaming, RTP-Unicast/UDP, IPv4

WSDL Reference: None
**Test Purpose:** To verify G.711 audio backchannel with H.264 or H.265 video and with G.711 or AAC audio media streaming based on RTP-Unicast/UDP Transport.

**Pre-Requisite:** Media2 Service is received from the DUT. Audio Outputs is supported by DUT. G.711 decoder is supported by DUT. Audio is supported by DUT. G.711 OR AAC audio encoding is supported by DUT. Video is supported by DUT. H.264 OR H.265 video encoding is supported by DUT. Real-time streaming is supported by DUT.

**Test Configuration:** ONVIF Client and DUT

**Test Procedure:**

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client configures a media profile and retrieves a stream uri for audio backchannel and video and audio streaming by following the procedure mentioned in Annex A.63 with the following input and output parameters
   - in PCMU - required supported audio decoder
   - in RtspUnicast - Transport Protocol
   - in IPv4 - IP version
   - out streamUri - Uri for media streaming
   - out profile - configured media profile
6. ONVIF Client tries to start audio backchannel streaming and start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.66 with the following input and output parameters
   - in streamUri - Uri for media streaming
   - in G.711 - audio backchannel stream encoding
   - in videoEncoding - expected video stream encoding
   - in audioEncoding - expected audio stream encoding
7. ONVIF Client restores settings of Audio Decoder Configuration, Video Encoder Configuration, Audio Encoder Configuration, and Media Profile changed at step 3.
Test Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT does not pass all assertions.

Note: See Annex A.3 for Name and Token Parameters Length limitations.
Annex A Helper Procedures and Additional Notes

A.1 Invalid RTP Header

A RTP header, which is not formed according to the header field format defined in the RFC 3550 Section 5.1, is considered an invalid RTP header.

A.2 I-frame insertion time interval

‘I-frame insertion time interval’ is the time interval between two consecutive I-frames sent by DUT.

ONVIF Client calculates this value by using the ‘GovLength’ parameter in the Video encoder configuration. ONVIF Client has to configure ‘GovLength’ to a large enough value so that there will be a sufficient time difference between two I-frames.

For SetSynchronizationPoint test cases in the “Real Time Streaming” section, ONVIF Client follows this procedure to verify that I-frame is inserted as a result of SetSynchronizationPoint request.

ONVIF Client waits for an I-frame before invoking SetSynchronizationPoint command.

After receiving I-frame, ONVIF Client starts a timer with time out period less than ‘I-frame insertion time interval’ and immediately invokes SetSynchronizationPoint command.

ONVIF Client waits for the I-frame and verifies that it receives I-frame before the timeout period.

A.3 Name and Token Parameters

There are the following limitations on maximum length of the Name and Token parameters that shall be used during tests by ONVIF Device Test Tool to prevent faults from DUT:

- Name shall be less than or equal to 64 characters (only readable characters accepted).
- Token shall be less than or equal to 64 characters (only readable characters accepted).
- UTF-8 character set shall be used for Name and Token.

**Note:** these limitations will not be used, if ONVIF Device Test Tool reuses values that were received from the DUT.

A.4 Turn on IPv6 network interface

**Name:** HelperTurnOnIPv6
Procedure Purpose: Helper procedure to turn on IPv6 network interface.

Pre-requisite: IPv6 is supported by DUT.

Input: None

Returns: Initial Network settings (initialNetworkSettings).

Procedure:

1. ONVIF Client will invoke GetNetworkInterfacesRequest message to retrieve the original settings of the DUT.

2. ONVIF Client verifies GetNetworkInterfacesResponse message.


7. If NetworkInterfaces.IPv6.Config.LinkLocal element is present and not empty, then ONVIF Client skips other steps and runs test using NetworkInterfaces.IPv6.Config.LinkLocal value as device IP. Otherwise, ONVIF Client skip other steps and failed test.

8. ONVIF Client will invoke SetNetworkInterfacesRequest message to turn off DHCP IPv6 (InterfaceToken = available network interface, NetworkInterfaces.IPv6.Config.DHCP=Off).

9. ONVIF Client gets current network interfaces via GetNetworkInterfacesRequest message.

10. ONVIF Client verifies GetNetworkInterfacesResponse message and checks that set settings were applied. Repeat steps 6-7.

11. If GetNetworkInterfacesResponse message does not contain NetworkInterfaces.IPv6 or NetworkInterfaces.IPv6.Enabled=false, then ONVIF Client will invoke SetNetworkInterfacesRequest message (InterfaceToken = available network interface, NetworkInterfaces.IPv6. Enabled=true) to turn on IPv6 configuration.

12. The DUT will return SetNetworkInterfacesResponse message.
13. If Reboot is required by DUT, invoke `SystemReboot` command.

14. If DUT supports Discovery:

   14.1. ONVIF Client waits for HELLO message from the default network interface.

15. If DUT does not support Discovery:

   15.1. ONVIF Client waits during `rebootTimeout`.

16. ONVIF Client gets current network interfaces via `GetNetworkInterfacesRequest` message.

17. ONVIF Client verifies `GetNetworkInterfacesResponse` message and checks that set settings were applied. Execute steps 5-7.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send `GetNetworkInterfacesResponse` message.
- DUT did not send `SetNetworkInterfacesResponse` message.
- DUT did not send `SystemReboot` message.

### A.5 Restore Network Settings

**Name:** HelperRestoreNetworkSettings

**Procedure Purpose:** Helper procedure to restore the original default settings.

**Pre-requisite:** None

**Input:** Initial Network settings to restore (`initialNetworkSettings`).

**Returns:** None

**Procedure:**

1. Restore the initial network settings by invoking `SetNetworkInterfaces` (Default settings) command.

2. If Reboot is required by DUT, invoke `SystemReboot` command.
3. If `SystemReboot` is invoked and DUT supports Discovery, wait for HELLO message from the default network interface.

4. If DUT does not support Discovery:
   
   4.1. ONVIF Client waits during `rebootTimeout`.

**Procedure Result:**

**PASS –**

- DUT passes all assertions.

**FAIL –**

- DUT did not send `GetNetworkInterfacesResponse` message.
- DUT did not send `SetNetworkInterfacesResponse` message.
- DUT did not send `SystemReboot` message.

### A.6 Media2 Service Profile Configuration for Video Streaming

**Name:** HelperFindMediaProfileForVideoStreaming

**Procedure Purpose:** Helper procedure to configure Media Profile to contain Video Source Configuration and Video Encoder Configuration with the required video encoding.

**Pre-requisite:** Media2 Service is received from the DUT.

**Input:** Required video encoding (`requiredVideoEncoding`)

**Returns:** Media Profile (`profile`) containing Video Source Configuration and Video Encoder Configuration with the required video encoding. Video Encoder Configuration Options for the Media Profile (`vecOptions`).

**Procedure:**

1. ONVIF Client invokes `GetProfiles` request with parameters
   
   - Token skipped
   - Type[0] := VideoSource
   - Type[1] := VideoEncoder

2. The DUT responds with `GetProfilesResponse` message with parameters
   
   - Profiles list =: `profileList`
3. For each Media Profile profile1 in profileList with both Configuration.VideoSource and Configuration.VideoEncoder repeat the following steps:

3.1. ONVIF Client invokes GetVideoEncoderConfigurationOptions request with parameters

   - ConfigurationToken := profile1.Configuration.VideoEncoder.@token
   - ProfileToken := profile1.@token

3.2. DUT responds with GetVideoEncoderConfigurationOptionsResponse message with parameters

   - Options list := optionsList

3.3. If optionsList list contains item with Encoding = requiredVideoEncoding:

   3.3.1. Set profile := profile1.
   3.3.2. Set vecOptions := item with Encoding = requiredVideoEncoding from optionsList list.
   3.3.3. Skip other steps in procedure.

4. For each Media Profile profile1 in profileList that contains VideoSource configuration repeat the following steps:

4.1. If profile1.Configurations.VideoSource.@token is different from video source configuration token of previous profiles in cycle:

   4.1.1. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters

      - ConfigurationToken skipped
      - ProfileToken := profile1.@token

   4.1.2. The DUT responds with GetVideoEncoderConfigurationsResponse with parameters

      - Configurations list := videoEncoderConfList

   4.1.3. For each Video Encoder Configuration videoEncoderConfiguration1 in videoEncoderConfList repeat the following steps:

      4.1.3.1. ONVIF Client invokes GetVideoEncoderConfigurationOptions request with parameters
• ConfigurationToken := videoEncoderConfiguration1.@token
• ProfileToken := profile1.@token

4.1.3.2. DUT responds with GetVideoEncoderConfigurationOptionsResponse message with parameters

• Options list =: optionsList

4.1.3.3. If optionsList list contains item with Encoding = requiredVideoEncoding:

4.1.3.3.1. ONVIF Client invokes AddConfiguration request with parameters

• ProfileToken := profile1.@token
• Name skipped
• Configuration[0].Type := VideoEncoder
• Configuration[0].Token := videoEncoderConfiguration1.@token

4.1.3.3.2. The DUT responds with AddConfigurationResponse message.

4.1.3.3.3. Set profile := profile1.

4.1.3.3.4. Set vecOptions := item with Encoding = requiredVideoEncoding from optionsList list.

4.1.3.3.5. Skip other steps in procedure.

5. Set profile1 := profileList[0]

6. Set confTypeList := (configurations that are contained in profile profile1)

7. ONVIF Client removes all configurations from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters

• in confTypeList - list of configuration type to remove from Media Profile
• in profile1 - Media Profile to update

8. ONVIF Client invokes GetVideoSourceConfigurations request with parameters
• ConfigurationToken skipped

• ProfileToken := profile1.@token

9. The DUT responds with GetVideoSourceConfigurationsResponse with parameters

• Configurations list =: videoSourceConfList

10. For each Video Source Configuration videoSourceConfiguration1 in videoSourceConfList repeat the following steps:

10.1. ONVIF Client invokes AddConfiguration request with parameters

• ProfileToken := profile1.@token

• Name skipped

• Configuration[0].Type := VideoSource

• Configuration[0].Token := videoSourceConfiguration1.@token

10.2. The DUT responds with AddConfigurationResponse message.

10.3. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters

• ConfigurationToken skipped

• ProfileToken := profile1.@token

10.4. The DUT responds with GetVideoEncoderConfigurationsResponse with parameters

• Configurations list =: videoEncoderConfList

10.5. For each Video Encoder Configuration videoEncoderConfiguration1 in videoEncoderConfList repeat the following steps:

10.5.1. ONVIF Client invokes GetVideoEncoderConfigurationOptions request with parameters

• ConfigurationToken := videoEncoderConfiguration1.@token

• ProfileToken := profile1.@token

10.5.2. DUT responds with GetVideoEncoderConfigurationOptionsResponse message with parameters
10.5.3. If `optionsList` list contains item with Encoding = `requiredVideoEncoding`:

10.5.3.1. ONVIF Client invokes `AddConfiguration` request with parameters

- `ProfileToken := profile1.@token`
- Name skipped
- `Configuration[0].Type := VideoEncoder`
- `Configuration[0].Token := videoEncoderConfiguration1.@token`

10.5.3.2. The DUT responds with `AddConfigurationResponse` message.

10.5.3.3. Set `profile := profile1`.

10.5.3.4. Set `vecOptions := item with Encoding = requiredVideoEncoding from optionsList list`.

10.5.3.5. Skip other steps in procedure.

11. FAIL the test and skip other steps.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send `GetProfilesResponse` message.
- DUT did not send `GetVideoEncoderConfigurationOptionsResponse` message.
- DUT did not send `GetVideoEncoderConfigurationsResponse` message.
- DUT did not send `AddConfigurationResponse` message.
- DUT did not send `GetVideoSourceConfigurationsResponse` message.
A.7 Media2 Service – Media Profile Configuration for Audio Streaming

**Name:** HelperConfigureMediaProfileForAudioStreaming

**Procedure Purpose:** Helper procedure to configure Media Profile to contain Audio Source Configuration and Audio Encoder Configuration with the required audio encoding.

**Pre-requisite:** Media2 Service is received from the DUT. Audio streaming is supported by DUT.

**Input:** Required audio encoding (`requiredAudioEncoding`)

**Returns:** Media Profile (`profile`) containing Audio Source Configuration and Audio Encoder Configuration with the required audio encoding. Audio Encoder Configuration Options for the Media Profile (`aecOptions`).

**Procedure:**

1. ONVIF Client invokes **GetProfiles** request with parameters
   - Token skipped
   - Type[0] := AudioSource
   - Type[1] := AudioEncoder

2. The DUT responds with **GetProfilesResponse** message with parameters
   - Profiles list = `profileList`

3. For each Media Profile `profile1` in `profileList` with both Configuration.AudioSource and Configuration.AudioEncoder repeat the following steps:

   3.1. ONVIF Client invokes **GetAudioEncoderConfigurationOptions** request with parameters
       - ConfigurationToken := `profile1.Configuration.AudioEncoder.@token`
       - ProfileToken := `profile1.@token`

   3.2. DUT responds with **GetAudioEncoderConfigurationOptionsResponse** message with parameters
       - Options list = `optionsList`

3.3. If `requiredAudioEncoding` = AAC:
3.3.1. If `optionsList` list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

3.3.1.1. Set `profile := profile1`.

3.3.1.2. Set `aecOptions := item with Encoding = "MP4A-LATM" from `optionsList` list if exists, otherwise item with Encoding = "MPEG4-GENERIC".

3.3.1.3. Skip other steps in procedure.

3.4. If `requiredAudioEncoding` = !AAC:

3.4.1. If `optionsList` list contains item with Encoding = `requiredAudioEncoding`:

3.4.1.1. Set `profile := profile1`.

3.4.1.2. Set `aecOptions := item with Encoding = `requiredAudioEncoding` from `optionsList` list.

3.4.1.3. Skip other steps in procedure.

4. For each Media Profile `profile1` in `profileList` repeat the following steps:

4.1. ONVIF Client invokes `GetAudioSourceConfigurations` request with parameters

   - ConfigurationToken skipped

   - ProfileToken := `profile1.@token`

4.2. The DUT responds with `GetAudioSourceConfigurationsResponse` with parameters

   - Configurations list := `audioSourceConfList`

4.3. For each Audio Source Configuration `audioSourceConfiguration1` in `audioSourceConfList` repeat the following steps:

4.3.1. ONVIF Client invokes `AddConfiguration` request with parameters

   - ProfileToken := `profile1.@token`

   - Name skipped

   - Configuration[0].Type := AudioSource

   - Configuration[0].Token := `audioSourceConfiguration1.@token`
4.3.2. The DUT responds with **AddConfigurationResponse** message.

4.3.3. ONVIF Client invokes **GetAudioEncoderConfigurations** request with parameters

- ConfigurationToken skipped
- ProfileToken := *profile1.*@token

4.3.4. The DUT responds with **GetAudioEncoderConfigurationsResponse** with parameters

- Configurations list := *audioEncoderConfList*

4.3.5. For each Audio Encoder Configuration *audioEncoderConfiguration1* in *audioEncoderConfList* repeat the following steps:

4.3.5.1. ONVIF Client invokes **GetAudioEncoderConfigurationOptions** request with parameters

- ConfigurationToken := *audioEncoderConfiguration1.*@token
- ProfileToken := *profile1.*@token

4.3.5.2. DUT responds with **GetAudioEncoderConfigurationOptionsResponse** message with parameters

- Options list := *optionsList*

4.3.5.3. If `requiredAudioEncoding` = AAC:

4.3.5.3.1. If *optionsList* list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

4.3.5.3.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile1.*@token
- Name skipped
- Configuration[0].Type := AudioEncoder
- Configuration[0].Token := *audioEncoderConfiguration1.*@token
4.3.5.3.1.2. The DUT responds with AddConfigurationResponse message.

4.3.5.3.1.3. Set profile := profile1.

4.3.5.3.1.4. Set aecOptions := item with Encoding = "MP4A-LATM" from optionsList list if exists, otherwise item with Encoding = "MPEG4-GENERIC".

4.3.5.3.1.5. Skip other steps in procedure.

4.3.5.4. If requiredAudioEncoding = !AAC:

4.3.5.4.1. If optionsList list contains item with Encoding = requiredAudioEncoding:

4.3.5.4.1.1. ONVIF Client invokes AddConfiguration request with parameters

   • ProfileToken := profile1.@token
   • Name skipped
   • Configuration[0].Type := AudioEncoder
   • Configuration[0].Token := audioEncoderConfiguration1.@token

4.3.5.4.1.2. The DUT responds with AddConfigurationResponse message.

4.3.5.4.1.3. Set profile := profile1.

4.3.5.4.1.4. Set aecOptions := item with Encoding = requiredAudioEncoding from optionsList list.

4.3.5.4.1.5. Skip other steps in procedure.

5. FAIL the test and skip other steps.

Procedure Result:

PASS –

• DUT passes all assertions.
FAIL –

- DUT did not send `GetProfilesResponse` message.
- DUT did not send `GetAudioEncoderConfigurationOptionsResponse` message.
- DUT did not send `GetAudioSourceConfigurationsResponse` message.
- DUT did not send `AddConfigurationResponse` message.
- DUT did not send `GetAudioEncoderConfigurationsResponse` message.

A.8 Removing Video Encoder Configuration and Metadata Configuration from Media Profile

**Name:** HelperRemoveVideoEncoderConfigAndMetadataConfigFromMediaProfile

**Procedure Purpose:** Helper Procedure to guarantee that Media Profile does not contain Video Encoder Configuration and Metadata Configuration.

**Pre-requisite:** Media2 Service is received from the DUT.

**Input:** Media Profile (profile)

**Returns:** None.

**Procedure:**

1. ONVIF Client invokes `GetProfiles` request with parameters
   
   - Token := profile.@token
   - Type[0] := VideoEncoder
   - Type[1] := Metadata

2. The DUT responds with `GetProfilesResponse` message with parameters

   - Profiles list =: profileList

3. If `profileList[0]` contains Configuration.VideoEncoder or Configuration.Metadata:

   3.1. ONVIF Client invokes `RemoveConfiguration` request with parameters

       - ProfileToken := profile1.@token

       - If `profileList[0]` contains Configuration.VideoEncoder:
• Configuration[0].Type := VideoEncoder
• Configuration[0].Token skipped
• If profileList[0] contains Configuration.Metadata:
  • Configuration[1].Type := Metadata
  • Configuration[1].Token skipped

3.2. The DUT responds with **RemoveConfigurationResponse** message.

**Procedure Result:**

**PASS** –

• DUT passes all assertions.

**FAIL** –

• DUT did not send **GetProfilesResponse** message.
• DUT did not send **RemoveConfigurationResponse** message.

**A.9 Removing Audio Encoder Configuration and Metadata Configuration from Media Profile**

**Name:** HelperRemoveAudioEncoderConfigAndMetadataConfigFromMediaProfile

**Procedure Purpose:** Helper Procedure to guarantee that Media Profile does not contain Audio Encoder Configuration and Metadata Configuration.

**Pre-requisite:** Media2 Service is received from the DUT.

**Input:** Media Profile (profile)

**Returns:** None.

**Procedure:**

1. ONVIF Client invokes **GetProfiles** request with parameters
   • Token := profile.@token
   • Type[0] := AudioEncoder
   • Type[1] := Metadata
2. The DUT responds with **GetProfilesResponse** message with parameters
   - Profiles list =: `profileList`

3. If `profileList[0]` contains Configuration.AudioEncoder or Configuration.Metadata:
   3.1. ONVIF Client invokes **RemoveConfiguration** request with parameters
       - ProfileToken := `profile1.@token`
       - If `profileList[0]` contains Configuration.AudioEncoder:
           - Configuration[0].Type := AudioEncoder
           - Configuration[0].Token skipped
       - If `profileList[0]` contains Configuration.Metadata:
           - Configuration[1].Type := Metadata
           - Configuration[1].Token skipped
   3.2. The DUT responds with **RemoveConfigurationResponse** message.

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **GetProfilesResponse** message.
- DUT did not send **RemoveConfigurationResponse** message.

**A.10 Media Streaming over RTP-Unicast/UDP**

**Name:** HelperStreamingRTPUnicastUDP

**Procedure Purpose:** Helper procedure to verify media streaming over RTP-Unicast/UDP.

**Pre-requisite:** None

**Input:** Uri for media streaming (`streamUri`). Media type (`mediaType`). Expected media stream encoding (`encoding`). Media type2 (`mediaType2`) (optional parameter). Expected media stream encoding for Media type2 (`encoding2`) (optional parameter).

**Returns:** None
Procedure:

1. ONVIF Client invokes **RTSP DESCRIBE** request to `streamUri` address.

2. The DUT responds with **200 OK** message with parameters
   
   - Response header =: `responseHeader`
   - SDP information =: `sdp`

3. If `sdp` does not contain Media Type = `mediaType` with rtpmap value corresponding to `encoding` and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4. If `mediaType2` is specified and `sdp` does not contain Media Type = `mediaType2` with rtpmap value corresponding to `encoding2`, FAIL the test and skip other steps.

5. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   
   - in `responseHeader` - header of response to DESCRIBE
   - in `sdp` - SDP information
   - in `streamUri` - Uri for media streaming

6. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to `mediaType` media type (see [RFC2326] for details), with parameters
   
   - Transport := RTP/AVP;unicast;client_port=`port1-port2`

7. The DUT responds with **200 OK** message with parameters

   - Transport
   - Session =: `session`

8. If `mediaType2` is specified:

   - ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to `mediaType2` media type (see [RFC2326] for details), with parameters
     
     - Transport := RTP/AVP;unicast;client_port=`port3-port4`

   - The DUT responds with **200 OK** message with parameters
     
     - Transport
     - Session =: `session`
9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := `session`

10. The DUT responds with **200 OK** message with parameters
    - Session
    - RTP-Info

11. If DUT does not send `encoding` RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If `mediaType2` is specified and DUT does not send `encoding2` RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

13. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

14. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := `session`

15. The DUT responds with **200 OK** message with parameters
    - Session

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP**, **RTSP PLAY** and **RTSP TEARDOWN** requests.
- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If `encoding` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.
A.11 Media Streaming over RTP-Unicast/RTSP/HTTP/TCP

Name: HelperStreamingRTPUnicastRTSPHTTPTCP

Procedure Purpose: Helper procedure to verify media streaming over RTP-Unicast/RTSP/HTTP/TCP.

Pre-requisite: None

Input: Uri for media streaming (streamUri). Media type (mediaType). Expected media stream encoding (encoding). Media type2 (mediaType2) (optional parameter). Expected media stream encoding for Media type2 (encoding2) (optional parameter).

Returns: None

Procedure:

1. ONVIF Client invokes HTTP GET request to streamUri address to establish DUT to ONVIF Client connection for RTP data transfer (connection1).

2. ONVIF Client invokes HTTP POST request to streamUri address to establish ONVIF Client to DUT connection for RTSP control requests (connection2).

3. ONVIF Client invokes RTSP DESCRIBE request to streamUri address converted to rtsp address on connection2.

4. The DUT responds with 200 OK message with parameters on connection1
   - Response header =: responseHeader
   - SDP information =: sdp

5. If sdp does not contain Media Type = mediaType with rtpmap value corresponding to encoding and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. If mediaType2 is specified and sdp does not contain Media Type = mediaType2 with rtpmap value corresponding to encoding2 and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

7. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters.
• in responseHeader - header of response to DESCRIBE
• in sdp - SDP information
• in streamUri - Uri for media streaming

8. ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType media type (see [RFC2326] for details) on connection2, with parameters
   • Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

9. The DUT responds with 200 OK message on connection1 with parameters
   • Transport
   • Session =: session

10. If mediaType2 is specified:
   • ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType2 media type (see [RFC2326] for details), with parameters
      • Transport := RTP/AVP/TCP;unicast;client_port=port3-port4
      • The DUT responds with 200 OK message with parameters
         • Transport
         • Session =: session

11. ONVIF Client invokes RTSP PLAY request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
    • Session := session

12. The DUT responds with 200 OK message on connection1 with parameters
    • Session
    • RTP-Info

13. If DUT does not send encoding RTP media stream to ONVIF Client over connection1, FAIL the test and skip other steps.

14. If mediaType2 is specified and DUT does not send encoding2 RTP media stream to ONVIF Client over connection1, FAIL the test and skip other steps.

15. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.
16. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters

- Session := session

17. ONVIF Client closes connection2.

18. The DUT responds with **HTTP 200 OK** message on connection1 and closes connection1.

**Procedure Result:**

**PASS –**

- DUT passes all assertions.

**FAIL –**

- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP** and **RTSP PLAY** requests.

- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If `encoding` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

**Note:** If `encoding2` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 6.

### A.12 Media Streaming over RTP/RTSP/TCP

**Name:** HelperStreamingRTPRTSPTCP

**Procedure Purpose:** Helper procedure to verify media streaming over RTP/RTSP/TCP.

**Pre-requisite:** None

**Input:** Uri for media streaming (**streamUri**). Media type (**mediaType**). Expected media stream encoding (**encoding**). Media type2 (**mediaType2**) (optional parameter). Expected media stream encoding for Media type2 (**encoding2**) (optional parameter).

**Returns:** None

**Procedure:**
1. ONVIF Client invokes **RTSP DESCRIBE** request to *streamUri* address.

2. The DUT responds with **200 OK** message with parameters
   - Response header =: *responseHeader*
   - SDP information =: *sdp*

3. If *sdp* does not contain Media Type = *mediaType* with rtpmap value corresponding to *encoding* and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4. If *mediaType2* is specified and *sdp* does not contain Media Type = *mediaType2* with rtpmap value corresponding to *encoding2* and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

5. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in *responseHeader* - header of response to DESCRIBE
   - in *sdp* - SDP information
   - in *streamUri* - Uri for media streaming

6. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to *mediaType* media type (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP/TCP;unicast;interleaved=0-1

7. The DUT responds with **200 OK** message with parameters
   - Transport
   - Session =: *session*

8. If *mediaType2* is specified:
   - ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to *mediaType2* media type (see [RFC2326] for details), with parameters
     - Transport := RTP/AVP/TCP;unicast;interleaved=0-1
   - The DUT responds with **200 OK** message with parameters
     - Transport
     - Session =: *session*
9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

10. The DUT responds with **200 OK** message with parameters
    - Session
    - RTP-Info

11. If DUT does not send `encoding` RTP media stream to ONVIF Client over RTSP control connection, FAIL the test and skip other steps.

12. If `mediaType2` is specified and DUT does not send `encoding2` RTP media stream to ONVIF Client over RTSP control connection, FAIL the test and skip other steps.

13. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

14. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

15. The DUT responds with **200 OK** message with parameters
    - Session

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE, RTSP SETUP, RTSP PLAY** and **RTSP TEARDOWN** requests.
- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If `encoding` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.
A.13 Media Streaming over RTP-Multicast

Name: HelperStreamingRTPMulticast

Procedure Purpose: Helper procedure to verify media streaming over RTP-Multicast.

Pre-requisite: None

Input: Uri for media streaming (streamUri). Media type (mediaType). Expected media stream encoding (encoding). Media type2 (mediaType2) (optional parameter). Expected media stream encoding for Media type2 (encoding2) (optional parameter).

Returns: None

Procedure:

1. ONVIF Client invokes RTSP DESCRIBE request to streamUri address.

2. The DUT responds with 200 OK message with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

3. If sdp does not contain Media Type = mediaType with rtpmap value corresponding to encoding and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4. If mediaType2 is specified and sdp does not contain Media Type = mediaType2 with rtpmap value corresponding to encoding2 and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

5. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

6. ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters

Note: If encoding2 = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 4.
7. The DUT responds with **200 OK** message with parameters
   - Transport
   - Session =: session

8. **If mediaType2 is specified:**
   - ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to mediaType2 media type (see [RFC2326] for details), with parameters
     - Transport := RTP/AVP;multicast;client_port=port3-port4
   - The DUT responds with **200 OK** message with parameters
     - Transport
     - Session =: session

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

10. The DUT responds with **200 OK** message with parameters
    - Session
    - RTP-Info

11. If DUT does not send **encoding** **RTP** **ipVersion** multicast media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If **mediaType2** is specified and DUT does not send **encoding2** **RTP** **ipVersion** multicast media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

13. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

14. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

15. The DUT responds with **200 OK** message with parameters
    - Session
Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

• RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

Note: If encoding2 = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 4.

A.14 Media Streaming over RTP-Unicast/RTSP/HTTPS/TCP

Name: HelperStreamingRTPUnicastRTSPHTTPSTCP

Procedure Purpose: Helper procedure to verify media streaming over RTP-Unicast/RTSP/HTTPS/TCP.

Pre-requisite: None

Input: Uri for media streaming (streamUri). Media type (mediaType). Expected media stream encoding (encoding).

Returns: None

Procedure:

1. ONVIF Client invokes HTTPS GET request to streamUri address to establish DUT to ONVIF Client secured connection for RTP data transfer (connection1).

2. ONVIF Client invokes HTTPS POST request to streamUri address to establish ONVIF Client to DUT secured connection for RTSP control requests (connection2).

3. ONVIF Client invokes RTSP DESCRIBE request to streamUri address converted to rtsp address on connection2.
4. The DUT responds with **200 OK** message with parameters on *connection1*
   - Response header =: `responseHeader`
   - SDP information =: `sdp`

5. If `sdp` does not contain Media Type = `mediaType` with rtmap value corresponding to `encoding` and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in `responseHeader` - header of response to DESCRIBE
   - in `sdp` - SDP information
   - in `streamUri` - Uri for media streaming

7. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to `mediaType` media type (see [RFC2326] for details) on *connection2*, with parameters
   - Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message on *connection1* with parameters
   - Transport
   - Session =: `session`

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on *connection2*, with parameters
   - Session := `session`

10. The DUT responds with **200 OK** message on *connection1* with parameters
    - Session
    - RTP-Info

11. If DUT does not send `encoding` RTP media stream to ONVIF Client over *connection1*, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on *connection2*, with parameters
• Session := session

14. ONVIF Client closes connection2.

15. The DUT responds with HTTP 200 OK message on connection1 and closes connection1.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP and RTSP PLAY requests.

• RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.15 Configuring HTTPS using Security Configuration Service

Name: HelperConfigureHTTPS


Pre-requisite: Security Configuration Service is received from the DUT. TLS Server is supported by the DUT. The DUT shall have enough free storage capacity for one additional RSA key pair. The DUT shall have enough free storage capacity for one additional certificate. The DUT shall have enough free storage capacity for one additional certification path. The DUT shall have enough free storage capacity for one additional server certificate assignment. Current time of the DUT shall be at least Jan 01, 1970.

Input: None

Returns: None

Procedure:
1. ONVIF Client invokes **GetAssignedServerCertificates**.

2. The DUT responds with a **GetAssignedServerCertificatesResponse** message with parameters
   - CertificationPathID list =: *initialCertificationPathList*

3. If number of items in *initialCertificationPathList* >= 1, go to the step 6.

4. If Create self-signed certificate is supported by the DUT:
   4.1. ONVIF Client adds server certification assignment and creates related certification path, the self-signed certificate and the RSA key pair by following the procedure mentioned in Annex A.16.
   4.2. Go to the step 6.

5. ONVIF Client creates a certification path based on CA-signed certificate and related RSA key pair and a corresponding CA certificate and related RSA key pair by following the procedure mentioned in Annex A.17.

6. ONVIF Client invokes **SetNetworkProtocols** request with parameters
   - NetworkProtocols[0].Name := HTTPS
   - NetworkProtocols[0].Enabled := true
   - NetworkProtocols[0].Port := 443
   - NetworkProtocols[0].Extension skipped

7. The DUT responds with **SetNetworkProtocolsResponse** message.

8. ONVIF Client waits until *operationDelay* timeout expires.

9. ONVIF Client checks that HTTPS protocol Port 443 is open. If HTTPS protocol port 443 is not open, FAIL the test and skip other steps.

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **SetNetworkProtocolsResponse** message.

**Note:** *operationDelay* will be taken from Operation Delay field of ONVIF Device Test Tool.
A.16 Add server certificate assignment with corresponding certification path, self-signed certificate and RSA key pair

Name: HelperAddServerCertAssign_SSCertificate


Pre-requisite: Security Configuration Service is received from the DUT. TLS Server is supported by the DUT. Create self-signed certificate is supported by the DUT. RSA key pair generation is supported by the DUT. The DUT shall have enough free storage capacity for one additional RSA key pair. The DUT shall have enough free storage capacity for one additional certificate. The DUT shall have enough free storage capacity for one additional certification path. The DUT shall have enough free storage capacity for one additional server certificate assignment.

Input: None

Returns: The identifiers of the new certification path (certPathID), certificate (certID) and RSA key pair (keyID).

Procedure:

1. ONVIF Client creates an RSA key pair by following the procedure mentioned in Annex A.18 with the following input and output parameters
   - out keyID - RSA key pair

2. ONVIF Client invokes CreateSelfSignedCertificate with parameters
   - X509Version skipped
   - KeyID := keyID
   - Subject := subject (see Annex A.19)
   - Alias skipped
   - notValidBefore skipped
   - notValidAfter skipped
   - SignatureAlgorithm.algorithm := 1.2.840.113549.1.1.5 (OID of SHA-1 with RSA Encryption algorithm)
   - SignatureAlgorithm.parameters skipped
   - SignatureAlgorithm.anyParameters skipped
3. The DUT responds with a **CreateSelfSignedCertificateResponse** message with parameters
   - CertificateID =: *certID*

4. ONVIF Client invokes **CreateCertificationPath** with parameters
   - Certificates.CertificateID[0] := *certID*
   - Alias := "ONVIF_Test"

5. The DUT responds with a **CreateCertificationPathResponse** message with parameters
   - CertificationPathID =: *certPathID*

6. ONVIF Client invokes **AddServerCertificateAssignment** with parameters
   - CertificationPathID := *certPathID*

7. The DUT responds with an **AddServerCertificateAssignmentResponse** message.

8. ONVIF Client waits for time *operationDelay*.

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **CreateSelfSignedCertificateResponse** message.
- DUT did not send **CreateCertificationPathResponse** message.
- DUT did not send **AddServerCertificateAssignmentResponse** message.

**Note:** *operationDelay* will be taken from Operation Delay field of ONVIF Device Test Tool.

**A.17 Add server certificate assignment with corresponding certification path, CA certificate and RSA key pair**

**Name:** HelperAddServerCertAssign_CACertificate

**Procedure Purpose:** Helper Procedure to configure HTTPS using Security Configuration Service.
Pre-requisite: Security Configuration Service is received from the DUT. TLS Server is supported by the DUT. Create PCKS#10 supported by the DUT. RSA key pair generation is supported by the DUT. The DUT shall have enough free storage capacity for one additional RSA key pair. The DUT shall have enough free storage capacity for one additional certificate. The DUT shall have enough free storage capacity for one additional certification path. The DUT shall have enough free storage capacity for one additional server certificate assignment.

Input: None

Returns: The identifiers of the new certification path (certPathID), certificate (certID) and RSA key pair (keyID).

Procedure:

1. ONVIF Client creates an RSA key pair by following the procedure mentioned in Annex A.18 with the following input and output parameters
   - out keyID - RSA key pair

2. ONVIF Client invokes CreatePKCS10CSR with parameter
   - Subject := subject (see Annex A.19)
   - KeyID := keyID
   - CSRAttribute skipped
   - SignatureAlgorithm.algorithm := 1.2.840.113549.1.1.5 (OID of SHA-1 with RSA Encryption algorithm)

3. The DUT responds with CreatePKCS10CSRResponse message with parameters
   - PKCS10CSR =: pkcs10

4. ONVIF Client creates an CA certificate by following the procedure mentioned in Annex A.37 with the following input and output parameters
   - out CAcert - CA certificate
   - out privateKey - private key for the CA certificate
   - out publicKey - public key for the CA certificate

5. Create an [RFC5280] compliant X.509 certificate (cert) from the PKCS#10 request (pkcs10) with the following properties:
   - version:= v3
• signature := sha1-WithRSAEncryption

• subject := subject from the PKCS#10 request (pkcs10)

• subject public key := subject public key in the PKCS#10 request (pkcs10)

• validity := not before 19700101000000Z and not after 99991231235959Z

• certificate signature is generated with the private key (privateKey) in the CA certificate (CAcert)

• certificate extensions := the X.509v3 extensions from the PKCS#10 request (pkcs10)

6. ONVIF Client invokes **UploadCertificate** with parameters

   • Certificate := cert

   • Alias := "ONVIF_Test1"

   • PrivateKeyRequired := true

7. The DUT responds with a **UploadCertificateResponse** message with parameters

   • CertificateID =: certID

   • KeyID =: keyID

8. ONVIF Client invokes **CreateCertificationPath** with parameters

   • CertificateIDs.CertificateID[0] := certID

   • Alias := "ONVIF_Test2"

9. The DUT responds with a **CreateCertificationPathResponse** message with parameters

   • CertificationPathID =: certPathID

10. ONVIF Client invokes **AddServerCertificateAssignment** with parameters

    • CertificationPathID := certPathID

11. The DUT responds with an **AddServerCertificateAssignmentResponse** message.

12. ONVIF Client waits for time **operationDelay**.

**Procedure Result:**

**PASS –**
• DUT passes all assertions.

FAIL –

• DUT did not send CreatePKCS10CSRResponse message.
• DUT did not send UploadCertificateResponse message.
• DUT did not send CreateCertificationPathResponse message.
• DUT did not send AddServerCertificateAssignmentResponse message.

Note: operationDelay will be taken from Operation Delay field of ONVIF Device Test Tool.

A.18 Create an RSA key pair

Name: HelperCreateRSAKeyPair

Procedure Purpose: Helper procedure to create an RSA key pair.

Pre-requisite: Security Configuration Service is received from the DUT. RSA key pair generation is supported by the DUT. The DUT shall have enough free storage capacity for one additional RSA key pair.

Input: None

Returns: The identifier of the new and RSA key pair (keyID).

Procedure:

1. ONVIF Client invokes GetServiceCapabilities request.
2. The DUT responds with GetServiceCapabilitiesResponse message with parameters
   • Capabilities =: cap
3. Set keyLength := the smallest supported key length at cap.RSAKeyLengths.
4. ONVIF Client invokes CreateRSAKeyPair with parameter
   • KeyLength := length
5. The DUT responds with CreateRSAKeyPairResponse message with parameters
   • KeyID =: keyID
   • EstimatedCreationTime =: duration
6. Until $duration + operationDelay$ expires repeat the following steps:

6.1. ONVIF Client waits for 5 seconds.

6.2. ONVIF Client invokes GetKeyStatus with parameters

- KeyID := keyID

6.3. The DUT responds with GetKeyStatusResponse message with parameters

- KeyStatus := keyStatus

6.4. If $keyStatus$ is equal to "ok", skip other steps of the procedure.

6.5. If $keyStatus$ is equal to "corrupt", FAIL the test and skip other steps.

7. If $duration + operationDelay$ expires for step 6 and the last $keyStatus$ is other than "ok", FAIL the test and skip other steps.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send GetKeyStatusResponse message.
- DUT did not send CreateRSAKeyPairResponse message.
- DUT did not send GetServiceCapabilitiesResponse message.

**Note:** $operationDelay$ will be taken from Operation Delay field of ONVIF Device Test Tool.

**A.19 Subject for a server certificate**

Use the following subject for test cases:

- Subject.Country := "US"
- Subject.CommonName := DUT IP-address

**A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming**

**Name:** HelperConfigureMediaProfileForBackchannelStreaming
**Procedure Purpose:** Helper procedure to configure Media Profile to contain Audio Output Configuration and Audio Decoder Configuration which supports a required audio decoding and send primacy with not only www.onvif.org/ver20/HalfDuplex/Server value and retrieves stream uri.

**Pre-requisite:** Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. Real-time streaming is supported by DUT.

**Input:** Required audio decoding (requiredAudioDecoding). Transport protocol (transportProtocol). IP type ipType.

**Returns:** Media Profile (profile) containing Audio Output Configuration and Audio Decoder Configuration with the required audio decoding. Uri for media streaming (streamUri). Audio decoding set in profile (requiredAudioDecoding).

**Procedure:**

1. ONVIF Client invokes GetProfiles request with parameters
   
   - Token skipped
   - Type[0] := AudioOutput
   - Type[1] := AudioDecoder

2. The DUT responds with GetProfilesResponse message with parameters
   
   - Profiles list =: profileList

3. For each Media Profile profile1 in profileList with both Configuration.AudioOutput and Configuration.AudioDecoder repeat the following steps:

   3.1. ONVIF Client invokes GetAudioOutputConfigurationOptions request with parameters

   - ConfigurationToken := profile1.Configuration.AudioOutput.@token
   - ProfileToken := profile1.@token

   3.2. DUT responds with GetAudioOutputConfigurationOptionsResponse message with parameters

   - Options =: aocOptions

   3.3. If aocOptions.SendPrimacyOptions list is not skipped and contains only one item which is equal to www.onvif.org/ver20/HalfDuplex/Server go to the next item at step 3.

3.5. ONVIF Client invokes \texttt{GetAudioDecoderConfigurationOptions} request with parameters
\begin{itemize}
\item ConfigurationToken := \texttt{profile1.Configuration.AudioDecoder.@token}
\item ProfileToken := \texttt{profile1.@token}
\end{itemize}

3.6. DUT responds with \texttt{GetAudioDecoderConfigurationOptionsResponse} message with parameters
\begin{itemize}
\item Options list := \texttt{adcOptionsList}
\end{itemize}

3.7. If \texttt{requiredAudioDecoding} = AAC:
\begin{itemize}
\item 3.7.1. If \texttt{adcOptionsList} list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":
\begin{itemize}
\item 3.7.1.1. Set \texttt{profile} := \texttt{profile1}.
\item 3.7.1.2. Set \texttt{requiredAudioDecoding} := "MP4A-LATM" if \texttt{adcOptionsList} contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".
\end{itemize}
\item 3.7.1.3. Go to step 6.
\end{itemize}

3.8. If \texttt{requiredAudioDecoding} \neq AAC:
\begin{itemize}
\item 3.8.1. If \texttt{adcOptionsList} list contains item with Encoding = \texttt{requiredAudioDecoding}:
\begin{itemize}
\item 3.8.1.1. Set \texttt{profile} := \texttt{profile1}.
\item 3.8.1.2. Go to step 6.
\end{itemize}
\end{itemize}

4. For each Media Profile \texttt{profile1} in \texttt{profileList} repeat the following steps:
\begin{itemize}
\item 4.1. ONVIF Client invokes \texttt{GetAudioOutputConfigurations} request with parameters
\begin{itemize}
\item ConfigurationToken skipped
\item ProfileToken := \texttt{profile1.@token}
\end{itemize}
\item 4.2. The DUT responds with \texttt{GetAudioOutputConfigurationsResponse} with parameters
\begin{itemize}
\item Configurations list := \texttt{audioOutputConfList}
\end{itemize}
\item 4.3. For each Audio Output Configuration \texttt{audioOutputConfiguration1} in \texttt{audioOutputConfList} repeat the following steps:
4.3.1. ONVIF Client invokes GetAudioOutputConfigurationOptions request with parameters

- ConfigurationToken := audioOutputConfiguration1.@token
- ProfileToken := profile1.@token

4.3.2. DUT responds with GetAudioOutputConfigurationOptionsResponse message with parameters

- Options := aocOptions

4.3.3. If aocOptions.SendPrimacyOptions list is not skipped and contains only one item which is equal to www.onvif.org/ver20/HalfDuplex/Server go to the next item at step 4.3.

4.3.4. Set audioOutputConfiguration := audioOutputConfiguration1.

4.3.5. ONVIF Client invokes AddConfiguration request with parameters

- ProfileToken := profile1.@token
- Name skipped
- Configuration[0].Type := AudioOutput
- Configuration[0].Token := audioOutputConfiguration1.@token

4.3.6. The DUT responds with AddConfigurationResponse message.

4.3.7. ONVIF Client invokes GetAudioDecoderConfigurations request with parameters

- ConfigurationToken skipped
- ProfileToken := profile1.@token

4.3.8. The DUT responds with GetAudioDecoderConfigurationsResponse with parameters

- Configurations list := audioDecoderConfList

4.3.9. For each Audio Decoder Configuration audioDecoderConfiguration1 in audioDecoderConfList repeat the following steps:
4.3.9.1. ONVIF Client invokes **GetAudioDecoderConfigurationOptions** request with parameters

- ConfigurationToken := audioDecoderConfiguration1.@token
- ProfileToken := profile1.@token

4.3.9.2. DUT responds with **GetAudioDecoderConfigurationOptionsResponse** message with parameters

- Options list =: adcOptionsList

4.3.9.3. If `requiredAudioDecoding` = AAC:

4.3.9.3.1. If `adcOptionsList` list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

4.3.9.3.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := profile1.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := audioDecoderConfiguration1.@token

4.3.9.3.1.2. The DUT responds with **AddConfigurationResponse** message.

4.3.9.3.1.3. Set `profile` := `profile1`.

4.3.9.3.1.4. Set `requiredAudioDecoding` := "MP4A-LATM" if `adcOptionsList` contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

4.3.9.3.1.5. Go to step 6.

4.3.9.4. If `requiredAudioDecoding` = !AAC:

4.3.9.4.1. If `adcOptionsList` list contains item with Encoding = `requiredAudioDecoding`:
4.3.9.4.1.1. ONVIF Client invokes AddConfiguration request with parameters

- ProfileToken := profile1.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := audioDecoderConfiguration1.@token

4.3.9.4.1.2. The DUT responds with AddConfigurationResponse message.

4.3.9.4.1.3. Set profile := profile1.

4.3.9.4.1.4. Go to step 6.

5. FAIL the test and skip other steps.

6. If audioOutputConfiguration.SendPrimacy = www.onvif.org/ver20/HalfDuplex/Server:

6.1. ONVIF Client invokes SetAudioOutputConfiguration request with parameters

- Configuration.@token := audioOutputConfiguration.@token
- Configuration.Name := audioOutputConfiguration.Name
- Configuration.UseCount := audioOutputConfiguration.UseCount
- Configuration.SendPrimacy := the highest value from aocOptions.SendPrimacyOptions list according to the following order - www.onvif.org/ver20/HalfDuplex/Client, www.onvif.org/ver20/HalfDuplex/Auto
- Configuration.OutputLevel := audioOutputConfiguration.OutputLevel

6.2. DUT responds with SetAudioOutputConfigurationResponse message.

7. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

- in transportProtocol - Transport protocol
• in *ipType* - IP Type
• in *profile.@token* - Media profile token
• out *streamUri* - Stream URI

Procedure Result:

**PASS** –

• DUT passes all assertions.

**FAIL** –

• DUT did not send *GetProfilesResponse* message.
• DUT did not send *GetAudioOutputConfigurationOptionsResponse* message.
• DUT did not send *GetAudioDecoderConfigurationOptionsResponse* message.
• DUT did not send *AddConfigurationResponse* message.
• DUT did not send *GetAudioOutputConfigurationsResponse* message.
• DUT did not send *GetAudioDecoderConfigurationsResponse* message.
• DUT did not send *SetAudioOutputConfigurationResponse* message.

### A.21 Audio Backchannel streaming over RTP-Unicast/UDP

**Name:** HelperBackchannelStreamingRTPUnicastUDP

**Procedure Purpose:** Helper procedure to verify audio backchannel streaming over RTP-Unicast/UDP.

**Pre-requisite:** Audio Backchannel is supported by DUT.

**Input:** Uri for audio backchannel streaming (*streamUri*). Expected audio stream encoding (*encoding*).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes *RTSP DESCRIBE* request with "Require: www.onvif.org/ver20/backchannel" tag to *streamUri* address.

2. The DUT responds with **200 OK** message with parameters
• Response header = : responseHeader

• SDP information = : sdp

3. If sdp does not contain Media Type = audio and with a=sendonly and with rtmap value corresponding to encoding, FAIL the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   • in responseHeader - header of response to DESCRIBE
   • in sdp - SDP information
   • in streamUri - Uri for media streaming

5. ONVIF Client invokes RTSP SETUP request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to audio backchannel media type (see [RFC2326] for details), with parameters
   • Transport := RTP/AVP;unicast;client_port=port1-port2

6. The DUT responds with 200 OK message with parameters
   • Transport
   • Session =: session

7. ONVIF Client invokes RTSP PLAY request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   • Session := session

8. The DUT responds with 200 OK message with parameters
   • Session
   • RTP-Info

9. ONVIF Client sends RTP Unicast audio stream with encoding to DUT over UDP.

10. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

11. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
• Session := session

12. The DUT responds with 200 OK message with parameters

• Session

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

• RTSP Session is terminated by DUT during media streaming.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

A.22 Audio Backchannel Streaming over RTP/RTSP/TCP

Name: HelperBackchannelStreamingRTPRTSPTCP

Procedure Purpose: Helper procedure to verify audio backchannel streaming over RTP/RTSP/TCP.

Pre-requisite: Audio Backchannel is supported by DUT. RTP/RTSP/TCP is supported by DUT.

Input: Uri for media streaming (streamUri). Expected media stream encoding (encoding).

Returns: None

Procedure:

1. ONVIF Client invokes RTSP DESCRIBE request with "Require: www.onvif.org/ver20/backchannel" tag to streamUri address.

2. The DUT responds with 200 OK message with parameters

• Response header =: responseHeader
3. If sdP does not contain Media Type = audio and with a=sendonly and with rtpmap value corresponding to encoding, FAIL the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters

   • in responseHeader - header of response to DESCRIBE
   
   • in sdP - SDP information
   
   • in streamUri - Uri for media streaming

5. ONVIF Client invokes RTSP SETUP request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters

   • Transport := RTP/AVP/TCP;unicast;interleaved=0-1

6. The DUT responds with 200 OK message with parameters

   • Transport
   
   • Session =: session

7. ONVIF Client invokes RTSP PLAY request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

   • Session := session

8. The DUT responds with 200 OK message with parameters

   • Session
   
   • RTP-Info

9. ONVIF Client sends RTP Unicast audio stream with encoding to DUT over RTSP control connection.

10. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

11. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
• Session := session

12. The DUT responds with **200 OK** message with parameters

  • Session

**Procedure Result:**

**PASS** –

  • DUT passes all assertions.

**FAIL** –

  • DUT did not send RTSP **200 OK** response for RTSP **DESCRIBE**, RTSP **SETUP**, RTSP **PLAY** and RTSP **TEARDOWN** requests.

  • RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

### A.23 Audio Backchannel Streaming over RTP-Multicast

**Name:** HelperBackchannelStreamingRTPMulticast

**Procedure Purpose:** Helper procedure to verify audio backchannel streaming over RTP-Multicast.

**Pre-requisite:** Audio Backchannel is supported by DUT. RTP-Multicast is supported by DUT.

**Input:** Uri for media streaming (**streamUri**). Expected media stream encoding (**encoding**). IP version (**ipVersion**).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes RTSP **DESCRIBE** request with "Require: www.onvif.org/ver20/backchannel" tag to **streamUri** address.

2. The DUT responds with **200 OK** message with parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

- Response header = \textit{responseHeader}
- SDP information = \textit{sdp}

3. If \textit{sdp} does not contain Media Type = audio and with a=sendonly and with rtpmap value corresponding to \textit{encoding}, FAIL the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in \textit{responseHeader} - header of response to DESCRIBE
   - in \textit{sdp} - SDP information
   - in \textit{streamUri} - Uri for media streaming

5. ONVIF Client invokes \texttt{RTSP SETUP} request with "\texttt{Require: www.onvif.org/ver20/backchannel}" tag to uri address, which corresponds to \textit{mediaType} media type (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP;multicast;client_port=port1-port2

6. The DUT responds with \texttt{200 OK} message with parameters
   - Transport
   - Session = \textit{session}

7. ONVIF Client invokes \texttt{RTSP PLAY} request with "\texttt{Require: www.onvif.org/ver20/backchannel}" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := \textit{session}

8. The DUT responds with \texttt{200 OK} message with parameters
   - Session
   - RTP-Info

9. ONVIF Client sends RTP \texttt{ipVersion} Multicast audio stream with \textit{encoding} to DUT over UDP.

10. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

11. ONVIF Client invokes \texttt{RTSP TEARDOWN} request with "\texttt{Require: www.onvif.org/ver20/backchannel}" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
12. The DUT responds with **200 OK** message with parameters

- **Session**

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP**, **RTSP PLAY** and **RTSP TEARDOWN** requests.

- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If **encoding** = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

### A.24 Removing Video Encoder Configuration, Audio Encoder Configuration and Metadata Configuration from Media Profile

**Name:** HelperRemoveAudioEncoderConfigAndMetadataConfigAndVideoConfigFromMediaProfile

**Procedure Purpose:** Helper Procedure to guarantee that Media Profile does not contain Video Encoder Configuration, Audio Encoder Configuration and Metadata Configuration.

**Pre-requisite:** Media2 Service is received from the DUT.

**Input:** Media Profile (**profile**)

**Returns:** None.

**Procedure:**

1. ONVIF Client invokes **GetProfiles** request with parameters

   - **Token := profile.@token**
• Type[0] := AudioEncoder
• Type[1] := Metadata
• Type[2] := VideoEncoder

2. The DUT responds with GetProfilesResponse message with parameters
   • Profiles list =: profileList

3. If profileList[0] contains Configuration.VideoEncoder or Configuration.AudioEncoder or Configuration.Metadata:
   3.1. ONVIF Client invokes RemoveConfiguration request with parameters
       • ProfileToken := profile1.@token
       • If profileList[0] contains Configuration.AudioEncoder:
         • Configuration[0].Type := AudioEncoder
         • Configuration[0].Token skipped
       • If profileList[0] contains Configuration.Metadata:
         • Configuration[1].Type := Metadata
         • Configuration[1].Token skipped
       • If profileList[0] contains Configuration.VideoEncoder:
         • Configuration[2].Type := VideoEncoder
         • Configuration[2].Token skipped
   3.2. The DUT responds with RemoveConfigurationResponse message.

Procedure Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT did not send GetProfilesResponse message.
   • DUT did not send RemoveConfigurationResponse message.
A.25 Get Media2 Service Capabilities

Name: HelperGetServiceCapabilities

Procedure Purpose: Helper procedure to get Media2 Service Capabilities from the DUT.

Pre-requisite: Media2 Service is received from the DUT.

Input: None

Returns: The service capabilities (cap).

Procedure:

1. ONVIF Client invokes GetServiceCapabilities request.

2. The DUT responds with GetServiceCapabilitiesResponse message with parameters
   • Capabilities =: cap

Procedure Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT did not send GetServiceCapabilitiesResponse message.

A.26 Web Socket Handshake

Name: HelperWebSocketHandshake

Procedure Purpose: Helper procedure to establish a WebSocket Connection.

Pre-requisite: WebSocket is supported by the DUT.

Input: Web Socket Uri (uri)

Returns: None.

Procedure:

1. ONVIF Client generates a Sec-WebSocket-Key value by following the procedure mentioned in Annex A.27 with the following input and output parameters
   • out webSocketKey - Sec-WebSocket-Key value.
2. If scheme component of *uri* is equal to **ws**: 

2.1. ONVIF Client invokes **HTTP GET** request to *uri* with parameters

- Upgrade =: "websocket"
- Connection =: "Upgrade"
- Sec-WebSocket-Key =: *webSocketKey*
- Sec-WebSocket-Protocol =: "rtsp.onvif.org"
- Sec-WebSocket-Version =: "13"

2.2. The DUT responds with **HTTP 101 Switching Protocols** message with parameters

- Upgrade =: *upgrade*
- Connection =: *connection*
- Sec-WebSocket-Accept =: *accept*
- Sec-WebSocket-Protocol =: *protocol*

3. If scheme component of *uri* is equal to **wss**: 

3.1. If the DUT does not support TLS Server, FAIL the test and skip other steps.

3.2. ONVIF Client invokes **GetNetworkProtocols** request.

3.3. The DUT responds with **GetNetworkProtocolsResponse** with parameters

- NetworkProtocols list =: *networkProtocolsList*

3.4. If *networkProtocolsList* contains item with Name = HTTPS and Enabled = true, go to step 3.6.

3.5. ONVIF Client configures HTTPS by following the procedure mentioned in Annex A.15.

3.6. ONVIF Client performs a TLS handshake by following the procedure mentioned in Annex A.28

3.7. ONVIF Client invokes **HTTPS GET** request to *uri* with parameters

- Upgrade =: "websocket"
- Connection =: "Upgrade"
- Sec-WebSocket-Key =: *webSocketKey*
3.8. The DUT responds with **HTTPS 101 Switching Protocols** message with parameters

- **Upgrade** =: *upgrade*
- **Connection** =: *connection*
- **Sec-WebSocket-Accept** =: *accept*
- **Sec-WebSocket-Protocol** =: *protocol*

4. If *upgrade* is not equal to "websocket", FAIL the test and skip other steps.

5. If *connection* is not equal to "Upgrade", FAIL the test and skip other steps.

6. If *accept* other than the base64-encoded SHA-1 of the concatenation of the *webSocketKey* (see RFC[6455] 4.1. Client Requirements), FAIL the test and skip other steps.

7. If *protocol* is not equal to "rtsp.onvif.org", FAIL the test and skip other steps.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send **HTTP 101**.
- DUT did not send **GetNetworkProtocolsResponse**.

### A.27 Sec-WebSocket-Key value generation

**Name:** HelperGenerateSecWebSocketKey

**Procedure Purpose:** Helper procedure to generate a Sec-WebSocket-Key value that is compliant to [RFC6455] and [RFC4648].

**Pre-requisite:** None.

**Input:** None.

**Returns:** Sec-WebSocket-Key value (*webSocketKey*)

**Procedure:**
A.28 Basic TLS handshake

**Name:** HelperBasicTLSHandshake

**Procedure Purpose:** Helper procedure to execute basic TLS handshake.

**Pre-requisite:** TLS is supported by the DUT as indicated by the TLSServerSupported capability. TLS is configured. HTTPS protocol is enabled.

**Input:** None.

**Returns:** None.

**Procedure:**

1. ONVIF Client invokes **ClientHello** with parameters

   - `ClientVersion := 3,1`
   - `Random number := ClientRandom[32]`, that is 4-byte number that consists of the client’s date and time plus a 28-byte randomly generated number
   - `CipherSuites := list of common CipherSuites used by TLS 1.0, SSL 2.0 and 3.0`
   - `Compression methods list := NONE`
   - `SessionID skipped`
   - `Extension: server_name := Server Name List`

2. The DUT TLS server responds with a **ServerHello** message with parameters

   - `Version := the highest version number supported by both sides`
   - `Random number := ServerRandom[32]`, that is 4-byte number that consists of the client’s date and time plus a 28-byte randomly generated number
   - `CipherSuite := the strongest cipher that both the client and server support`
   - `Compression method := NONE`
   - `Session ID := SessionID`

3. The DUT TLS server responds with **Certificate** message with parameters
- Certificate.KeyID = KeyID

4. The DUT TLS server responds with a ServerHelloDone message.

5. ONVIF Client invokes ClientKeyExchange message with parameters
   - Premaster Secret := PreMasterSecret encrypted with KeyID


8. ONVIF Client invokes ChangeCipherSpec message.

9. ONVIF Client invokes encrypted Finished message, containing a hash := hash1 and MAC := MAC1 over the previous handshake messages.

10. The DUT TLS server decrypts the client's Finished message and verify the hash and MAC.

11. The DUT TLS server responds its encrypted Finished message, containing a hash := hash2 and MAC := MAC2 over the previous handshake messages.

12. If hash1 is not equal to hash2, FAIL the test.

13. If MAC1 is not equal to MAC2, FAIL the test.

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- The DUT TLS server did not send ServerHello message.
- The DUT TLS server did not send Certificate message.
- The DUT TLS server did not send ServerHelloDone message.
- The DUT TLS server did not send ChangeCipherSpec message.
- The DUT TLS server did not send Finished message.
- The DUT TLS server sends Alert Message.
A.29 Media Streaming over WebSocket

Name: HelperStreamingOverWebSocket

Procedure Purpose: Helper procedure to verify media streaming over WebSocket.

Pre-requisite: WebSocket is supported by the DUT.

Input: Uri for media streaming (streamUri). Media type (mediaType). Expected media stream encoding (encoding).

Returns: None

Procedure:

1. ONVIF Client gets Web Socket Uri by following the procedure mentioned in Annex A.57 with the following output parameters
   • out uri - Web Socket Uri

2. ONVIF Client establishes a WebSocket Connection by following the procedure mentioned in Annex A.26 with the following input and output parameters
   • in uri - Web Socket Uri

3. ONVIF Client invokes RTSP DESCRIBE request to streamUri address over WebSocket.

4. The DUT responds with 200 OK message over WebSocket with parameters
   • Response header =: responseHeader
   • SDP information =: sdp

5. If sdp does not contain Media Type = mediaType with rtpmap value corresponding to encoding and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   • in responseHeader - header of response to DESCRIBE
   • in sdp - SDP information
   • in streamUri - Uri for media streaming

7. ONVIF Client invokes RTSP SETUP request over WebSocket to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters
8. The DUT responds with **200 OK** message over WebSocket with parameters
   - Transport
   - Session := session

9. ONVIF Client invokes **RTSP PLAY** request over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

10. The DUT responds with **200 OK** message over WebSocket with parameters
    - Session
    - RTP-Info

11. If DUT does not send *encoding* RTP media stream to ONVIF Client over RTSP control connection, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes **RTSP TEARDOWN** request over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

14. The DUT responds with **200 OK** message over WebSocket with parameters
    - Session

**Procedure Result:**

**PASS** –
- DUT passes all assertions.

**FAIL** –
- DUT did not send **RTSP 200 OK** response over WebSocket for **RTSP DESCRIBE**, **RTSP SETUP**, **RTSP PLAY** and **RTSP TEARDOWN** requests.
- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.
Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.30 Media2 Service – Media Profile Configuration for Metadata Streaming

Name: HelperConfigureMediaProfileForMetadataStreaming

Procedure Purpose: Helper procedure to configure Media Profile to contain Video Source Configuration and Metadata Configuration.

Pre-requisite: Media2 Service is received from the DUT.

Input: Transport protocol (transportProtocol), IP type (ipType) (optional parameter, IPv4 by default).

Returns: Media Profile (profile) containing Video Source Configuration, Metadata Configuration, PTZ Configuration (if found), and Analytics Configuration (if found). Uri for media streaming (streamUri), Metadata Configuration (metadataConfiguration).

Procedure:

1. ONVIF Client invokes GetProfiles request with parameters
   - Token skipped
   - Type := All

2. The DUT responds with GetProfilesResponse message with parameters
   - Profiles list =: profileList

3. For each Media Profile profile in profileList with both Configuration.VideoSource and Configuration.Metadata repeat the following steps:

3.1. ONVIF Client invokes GetMetadataConfigurationOptions request with parameters
   - ConfigurationToken := profile.Configuration.Metadata.@token
   - ProfileToken := profile.@token

3.2. DUT responds with GetMetadataConfigurationOptionsResponse message with parameters
   - Options =: metadataOptions
3.3. If metadataOptions does not contain Extension element or metadataOptions.Extension contains CompressionType with value equals to None, go to step 6.

4. For each Media Profile profile in profileList repeat the following steps:

4.1. ONVIF Client invokes GetVideoSourceConfigurations request with parameters
   - ConfigurationToken skipped
   - ProfileToken := profile.@token

4.2. The DUT responds with GetVideoSourceConfigurationsResponse with parameters
   - Configurations list := videoSourceConfList

4.3. For each Video Source Configuration videoSourceConfiguration in videoSourceConfList repeat the following steps:

4.3.1. ONVIF Client invokes AddConfiguration request with parameters
   - ProfileToken := profile.@token
   - Name skipped
   - Configuration[0].Type := VideoSource
   - Configuration[0].Token := videoSourceConfiguration.@token

4.3.2. The DUT responds with AddConfigurationResponse message.

4.3.3. ONVIF Client invokes GetMetadataConfigurations request with parameters
   - ConfigurationToken skipped
   - ProfileToken := profile.@token

4.3.4. The DUT responds with GetMetadataConfigurationsResponse with parameters
   - Configurations list := metadataConfList

4.3.5. For each Metadata Configuration metadataConf in metadataConfList repeat the following steps:

4.3.5.1. ONVIF Client invokes GetMetadataConfigurationOptions request with parameters
4.3.5.2. DUT responds with `GetMetadataConfigurationOptionsResponse` message with parameters

- Options := `metadataOptions`

4.3.5.3. If `metadataOptions` does not contain Extension element or `metadataOptions`.Extension contains CompressionType with value equals to None:

4.3.5.3.1. ONVIF Client invokes `AddConfiguration` request with parameters

- ProfileToken := `profile.@token`
- Name skipped
- Configuration[0].Type := Metadata
- Configuration[0].Token := `metadataConf.@token`

4.3.5.3.2. The DUT responds with `AddConfigurationResponse` message.

4.3.5.3.3. Go to step 6.

5. If cycle for step 4 ends without `metadataOptions` that does not contain Extension element or that contains `metadataOptions`.Extension with CompressionType with value equals to None, FAIL the test and skip other steps.

6. If the DUT supports PTZ Service and if `metadataOptions`.PTZStatusFilterOptions.PanTiltStatusSupported is equal to true or `metadataOptions`.PTZStatusFilterOptions.ZoomStatusSupported is equal to true or `metadataOptions`.PTZStatusFilterOptions.PanTiltPositionSupported is equal to true or `metadataOptions`.PTZStatusFilterOptions.ZoomPositionSupported is equal to true, ONVIF Client adds PTZ Configuration to a Media Profile by following the procedure mentioned in Annex A.31 with the following input and output parameters

- in `profile` - Media Profile
7. If The DUT supports Analytics, ONVIF Client adds Analytics Configuration to a Media Profile by following the procedure mentioned in Annex A.32 with the following input and output parameters

- in \textit{profile} - Media Profile

8. ONVIF Client sets the following:

- \textit{metadataConfiguration}.@token := \textit{profile}.Configurations.Metadata.@token
- \textit{metadataConfiguration}.Name := \textit{profile}.Configurations.Metadata.Name

- if \textit{mcOptions}.Extention.CompressionType skipped:
  - \textit{metadataConfiguration}.@CompressionType skipped

- If \textit{mcOptions}.Extention.CompressionType is not skipped:
  - \textit{metadataConfiguration}.@CompressionType := None

- if \textit{mcOptions}.PTZStatusFilterOptions.PanTiltStatusSupported is equal to false and \textit{mcOptions}.PTZStatusFilterOptions.ZoomStatusSupported is equal to false and \textit{mcOptions}.PTZStatusFilterOptions.PanTiltPositionSupported is equal to false and \textit{mcOptions}.PTZStatusFilterOptions.ZoomPositionSupported is equal to false:
  - \textit{metadataConfiguration}.PTZStatus skipped

- If at least on element value within \textit{mcOptions}.PTZStatusFilterOptions is equal to true:

- \textit{metadataConfiguration}.Events
  - \textit{metadataConfiguration}.Events.Filter skipped
  - \textit{metadataConfiguration}.Events.SubscriptionPolicy skipped
• If `profile.Configurations` contains Analytics:
  
  \[
  \text{metadataConfiguration.Analytics} := \text{true}
  \]

• If `profile.Configurations` does not contain Analytics:

  \[
  \text{metadataConfiguration.Analytics} \text{ skipped}
  \]

• If `transportProtocol` is not equal to `RtspMulticast`:

  \[
  \text{metadataConfiguration.Multicast} := \text{profile.Configurations.Metadata.Multicast}
  \]

• If `transportProtocol` is equal to `RtspMulticast`:

  • If `ipType` is equal to `IPv4`:

    \[
    \begin{align*}
    \text{metadataConfiguration.Multicast.Address.Type} & := \text{IPv4} \\
    \text{metadataConfiguration.Multicast.Address.IPv4Address} & := \text{multicast IPv4 address} \\
    \text{metadataConfiguration.Multicast.Address.IPv6Address} & \text{ skipped}
    \end{align*}
    \]

  • If `ipType` is equal to `IPv6`:

    \[
    \begin{align*}
    \text{metadataConfiguration.Multicast.Address.Type} & := \text{IPv6} \\
    \text{metadataConfiguration.Multicast.Address.IPv4Address} & \text{ skipped} \\
    \text{metadataConfiguration.Multicast.Address.IPv6Address} & := \text{multicast IPv6 address}
    \end{align*}
    \]

    \[
    \text{metadataConfiguration.Multicast.Port} := \text{port for multicast streaming}
    \]

    \[
    \text{metadataConfiguration.Multicast.TTL} := 1
    \]

    \[
    \text{metadataConfiguration.Multicast.AutoStart} := \text{false}
    \]

• `metadataConfiguration.SessionTimeout` := `profile.Configurations.Metadata.SessionTimeout`

9. ONVIF Client invokes `SetMetadataConfiguration` request with parameters

• `Configuration := metadataConfiguration`

• `Configuration.SessionTimeout := profile.Configurations.Metadata.SessionTimeout`

10. The DUT responds with `SetMetadataConfigurationResponse` message.

11. If `protocol` = `RtspMulticast`:
11.1. Set confTypeList := (VideoEncoder, AudioEncoder)

11.2. ONVIF Client removes Video Encoder Configuration and Audio Encoder from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters

- in confTypeList - list of configuration type to remove from Media Profile
- in profile - Media Profile to update

12. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

- in transportProtocol - Transport protocol
- in ipType - IP type
- in profile.@token - Media profile token
- out streamUri - Stream URI

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send GetProfilesResponse message.
- DUT did not send GetMetadataConfigurationOptionsResponse message.
- DUT did not send GetVideoSourceConfigurationsResponse message.
- DUT did not send AddConfigurationResponse message.
- DUT did not send GetMetadataConfigurationsResponse message.
- DUT did not send SetMetadataConfigurationResponse message.

A.31 Media2 Service – Add PTZ Configuration to Media Profile

Name: HelperAddPTZConfiguration

Procedure Purpose: Helper procedure to configure Media Profile to contain PTZ Configuration.
Pre-requisite: Media2 Service is received from the DUT. PTZ Service is received from the DUT.

Input: Media Profile (profile).

Returns: None.

Procedure:

1. If profile.Configurations does not contain PTZ:
   1.1. ONVIF Client invokes GetCompatibleConfigurations request with parameters
       • ProfileToken := profile.@token
   1.2. The DUT responds with GetCompatibleConfigurationsResponse message with parameters
       • PTZConfiguration list := ptzConfigurationList
   1.3. If ptzConfigurationList is empty, skip other steps.
   1.4. ONVIF Client invokes AddConfiguration request with parameters
       • ProfileToken := profile.@token
       • Name skipped
       • Configuration[0].Type := PTZ
       • Configuration[0].Token := ptzConfigurationList[0].@token
   1.5. The DUT responds with AddConfigurationResponse message.

Procedure Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT did not send GetCompatibleConfigurationsResponse message.
• DUT did not send AddConfigurationResponse message.

A.32 Media2 Service – Add Analytics Configuration to Media Profile

Name: HelperAddAnalyticsConfiguration
Procedure Purpose: Helper procedure to configure Media Profile to contain Analytics Configuration.

Pre-requisite: Media2 Service is received from the DUT. Analytics is supported by the DUT.

Input: Media Profile (profile)

Returns: None.

Procedure:

1. If profile.Configurations does not contain Analytics:
   1.1. ONVIF Client invokes GetAnalyticsConfigurations request with parameters
       • ConfigurationToken skipped
       • ProfileToken := profile.@token
   1.2. The DUT responds with GetAnalyticsConfigurationsResponse message with parameters
       • Configurations list =: acList
   1.3. If acList is not empty:
       1.3.1. ONVIF Client invokes AddConfiguration request with parameters
           • ProfileToken := profile.@token
           • Name skipped
           • Configuration[0].Type := Analytics
           • Configuration[0].Token := acList[0].@token
       1.3.2. The DUT responds with AddConfigurationResponse message.

Procedure Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT did not send GetAnalyticsConfigurationsResponse message.
• DUT did not send AddConfigurationResponse message.
A.33 Metadata Streaming over RTP-Unicast/UDP

**Name:** HelperMetadataStreamingRTPUnicastUDP

**Procedure Purpose:** Helper procedure to verify metadata streaming over RTP-Unicast/UDP.

**Pre-requisite:** None

**Input:** Uri for media streaming (streamUri), Metadata Configuration (metadataConfiguration).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes **RTSP DESCRIBE** request to streamUri address.

2. The DUT responds with **200 OK** message with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

3. If sdp does not contain Media Type = application and with ‘vnd.onvif.metadata’ encoding name in a=rtpmap and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

5. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to 'application' media type with 'vnd.onvif.metadata' encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP;unicast;client_port=port1-port2

6. The DUT responds with **200 OK** message with parameters
   - Transport
   - Session =: session

7. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
8. The DUT responds with **200 OK** message with parameters

   - Session
   - RTP-Info

9. ONVIF Client invokes **SetMetadataConfiguration** request with parameters

   - Configuration.@token := metadataConfiguration.@token
   - Configuration.Name := metadataConfiguration.Name
   - Configuration.UseCount := metadataConfiguration.UseCount
   - Configuration.@CompressionType := metadataConfiguration.CompressionType
   - Configuration.PTZStatus := metadataConfiguration.PTZStatus
   - Configuration.Events.Filter.TopicExpression := "tns1:Media/ConfigurationChanged"
   - Configuration.Events.Filter.MessageContent skipped
   - Configuration.Events.SubscriptionPolicy skipped
   - Configuration.Analytics := metadataConfiguration.Analytics
   - Configuration.Multicast.Address.Type := metadataConfiguration.Multicast.Address.Type
   - Configuration.Multicast.Address.IPv4Address := metadataConfiguration.Multicast.Address.IPv4Address
   - Configuration.Multicast.TTL := metadataConfiguration.Multicast.TTL
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

- Configuration.SessionTimeout := metadataConfiguration.SessionTimeout

10. The DUT responds with SetMetadataConfigurationResponse message.

11. If DUT does not send Metadata RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes RTSP TEARDOWN request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

14. The DUT responds with 200 OK message with parameters
   - Session

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.
- RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

A.34 Metadata Streaming over RTP-Unicast/RTSP/HTTP/TCP

Name: HelperMetadataStreamingRTPUnicastRTSPHTTPTCP

Procedure Purpose: Helper procedure to verify metadata streaming over RTP-Unicast/RTSP/ HTTP/TCP.

Pre-requisite: None
**Input:** Uri for media streaming (streamUri), Metadata Configuration (metadataConfiguration).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes **HTTP GET** request to streamUri address to establish DUT to ONVIF Client connection for RTP data transfer (connection1).

2. ONVIF Client invokes **HTTP POST** request to streamUri address to establish ONVIF Client to DUT connection for RTSP control requests (connection2).

3. ONVIF Client invokes **RTSP DESCRIBE** request to streamUri address converted to rtsp address on connection2.

4. The DUT responds with **200 OK** message with parameters on connection1
   - Response header =: responseHeader
   - SDP information =: sdp

5. If sdp does not contain Media Type = application and with ‘vnd.onvif.metadata’ encoding name in a=rtpmap and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

7. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to ‘application’ media type with ‘vnd.onvif.metadata’ encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message on connection1 with parameters
   - Transport
   - Session =: session

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
10. The DUT responds with **200 OK** message on *connection1* with parameters

- Session
- RTP-Info

11. ONVIF Client invokes **SetMetadataConfiguration** request with parameters

- Configuration.@token := *metadataConfiguration*.@token
- Configuration.Name := *metadataConfiguration*.Name
- Configuration.UseCount := *metadataConfiguration*.UseCount
- Configuration.@CompressionType := *metadataConfiguration*.CompressionType
- Configuration.PTZStatus := *metadataConfiguration*.PTZStatus
- Configuration.Events.Filter.TopicExpression := "tns1:Media/ConfigurationChanged"
- Configuration.Events.Filter.MessageContent skipped
- Configuration.Events.SubscriptionPolicy skipped
- Configuration.Analytics := *metadataConfiguration*.Analytics
- Configuration.Multicast.Address.Type := *metadataConfiguration*.Multicast.Address.Type
- Configuration.Multicast.Address.IPv4Address := *metadataConfiguration*.Multicast.Address.IPv4Address
- Configuration.Multicast.Address.IPv6Address := *metadataConfiguration*.Multicast.Address.IPv6Address
- Configuration.Multicast.Port := *metadataConfiguration*.Multicast.Port
- Configuration.Multicast.TTL := *metadataConfiguration*.Multicast.TTL
12. The DUT responds with `SetMetadataConfigurationResponse` message.

13. If DUT does not send Metadata RTP media stream to ONVIF Client over `connection1`, FAIL the test and skip other steps.

14. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

15. ONVIF Client invokes `RTSP TEARDOWN` request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on `connection2`, with parameters

   - `Session := session`

16. ONVIF Client closes `connection2`.

17. The DUT responds with **HTTP 200 OK** message on `connection1` and closes `connection1`.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP** and **RTSP PLAY** requests.

- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

### A.35 Metadata Streaming over RTP/RTSP/TCP

**Name:** HelperMetadataStreamingRTPRTSPTCP

**Procedure Purpose:** Helper procedure to verify metadata streaming over RTP/RTSP/TCP.

**Pre-requisite:** None

**Input:** Uri for media streaming (`streamUri`), Metadata Configuration (`metadataConfiguration`).

**Returns:** None
Procedure:

1. ONVIF Client invokes **RTSP DESCRIBE** request to *streamUri* address.

2. The DUT responds with **200 OK** message with parameters
   - Response header =: *responseHeader*
   - SDP information =: *sdp*

3. If *sdp* does not contain Media Type = application and with 'vnd.onvif.metadata' encoding name in a=rtpmap and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in *responseHeader* - header of response to DESCRIBE
   - in *sdp* - SDP information
   - in *streamUri* - Uri for media streaming

5. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to 'application' media type with 'vnd.onvif.metadata' encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP/TCP;unicast;interleaved=0-1

6. The DUT responds with **200 OK** message with parameters
   - Transport
   - Session =: *session*

7. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := *session*

8. The DUT responds with **200 OK** message with parameters
   - Session
   - RTP-Info

9. ONVIF Client invokes **SetMetadataConfiguration** request with parameters
   - Configuration.@token := *metadataConfiguration.@token*
10. The DUT responds with **SetMetadataConfigurationResponse** message.

11. If DUT does not send Metadata RTP media stream to ONVIF Client over RTSP control connection, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes **RTSP TEARDOWN** request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

14. The DUT responds with 200 OK message with parameters

- Session

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

- RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

A.36 Metadata Streaming over RTP-Unicast/UDP

Name: HelperMetadataStreamingRTPMulticastUDP

Procedure Purpose: Helper procedure to verify metadata streaming over RTP-Multicast/UDP.

Pre-requisite: None

Input: Uri for media streaming (streamUri), Expected media stream encoding (encoding), IP version (ipVersion), Metadata Configuration (metadataConfiguration).

Returns: None

Procedure:

1. ONVIF Client invokes RTSP DESCRIBE request to streamUri address.

2. The DUT responds with 200 OK message with parameters

   - Response header =: responseHeader
3. If \textit{sdp} does not contain \texttt{Media Type = application} and with \texttt{'vnd.onvif.metadata'} encoding name in \texttt{a=rtpmap} and without session attribute "sendonly" (\texttt{a=sendonly}), \textbf{FAIL} the test and skip other steps.

4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in \textit{Annex A.60} with the following input parameters
   - \texttt{in responseHeader} - header of response to DESCRIBE
   - \texttt{in sdp} - SDP information
   - \texttt{in streamUri} - Uri for media streaming

5. ONVIF Client invokes \texttt{RTSP SETUP} request to uri address, which corresponds to 'application' media type with \texttt{'vnd.onvif.metadata'} encoding name in \texttt{a=rtpmap} (see [RFC2326] for details), with parameters
   - \texttt{Transport := RTP/AVP;multicast;client_port=port1-port2}

6. The DUT responds with \texttt{200 OK} message with parameters
   - \texttt{Transport}
   - \texttt{Session := session}

7. ONVIF Client invokes \texttt{RTSP PLAY} request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - \texttt{Session := session}

8. The DUT responds with \texttt{200 OK} message with parameters
   - \texttt{Session}
   - \texttt{RTP-Info}

9. ONVIF Client invokes \texttt{SetMetadataConfiguration} request with parameters
   - \texttt{Configuration.@token := metadataConfiguration.@token}
   - \texttt{Configuration.Name := metadataConfiguration.Name}
   - \texttt{Configuration.UseCount := metadataConfiguration.UseCount}
   - \texttt{Configuration.@CompressionType := metadataConfiguration.CompressionType}
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

• Configuration.PTZStatus := metadataConfiguration.PTZStatus
• Configuration.PTZStatus.Status := metadataConfiguration.PTZStatus.Status
• Configuration.PTZStatus.Position := metadataConfiguration.PTZStatus.Position
• Configuration.Events.Filter.TopicExpression := "tns1:Media/ConfigurationChanged"
• Configuration.Events.Filter.MessageContent skipped
• Configuration.Events.SubscriptionPolicy skipped
• Configuration.Analytics := metadataConfiguration.Analytics
• Configuration.Multicast.Address.Type := metadataConfiguration.Multicast.Address.Type
• Configuration.Multicast.Address.IPv4Address := metadataConfiguration.Multicast.Address.IPv4Address
• Configuration.Multicast.Address.IPv6Address := metadataConfiguration.Multicast.Address.IPv6Address
• Configuration.Multicast.Port := metadataConfiguration.Multicast.Port
• Configuration.Multicast.TTL := metadataConfiguration.Multicast.TTL
• Configuration.SessionTimeout := metadataConfiguration.SessionTimeout

10. The DUT responds with SetMetadataConfigurationResponse message.

11. If DUT does not send Metadata RTP ipVersion multicast media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes RTSP TEARDOWN request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

   • Session := session

14. The DUT responds with 200 OK message with parameters

   • Session
Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

• RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

A.37 Provide CA certificate

Name: HelperCreateCACertificate

Procedure Purpose: Helper procedure to create an X.509 CA certificate.

Pre-requisite: None

Input: The subject (subject) of certificate(optional input parameter, could be skipped).

Returns: An X.509 CA certificate (CAcert) that is compliant to [RFC5280] and a corresponding private key (privateKey) and public key (publicKey).

Procedure:

1. ONVIF Client determines the length of the key to generate (out length) by following the procedure mentioned in Annex A.56.

2. If subject is skipped set:

   • subject := "CN=ONVIF TT,C=US"

3. ONVIF Client creates an X.509 self-signed CA certificate that is compliant to [RFC5280] and has the following properties:

   • version := v3

   • signature := sha1-WithRSAEncryption
• validity := not before 19700101000000Z and not after 99991231235959Z
• subject := subject
• length of the key to be used := length

Procedure Result:

PASS –
• None.

FAIL –
• None.

Note: ONVIF Client may return the same CA certificate in subsequent invocations of this procedure for the same subject.

A.38 Get Stream Uri

Name: HelperGetStreamUri

Procedure Purpose: Helper procedure to get stream URI from the DUT.

Pre-requisite: Media2 Service is received from the DUT.


Returns: Stream Uri (streamUri).

Procedure:

1. ONVIF Client invokes GetStreamUri request with parameters
   • Protocol := protocol
   • ProfileToken := token

2. The DUT responds with GetStreamUriResponse message with parameters
   • Uri =: streamUri

3. If streamUri is longer than 128 octets, FAIL the test and skip other steps.
4. If ipType skipped, set ipType := IPv4.

5. If streamUri ip type is not equal to ipType, FAIL the test and skip other steps.

6. If protocol = RtspOverHttp:
   6.1. If streamUri doesn't have the same port with the web service, FAIL the test and skip other steps.
   6.2. If streamUri doesn't have the same scheme with the web service ('http' or 'https'), FAIL the test and skip other steps.

7. If protocol != RtspOverHttp:
   7.1. If streamUri doesn't have scheme equal to 'rtsp', FAIL the test and skip other steps.

Procedure Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT did not send GetStreamUriResponse message.

A.39 Device Configuration for Video Streaming

Name: HelperDeviceConfigurationForVideoStreaming

Procedure Purpose: Helper procedure to configure Media profile, Video Encoder Configuration, and get stream URI from the DUT for video streaming.

Pre-requisite: Media2 Service is received from the DUT.

Input: Required video encoding (requiredVideoEncoding), Transport protocol (protocol), IP version (ipVersion).

Returns: Stream Uri (streamUri).

Procedure:

1. ONVIF Client selects a Media Profile with required video encoding support by following the procedure mentioned in Annex A.6 with the following input and output parameters
   • in requiredVideoEncoding - required video encoding
• out **profile** - Media Profile with Video Source Configuration and Video Encoder Configuration with the required video encoding

• out **vecOptions** - Video Encoder Configuration Options for the Media Profile

2. if **protocol** = RtspMulticast:

2.1. ONVIF Client removes Audio Encoder Configuration and Metadata Configuration from media profile by following the procedure mentioned in Annex A.9 with the following input and output parameters

• in **profile** - Media Profile

3. ONVIF Client invokes **SetVideoEncoderConfiguration** request with parameters

• **Configuration.@token** := **profile**.Configurations.VideoEncoder.@token

• **Configuration.Name** := **profile**.Configurations.VideoEncoder.Name

• **Configuration.UseCount** := **profile**.Configurations.VideoEncoder.UseCount

• **Configuration.@GovLength** := minimum item from **vecOptions**.@GovLengthRange list (or skipped if **vecOptions**.@GovLengthRange skipped)

• **Configuration.@Profile** := highest value from **vecOptions**.@ProfilesSupported list as the order is High/Extended/Main/Baseline (or skipped if **vecOptions**.@ProfilesSupported skipped)

• **Configuration.Encoding** := **requiredVideoEncoding**

• **Configuration.Resolution** := resolution closest to 640x480 from **vecOptions**.ResolutionsAvailable list

• if **vecOptions**.@FrameRatesSupported skipped and **profile**.Configurations.VideoEncoder.RateControl skipped:

• **Configuration.RateControl** skipped

• if **vecOptions**.@FrameRatesSupported or **profile**.Configurations.VideoEncoder.RateControl is not skipped:

• **Configuration.RateControl.@ConstantBitRate** := **vecOptions**.@ConstantBitRateSupported

• **Configuration.RateControl.FrameRateLimit** := value closest to 25 but greater than 1 from **vecOptions**.@FrameRatesSupported
list (or profile.Configurations.VideoEncoder.RateControl.FrameRateLimit if vecOptions.@FrameRatesSupported skipped)


- if protocol is not equal to RtspMulticast:


- if protocol = RtspMulticast and ipVersion = IPv4:

  - Configuration.Multicast.Address.Type := IPv4
  - Configuration.Multicast.Address.IPv4Address := multicast IPv4 address
  - Configuration.Multicast.Address.IPv6Address skipped
  - Configuration.Multicast.Port := port for multicast streaming
  - Configuration.Multicast.TTL := 1
  - Configuration.Multicast.AutoStart := false

- if protocol = RtspMulticast and ipVersion = IPv6:

  - Configuration.Multicast.Address.Type := IPv6
  - Configuration.Multicast.Address.IPv4Address skipped
  - Configuration.Multicast.Address.IPv6Address := multicast IPv6 address
  - Configuration.Multicast.Port := port for multicast streaming
  - Configuration.Multicast.TTL := 1
  - Configuration.Multicast.AutoStart := false

- Configuration.Quality := vecOptions.QualityRange.Min

4. The DUT responds with **SetVideoEncoderConfigurationResponse** message.

5. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

   - in protocol - Transport protocol
• in \textit{ipVersion} - IP Type

• in \textit{profile.@token} - Media profile token

• out \textit{uri} - Stream URI

\textbf{Procedure Result:}

\textbf{PASS} –

• DUT passes all assertions.

\textbf{FAIL} –

• DUT did not send \texttt{SetVideoEncoderConfigurationResponse} message.

\textbf{Note:} See Annex A.3 for Name and Token Parameters Length limitations.

\section*{A.40 Device Configuration for Audio Streaming}

\textbf{Name:} HelperDeviceConfigurationForAudioStreaming

\textbf{Procedure Purpose:} Helper procedure to configure Media profile, Audio Encoder Configuration, and get stream URI from the DUT for audio streaming.

\textbf{Pre-requisite:} Media2 Service is received from the DUT, Audio is supported by the DUT.

\textbf{Input:} Required audio encoding (\texttt{requiredAudioEncoding}), Transport protocol (\texttt{protocol}), IP version (\texttt{ipVersion}).

\textbf{Returns:} Stream Uri (\texttt{streamUri}), Audio encoding set in profile (\texttt{requiredAudioEncoding}).

\textbf{Procedure:}

1. ONVIF Client selects a Media Profile with required audio encoding support by following the procedure mentioned in Annex A.7 with the following input and output parameters

   • in \texttt{requiredAudioEncoding} - required audio encoding

   • out \texttt{profile} - Media Profile with Audio Source Configuration and Audio Encoder Configuration with the required audio encoding

   • out \texttt{aecOptions} - Audio Encoder Configuration Options for the Media Profile

2. if \texttt{protocol} = RtspMulticast:
2.1. ONVIF Client removes Video Encoder Configuration and Metadata Configuration from media profile by following the procedure mentioned in Annex A.8 with the following input and output parameters

- **in profile** - Media Profile

3. ONVIF Client invokes `SetAudioEncoderConfiguration` request with parameters

- **Configuration.@token** := `profile.Configurations.AudioEncoder.@token`
- **Configuration.Name** := `profile.Configurations.AudioEncoder.Name`
- **Configuration.UseCount** := `profile.Configurations.AudioEncoder.UseCount`
- **Configuration.Encoding** := `aecOptions.Encoding`
- **if protocol** is not equal to RtspMulticast:
  - **Configuration.Multicast** := `profile.Configurations.AudioEncoder.Multicast`
- **if protocol = RtspMulticast and ipVersion = IPv4**:
  - **Configuration.Multicast.Address.Type** := IPv4
  - **Configuration.Multicast.Address.IPv4Address** := multicast IPv4 address
  - **Configuration.Multicast.Address.IPv6Address** skipped
  - **Configuration.Multicast.Port** := port for multicast streaming
  - **Configuration.Multicast.TTL** := 1
  - **Configuration.Multicast.AutoStart** := false
- **if protocol = RtspMulticast and ipVersion = IPv6**:
  - **Configuration.Multicast.Address.Type** := IPv6
  - **Configuration.Multicast.Address.IPv4Address** skipped
  - **Configuration.Multicast.Address.IPv6Address** := multicast IPv6 address
  - **Configuration.Multicast.Port** := port for multicast streaming
  - **Configuration.Multicast.TTL** := 1
  - **Configuration.Multicast.AutoStart** := false

• Configuration.SampleRate := the nearest value to `profile.Configurations.AudioEncoder.SampleRate` from `aecOptions.SampleRateList.Items` list

4. The DUT responds with `SetAudioEncoderConfigurationResponse` message.

5. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

   • in `protocol` - Transport protocol
   • in `ipVersion` - IP Type
   • in `profile.@token` - Media profile token
   • out `uri` - Stream URI

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send `SetAudioEncoderConfigurationResponse` message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

A.41  Backchannel Streaming over WebSocket

Name: HelperBackchannelStreamingOverWebSocket

Procedure Purpose: Helper procedure to verify audio backchannel streaming over WebSocket.

Pre-requisite: WebSocket is supported by the DUT. Audio Backchannel is supported by DUT.

Input: Uri for audio backchannel streaming (`streamUri`). Expected media stream encoding (`encoding`).

Returns: None
Procedure:

1. ONVIF Client retrieves Media2 Service capabilities by following the procedure mentioned in Annex A.25 with the following input and output parameters
   - out cap - Media2 Service capabilities

2. Set uri := cap.StreamingCapabilities.RTSPWebSocketUri

3. If scheme component of uri is not equal to ws or wss, FAIL the test and skip other steps.

4. ONVIF Client establishes a WebSocket Connection by following the procedure mentioned in Annex A.26 with the following input and output parameters
   - in uri - Web Socket Uri

5. ONVIF Client invokes RTSP DESCRIBE request with "Require: www.onvif.org/ver20/backchannel" tag to streamUri address over WebSocket.

6. The DUT responds with 200 OK message over WebSocket with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

7. If sdp does not contain Media Type = audio and with a=sendonly and with rtppmap value corresponding to encoding, FAIL the test and skip other steps.

8. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming

9. ONVIF Client invokes RTSP SETUP request with "Require: www.onvif.org/ver20/backchannel" tag over WebSocket to uri address, which corresponds to audio backchannel media type (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP/TCP;unicast;interleaved=0-1

10. The DUT responds with 200 OK message over WebSocket with parameters
    - Transport
    - Session =: session
11. ONVIF Client invokes RTSP PLAY request with "Require: www.onvif.org/ver20/backchannel" tag over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

   • Session := session

12. The DUT responds with 200 OK message over WebSocket with parameters

   • Session
   • RTP-Info

13. ONVIF Client sends RTP Unicast audio stream with encoding to DUT over UDP.

14. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

15. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

   • Session := session

16. The DUT responds with 200 OK message over WebSocket with parameters

   • Session

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response over WebSocket for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

• RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 7.
A.42 Configuring HTTPS if Required

Name: HelperCheckAndConfigureHTTPS

Procedure Purpose: Helper Procedure to check and configure HTTPS using Security Configuration Service if required.

Pre-requisite: RTP/RTSP/HTTPS feature is supported by DUT. HTTPS is configured on the DUT, if TLS Server is not supported by DUT. Security Configuration Service is received from the DUT, if TLS Server is supported by DUT.

Input: None.

Returns: None.

Procedure:

1. ONVIF Client invokes GetNetworkProtocols request.

2. The DUT responds with GetNetworkProtocolsResponse with parameters

   - NetworkProtocols list =: networkProtocolsList

3. If networkProtocolsList contains item with Name = HTTPS and Enabled = true, return to the test and skip other procedure steps.

4. If the DUT does not support TLS Server, FAIL the test and skip other steps.

5. ONVIF Client configures HTTPS by following the procedure mentioned in Annex A.15.

Procedure Result:

PASS –
- DUT passes all assertions.

FAIL –
- DUT did not send GetNetworkProtocolsResponse message.

A.43 Removing Configurations from Media Profile

Name: HelperRemoveConfigurationsFromMediaProfile

Procedure Purpose: Helper Procedure to remove configurations from Media Profile.

Pre-requisite: Media2 Service is received from the DUT.
**Input:** Media Profile (profile). List of configuration type to remove from profile (confTypeList).

**Returns:** None.

**Procedure:**

1. ONVIF Client invokes `GetProfiles` request with parameters
   - Token := profile.@token
   - Type[0] := All

2. The DUT responds with `GetProfilesResponse` message with parameters
   - Profiles list =: profileList

3. If `profileList[0]` contains at least one Configuration with type equals to configuration type from `confTypeList`:
   3.1. ONVIF Client invokes `RemoveConfiguration` request with parameters
       - ProfileToken := profile.@token
       - If `profileList[0]` contains Configuration.VideoSource and `confTypeList` contains VideoSource:
         - Configuration[0].Type := VideoSource
         - Configuration[0].Token skipped
       - If `profileList[0]` contains Configuration.VideoEncoder and `confTypeList` contains VideoEncoder:
         - Configuration[1].Type := VideoEncoder
         - Configuration[1].Token skipped
       - If `profileList[0]` contains Configuration.AudioSource and `confTypeList` contains AudioSource:
         - Configuration[2].Type := AudioSource
         - Configuration[2].Token skipped
       - If `profileList[0]` contains Configuration.AudioEncoder and `confTypeList` contains AudioEncoder:
         - Configuration[3].Type := AudioEncoder
• Configuration[3].Token skipped

• If profileList[0] contains Configuration.AudioOutput and confTypeList contains AudioOutput:
  • Configuration[4].Type := AudioOutput
  • Configuration[4].Token skipped

• If profileList[0] contains Configuration.AudioDecoder and confTypeList contains AudioDecoder:
  • Configuration[5].Type := AudioDecoder
  • Configuration[5].Token skipped

• If profileList[0] contains Configuration.Metadata and confTypeList contains Metadata:
  • Configuration[6].Type := Metadata
  • Configuration[6].Token skipped

• If profileList[0] contains Configuration.Analytics and confTypeList contains Analytics:
  • Configuration[7].Type := Analytics
  • Configuration[7].Token skipped

• If profileList[0] contains Configuration.PTZ and confTypeList contains PTZ:
  • Configuration[8].Type := PTZ
  • Configuration[8].Token skipped

3.2. The DUT responds with RemoveConfigurationResponse message.

Procedure Result:

PASS –
  • DUT passes all assertions.

FAIL –
  • DUT did not send GetProfilesResponse message.
  • DUT did not send RemoveConfigurationResponse message.
A.44 Device Configuration for Audio Streaming using Media Profile that contains only Audio Configurations

Name: HelperDeviceConfigurationForAudioStreamingUsingOnlyAudioInProfile

Procedure Purpose: Helper procedure to configure Media profile that contains only Audio Source and Audio Encoder configurations, to configure Audio Encoder Configuration, and get stream URI from the DUT for audio streaming.

Pre-requisite: Media2 Service is received from the DUT, Audio is supported by the DUT.

Input: Required audio encoding (requiredAudioEncoding), Transport protocol (protocol), IP version (ipVersion).

Returns: Stream Uri (streamUri).

Procedure:

1. ONVIF Client selects a Media Profile with required audio encoding support by following the procedure mentioned in Annex A.7 with the following input and output parameters
   - in requiredAudioEncoding - required audio encoding
   - out profile - Media Profile with Audio Source Configuration and Audio Encoder Configuration with the required audio encoding
   - out aecOptions - Audio Encoder Configuration Options for the Media Profile

2. ONVIF Client invokes SetAudioEncoderConfiguration request with parameters
   - Configuration.@token := profile.Configurations.AudioEncoder.@token
   - Configuration.Encoding := requiredAudioEncoding
   - if protocol is not equal to RtspMulticast:
   - if protocol = RtspMulticast and ipVersion = IPv4:
     - Configuration.Multicast.Address.Type := IPv4
     - Configuration.Multicast.Address.IPv4Address := multicast IPv4 address
• Configuration.Multicast.Address.IPv6Address skipped

• Configuration.Multicast.Port := port for multicast streaming

• Configuration.Multicast.TTL := 1

• Configuration.Multicast.AutoStart := false

• if protocol = RtspMulticast and ipVersion = IPv6:

• Configuration.Multicast.Address.Type := IPv6

• Configuration.Multicast.Address.IPv4Address skipped

• Configuration.Multicast.Address.IPv6Address := multicast IPv6 address

• Configuration.Multicast.Port := port for multicast streaming

• Configuration.Multicast.TTL := 1

• Configuration.Multicast.AutoStart := false


• Configuration.SampleRate := the nearest value to profile.Configurations.AudioEncoder.SampleRate from aecOptions.SampleRateList.Items list

3. The DUT responds with SetAudioEncoderConfigurationResponse message.

4. Set confTypeList := (VideoSource, VideoEncoder, AudioOutput, AudioDecoder, Metadata, Analytics, PTZ)

5. ONVIF Client removes all configurations except AudioSource and AudioEncoder from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters

• in confTypeList - list of configuration type to remove from Media Profile

• in profile - Media Profile to update

6. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

• in protocol - Transport protocol
Procedure Result:

PASS –
• DUT passes all assertions.

FAIL –
• DUT did not send `SetAudioEncoderConfigurationResponse` message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

A.45 Device Configuration for Video and Audio Streaming

Name: HelperDeviceConfigurationForVideoAndAudioStreaming

Procedure Purpose: Helper procedure to configure Media profile, Video Encoder Configuration, Audio Encoder Configuration, and get stream URI from the DUT for video and audio streaming.

Pre-requisite: Media2 Service is received from the DUT.

Input: Required audio encoding (`requiredAudioEncoding`), Transport protocol (`protocol`), IP version (`ipVersion`).

Returns: Stream Uri (`streamUri`). Media profile with required configurations (`profile`).

Procedure:

1. ONVIF Client invokes `GetProfiles` request with parameters
   • Token skipped
   • Type[0] := All

2. The DUT responds with `GetProfilesResponse` message with parameters
   • Profiles list := `profileList`

3. For each Media Profile `profile` in `profileList` with not empty Configuration.VideoSource, Configuration.VideoEncoder, Configuration.AudioSource, and Configuration.AudioEncoder repeat the following steps:
   3.1. If `profile.Configuration.VideoEncoder` = H264 or H265
3.1.1. ONVIF Client invokes `GetAudioEncoderConfigurationOptions` request with parameters

- ConfigurationToken := profile.Configuration.AudioEncoder.@token
- ProfileToken := profile.@token

3.1.2. DUT responds with `GetAudioEncoderConfigurationOptionsResponse` message with parameters

- Options list := optionsList

3.1.3. If `requiredAudioEncoding` = AAC:

3.1.3.1. If `optionsList` list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

3.1.3.1.1. Set `aecOptions` := item with Encoding = "MP4A-LATM" from `optionsList` list if exists, otherwise item with Encoding = "MPEG4-GENERIC".

3.1.4. If `requiredAudioEncoding` != AAC:

3.1.4.1. If `optionsList` list contains item with Encoding = `requiredAudioEncoding`:

3.1.4.1.1. Set `aecOptions` := item with Encoding = `requiredAudioEncoding` from `optionsList` list.

3.1.5. If `aecOptions` != NULL

3.1.5.1. ONVIF Client sets audio encoder configuration by following the procedure mentioned in Annex A.62 with the following input and output parameters

- in profile - Media profile
- in aecOptions - audio encoder configuration options
- in protocol - Transport protocol
- in ipVersion - IP Type

3.1.5.2. ONVIF Client invokes `GetVideoEncoderConfigurationOptions` request with parameters
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

3.1.5.3. DUT responds with 
GetVideoEncoderConfigurationOptionsResponse message with parameters

- Options list = optionsList

3.1.5.4. Set vecOptions := item with Encoding = profile.Configuration.VideoEncoder.Encoding from optionsList list.

3.1.5.5. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.61 with the following input and output parameters

- in profile - Media profile
- in vecOptions - video encoder configuration options
- in protocol - Transport protocol
- in ipVersion - IP Type

3.1.5.6. Go to step 10.

4. Set profile = profileList[0].

5. Set confTypeList := (configurations that are contained in profile profile)

6. ONVIF Client removes all configurations from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters

- in confTypeList - list of configuration type to remove from Media Profile
- in profile - Media Profile to update

7. ONVIF Client invokes GetVideoSourceConfigurations request with parameters

- ConfigurationToken skipped
- ProfileToken := profile.@token

8. The DUT responds with GetVideoSourceConfigurationsResponse with parameters

- Configurations list = videoSourceConfList
9. For each Video Source Configuration `videoSourceConfiguration` in `videoSourceConfList` repeat the following steps:

9.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := `profile.@token`
- Name skipped
- Configuration[0].Type := VideoSource
- Configuration[0].Token := `videoSourceConfiguration.@token`

9.2. The DUT responds with **AddConfigurationResponse** message.

9.3. ONVIF Client invokes **GetVideoEncoderConfigurations** request with parameters

- ConfigurationToken skipped
- ProfileToken := `profile.@token`

9.4. The DUT responds with **GetVideoEncoderConfigurationsResponse** with parameters

- Configurations list =: `videoEncoderConfList`

9.5. For each Video Encoder Configuration `videoEncoderConfiguration` in `videoEncoderConfList` repeat the following steps:

9.5.1. ONVIF Client invokes **GetVideoEncoderConfigurationOptions** request with parameters

- ConfigurationToken := `videoEncoderConfiguration.@token`
- ProfileToken := `profile.@token`

9.5.2. DUT responds with **GetVideoEncoderConfigurationOptionsResponse** message with parameters

- Options list =: `optionsList`

9.5.3. If `optionsList` list contains item with Encoding = H264 or H265:

9.5.3.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := `profile.@token`
• Name skipped

• Configuration[0].Type := VideoEncoder

• Configuration[0].Token := videoEncoderConfiguration.@token

9.5.3.2. The DUT responds with AddConfigurationResponse message.

9.5.3.3. Set vecOptions := item with Encoding = H264 from optionsList list if present, otherwise item with Encoding = H265.

9.5.3.4. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.61 with the following input and output parameters

• in profile - Media profile

• in vecOptions - video encoder configuration options

• in protocol - Transport protocol

• in ipVersion - IP Type

9.5.3.5. ONVIF Client tries to add AudioSource Configuration and AudioEncoder Configuration with required audio encoding support to the Media Profile by following the procedure mentioned in Annex A.46 with the following input and output parameters

• in requiredAudioEncoding - required audio encoding

• in profile - Media profile

• out (optional) aecOptions - Audio Encoder Configuration Options for the Media Profile

9.5.3.6. If aecOptions != NULL

9.5.3.6.1. ONVIF Client sets audio encoder configuration by following the procedure mentioned in Annex A.62 with the following input and output parameters
9.5.3.6. Go to step 10.

9.5.3.7. ONVIF Client invokes `RemoveConfiguration` request with parameters

- `ProfileToken = profile.@token`
- `Configuration[0].Type = VideoEncoder`
- Configuration[0].Token skipped

9.5.3.8. The DUT responds with `RemoveConfigurationResponse` message.

10. If step 9 ends with `aecOptions = NULL`, fail the test, restore DUT settings, and skip other steps.

11. If `protocol = RtspMulticast`:

   11.1. Set `confTypeList := (Metadata)`

   11.2. ONVIF Client removes Metadata Configuration from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters

   - in `confTypeList` - list of configuration type to remove from Media Profile
   - in `profile` - Media Profile to update

12. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

   - in `protocol` - Transport protocol
   - in `ipVersion` - IP Type
   - in `profile.@token` - Media profile token
• out uri - Stream URI

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send SetVideoEncoderConfigurationResponse message.
• DUT did not send SetAudioEncoderConfigurationResponse message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

A.46 Media2 Service – Adding AudioSource and AudioEncoder with Specified Audio Encoder Value to Media Profile

Name: HelperAddAudioConfigurationsWithSpecificEncoderToMediaProfile

Procedure Purpose: Helper procedure to add AudioSource Configuration and AudioEncoder Configuration with required audio encoding to the Media Profile if corresponding AudioEncoder Configuration found.

Pre-requisite: Media2 Service is received from the DUT. Audio is supported by DUT.

Input: Required audio encoding (requiredAudioEncoding). Media Profile (profile)

Returns: Audio Encoder Configuration Options for the Media Profile (aecOptions) (optional, returned in case profile was configured with audio).

Procedure:

1. ONVIF Client invokes GetAudioSourceConfigurations request with parameters
   • ConfigurationToken skipped
   • ProfileToken := profile.@token

2. The DUT responds with GetAudioSourceConfigurationsResponse with parameters
   • Configurations list =: audioSourceConfList

3. For each Audio Source Configuration audioSourceConfiguration in audioSourceConfList repeat the following steps:
   3.1. ONVIF Client invokes AddConfiguration request with parameters
3.2. The DUT responds with **AddConfigurationResponse** message.

3.3. ONVIF Client invokes **GetAudioEncoderConfigurations** request with parameters

   - ConfigurationToken skipped
   - ProfileToken := `profile.@token`

3.4. The DUT responds with **GetAudioEncoderConfigurationsResponse** with parameters

   - Configurations list =: `audioEncoderConfList`

3.5. For each Audio Encoder Configuration `audioEncoderConfiguration` in `audioEncoderConfList` repeat the following steps:

3.5.1. ONVIF Client invokes **GetAudioEncoderConfigurationOptions** request with parameters

   - ConfigurationToken := `audioEncoderConfiguration.@token`
   - ProfileToken := `profile.@token`

3.5.2. DUT responds with **GetAudioEncoderConfigurationOptionsResponse** message with parameters

   - Options list =: `optionsList`

3.5.3. If `requiredAudioEncoding` = AAC:

3.5.3.1. If `optionsList` list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

3.5.3.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

   - ProfileToken := `profile.@token`
• Name skipped

• Configuration[0].Type := AudioEncoder

• Configuration[0].Token := audioEncoderConfiguration.@token

3.5.3.1.2. The DUT responds with AddConfigurationResponse message.

3.5.3.1.3. Set aecOptions := item with Encoding = "MP4ALATM" from optionsList list if exists, otherwise item with Encoding = "MPEG4 GENERIC".

3.5.3.1.4. Skip other steps in procedure.

3.5.4. If requiredAudioEncoding != AAC:

3.5.4.1. If optionsList list contains item with Encoding = requiredAudioEncoding:

3.5.4.1.1. ONVIF Client invokes AddConfiguration request with parameters

• ProfileToken := profile.@token

• Name skipped

• Configuration[0].Type := AudioEncoder

• Configuration[0].Token := audioEncoderConfiguration.@token

3.5.4.1.2. The DUT responds with AddConfigurationResponse message.

3.5.4.1.3. Set aecOptions := item with Encoding = requiredAudioEncoding from optionsList list.

3.5.4.1.4. Skip other steps in procedure.

3.6. ONVIF Client invokes RemoveConfiguration request with parameters

• ProfileToken = profile.@token

• Configuration[0].Type = AudioSource
• Configuration[0].Token skipped

3.7. The DUT responds with RemoveConfigurationResponse message.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send GetAudioEncoderConfigurationOptionsResponse message.
• DUT did not send GetAudioSourceConfigurationsResponse message.
• DUT did not send AddConfigurationResponse message.
• DUT did not send GetAudioEncoderConfigurationsResponse message.
• DUT did not send RemoveConfigurationResponse message.

A.47 RTSP Authentication Check

Name: HelperRTSPAuthenticationCheck

Procedure Purpose: Helper procedure to check that DUT uses Digest authentication type for RTSP.

Pre-requisite: Real-time Streaming is supported by DUT.

Input: None.

Returns: None.

Procedure:

1. If Device supports Profile T according to feature definition results:
   1.1. If DUT does not send RTSP 401 Unauthorized message to any RTSP anonymous request, FAIL the test and skip other steps.
   1.2. If RTSP 401 Unauthorized message does not have WWW-Authenticate: Digest header, FAIL the test and skip other steps.

Procedure Result:

PASS –

• DUT passes all assertions.
FAIL –

- DUT did not send response message to RTSP request.

A.48 Metadata Streaming over RTP-Unicast/RTSP/HTTPS/TCP

**Name:** HelperMetadataStreamingRTPUnicastRTSPHTTPSTCP

**Procedure Purpose:** Helper procedure to verify metadata streaming over RTP-Unicast/RTSP/HTTP/TCP.

**Pre-requisite:** HTTPS is configured on the DUT.

**Input:** Uri for media streaming (streamUri), Metadata Configuration (metadataConfiguration).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes **HTTP GET** request to streamUri address to establish DUT to ONVIF Client secured connection for RTP data transfer (connection1).

2. ONVIF Client invokes **HTTP POST** request to streamUri address to establish ONVIF Client to DUT secured connection for RTSP control requests (connection2).

3. ONVIF Client invokes **RTSP DESCRIBE** request to streamUri address converted to rtsp address on connection2.

4. The DUT responds with **200 OK** message with parameters on connection1
   - Response header =: responseHeader
   - SDP information =: sdp

5. If sdp does not contain Media Type = application and with ‘vnd.onvif.metadata’ encoding name in a=rtpmap and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming
7. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to 'application' media type with 'vnd.onvif.metadata' encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message on *connection1* with parameters
   - Transport
   - Session =: *session*

9. ONVIF Client invokes **RTSP PLAY** request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on *connection2*, with parameters
   - Session := *session*

10. The DUT responds with **200 OK** message on *connection1* with parameters
    - Session
    - RTP-Info

11. ONVIF Client invokes **SetMetadataConfiguration** request with parameters
    - Configuration.@token := *metadataConfiguration.@token*
    - Configuration.Name := *metadataConfiguration.Name*
    - Configuration.UseCount := *metadataConfiguration.UseCount*
    - Configuration.@CompressionType := *metadataConfiguration.CompressionType*
    - Configuration.PTZStatus := *metadataConfiguration.PTZStatus*
    - Configuration.PTZStatus.Status := *metadataConfiguration.PTZStatus.Status*
    - Configuration.Events.Filter.TopicExpression := "tns1:Media/ConfigurationChanged"
    - Configuration.Events.Filter.MessageContent skipped
    - Configuration.Events.SubscriptionPolicy skipped
    - Configuration.Analytics := *metadataConfiguration.Analytics*
12. The DUT responds with SetMetadataConfigurationResponse message.

13. If DUT does not send Metadata RTP media stream to ONVIF Client over connection1, FAIL the test and skip other steps.

14. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

15. ONVIF Client invokes RTSP TEARDOWN request to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters

   - Session := session

16. ONVIF Client closes connection2.

17. The DUT responds with HTTP 200 OK message on connection1 and closes connection1.

Procedure Result:

PASS –

   - DUT passes all assertions.

FAIL –

   - DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP and RTSP PLAY requests.
   - RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.
A.49 Metadata Streaming over WebSocket

Name: HelperMetadataStreamingWebSocket

Procedure Purpose: Helper procedure to verify metadata streaming over WebSocket.

Pre-requisite: WebSocket is supported by the DUT.

Input: Uri for media streaming (streamUri), Metadata Configuration (metadataConfiguration).

Returns: None

Procedure:

1. ONVIF Client retrieves Media2 Service capabilities by following the procedure mentioned in Annex A.25 with the following input and output parameters
   - out cap - Media2 Service capabilities

2. Set uri := cap.StreamingCapabilities.RTSPWebSocketUri

3. If scheme component of uri is not equal to ws or wss, FAIL the test and skip other steps.

4. ONVIF Client establishes a WebSocket Connection by following the procedure mentioned in Annex A.26 with the following input and output parameters
   - in uri - Web Socket Uri

5. ONVIF Client invokes RTSP DESCRIBE request to streamUri address over WebSocket.

6. The DUT responds with 200 OK message over WebSocket with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

7. If sdp does not contain Media Type = application and with 'vnd.onvif.metadata' encoding name in a=rtpmap and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

8. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
   - in sdp - SDP information
   - in streamUri - Uri for media streaming
9. ONVIF Client invokes **RTSP SETUP** request over WebSocket to uri address, which corresponds to 'application' media type with 'vnd.onvif.metadata' encoding name in a=rtpmap (see [RFC2326] for details), with parameters
   - Transport := RTP/AVP;unicast;client_port=port1-port2

10. The DUT responds with **200 OK** message over WebSocket with parameters
    - Transport
    - Session =: session

11. ONVIF Client invokes **RTSP PLAY** request over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    - Session := session

12. The DUT responds with **200 OK** message over WebSocket with parameters
    - Session
    - RTP-Info

13. ONVIF Client invokes **SetMetadataConfiguration** request with parameters
    - Configuration.@token := metadataConfiguration.@token
    - Configuration.Name := metadataConfiguration.Name
    - Configuration.UseCount := metadataConfiguration.UseCount
    - Configuration.@CompressionType := metadataConfiguration.CompressionType
    - Configuration.PTZStatus := metadataConfiguration.PTZStatus
    - Configuration.Events.Filter.TopicExpression := "tns1:Media/ConfigurationChanged"
    - Configuration.Events.Filter.MessageContent skipped
    - Configuration.Events.SubscriptionPolicy skipped
    - Configuration.Analytics := metadataConfiguration.Analytics
ONVIF RT Streaming (Media2) Device Test Spec Version 23.06

- Configuration.Multicast.Address.Type := metadataConfiguration.Multicast.Address.Type
- Configuration.Multicast.Address.IPv4Address := metadataConfiguration.Multicast.Address.IPv4Address
- Configuration.Multicast.TTL := metadataConfiguration.Multicast.TTL
- Configuration.SessionTimeout := metadataConfiguration.SessionTimeout

14. The DUT responds with SetMetadataConfigurationResponse message.

15. If DUT does not send Metadata RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

16. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

17. ONVIF Client invokes RTSP TEARDOWN request over WebSocket to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   - Session := session

18. The DUT responds with 200 OK message over WebSocket with parameters
   - Session

Procedure Result:

PASS –
   - DUT passes all assertions.

FAIL –
   - DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.
   - RTSP Session is terminated by DUT during media streaming.

Note: See Annex A.1 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.
A.50 Remove all non-fixed Media Profiles and remove all configurations from fixed Media Profiles

Name: HelperMediaProfilesCleanUp

Procedure Purpose: Helper procedure, which removes all non-fixed Media Profiles and removes all configurations from fixed Media Profiles.

Pre-requisite: Media2 Service is supported by the DUT.

Input: Media Profiles List (profileList).

Returns: None.

Procedure:

1. For each Media Profile profile1 in profileList repeat the following steps:

   1.1. If profile1.@fixed = true:

      1.1.1. ONVIF Client invokes RemoveConfiguration request with parameters

             • ProfileToken := profile1.@token
             • Configuration[0].Type := All
             • Configuration[0].Token skipped

      1.1.2. The DUT responds with RemoveConfigurationResponse message.

   1.2. If profile1.@fixed = false or skipped:

      1.2.1. ONVIF Client invokes DeleteProfile request with parameters

             • Token := profile1.@token

      1.2.2. The DUT responds with DeleteProfileResponse message.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send DeleteProfileResponse message.
• DUT did not send RemoveConfigurationResponse message.

A.51 Get Video Source Configurations List

Name: HelperGetVideoSourceConfigurationsList

Procedure Purpose: Helper procedure to retrieve Video Source Configurations List.

Pre-requisite: Media2 Service is received from the DUT.

Input: None.

Returns: Video Source Configurations list (videoSourceConfList).

Procedure:

1. ONVIF Client invokes GetVideoSourceConfigurations request with parameters
   • ConfigurationToken skipped
   • ProfileToken skipped
2. The DUT responds with GetVideoSourceConfigurationsResponse with parameters
   • Configurations list =: videoSourceConfList
3. If videoSourceConfList is empty, FAIL the test.

Procedure Result:

PASS –
   • DUT passes all assertions.

FAIL –
   • DUT did not send GetVideoSourceConfigurationsResponse message.

A.52 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration

Name: HelperFindGuaranteedProfiles4

Procedure Purpose: Helper procedure, which tries to create new Media Profiles to reach number of guaranteed encoder instances without changing already configured profiles.

Pre-requisite: Media2 Service is supported by the DUT. Profile T is supported by the DUT.

**Returns:** List of configured Media Profiles (configuredProfilesList).

**Procedure:**

1. Set configuredProfilesListForVSC1 := empty.

2. If number of items in configuredProfilesListForVSC1 is equal to info.Total, skip other steps of procedure.

3. ONVIF Client invokes CreateProfile request with parameters
   - Name := "testMedia"
   - Configuration list - skipped

4. DUT responds with CreateProfileResponse message with parameters
   - Token := clearProfileToken1

5. ONVIF Client invokes GetVideoSourceConfigurations request with parameters
   - ConfigurationToken skipped
   - ProfileToken := clearProfileToken1

6. The DUT responds with GetVideoSourceConfigurationsResponse with parameters
   - Configurations list =: videoSourceConfigurationList1

7. If videoSourceConfigurationList1 does not contain item with @token = videoSourceConfig.@token, FAIL the test and skip other steps.

8. ONVIF Client invokes AddConfiguration request with parameters
   - ProfileToken := clearProfileToken1
   - Name skipped
   - Configuration[0].Type := VideoSource
   - Configuration[0].Token := videoSourceConfig.@token

9. The DUT responds with AddConfigurationResponse message.

10. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters
    - ConfigurationToken skipped
11. The DUT responds with compatible video encoder configurations in GetVideoEncoderConfigurationsResponse with parameters

• Configurations list =: videoEncoderConfList1

12. If videoEncoderConfList1 is empty, FAIL the test and skip other steps.

13. If videoEncoderConfList1 contains only items that were used in Media Profiles from configuredProfilesList list, FAIL the test and skip other steps.

14. For each Video Encoder Configuration videoEncoderConf1 from videoEncoderConfList1, which was not used in Media Profiles from configuredProfilesList list repeat the following steps:

14.1. ONVIF Client invokes GetVideoEncoderConfigurationOptions request with parameters

• ConfigurationToken := videoEncoderConf1.@token
• ProfileToken := clearProfileToken1

14.2. DUT responds with GetVideoEncoderConfigurationOptionsResponse message with parameters

• Options list =: optionsList1

14.3. For each Video Encoder Options vecOptions1 in optionsList1 repeat the following steps:

14.3.1. If info.Codec list contains no items with Encoding = vecOptions1.Encoding or if info.Codec list contains an item with Encoding = vecOptions1.Encoding and number of Media Profiles with Configurations.VideoEncoder.Encoding = vecOptions1.Encoding in configuredProfilesListForVSC1 is less then info.Codec.Number for this vecOptions1.Encoding:

14.3.1.1. Set options1 := vecOptions1
14.3.1.2. Set videoEncoderConfToAdd1 := videoEncoderConf1
14.3.1.3. Go to step 16.

14.4. Go to the next Video Encoder Configuration for the step 14.

15. FAIL the test and skip other steps.
16. ONVIF Client invokes `SetVideoEncoderConfiguration` request with parameters

- Configuration.@token := `videoEncoderConfToAdd1.@token`
- Configuration.Name := `videoEncoderConfToAdd1.Name`
- Configuration.@GovLength skipped
- Configuration.@Profile skipped
- Configuration.Encoding := `options1.Encoding`
- Configuration.Resolution := `options1.ResolutionsAvailable[0]`
- Configuration.RateControl skipped
- Configuration.Multicast := `videoEncoderConfToAdd1.Multicast`
- Configuration.Quality := `options1.QualityRange.Min`

17. DUT responds with `SetVideoEncoderConfigurationResponse` message.

18. ONVIF Client invokes `AddConfiguration` request with parameters

- ProfileToken := `clearProfileToken1`
- Name skipped
- Configuration[0].Type := VideoEncoder
- Configuration[0].Token := `videoEncoderConfToAdd1.@token`

19. The DUT responds with `AddConfigurationResponse` message.

20. Add Media Profile with @token = `clearProfileToken1` to `configuredProfilesListForVSC` list.

21. Add Media Profile with @token = `clearProfileToken1` to `configuredProfilesList` list.

22. Go to step 2.

**Procedure Result:**

**PASS –**

- DUT passes all assertions.

**FAIL –**

- DUT did not send `AddConfigurationResponse` message.
- DUT did not send `SetVideoEncoderConfigurationResponse` message.
• DUT did not send `GetVideoEncoderConfigurationOptionsResponse` message.
• DUT did not send `GetVideoEncoderConfigurationsResponse` message.
• DUT did not send `GetVideoSourceConfigurationsResponse` message.
• DUT did not send `CreateProfileResponse` message.

A.53 Concurrent Video Streaming over RTP-Unicast/UDP

**Name:** HelperStreamingRTPUnicastUDPInstances

**Procedure Purpose:** Helper procedure to verify concurrent video streaming over RTP-Unicast/UDP for provided list of media profiles.

**Pre-requisite:** Media2 Service is received from the DUT.

**Input:** List of media profiles (`configuredProfilesList`). Expected media stream encoding (`encoding`).

**Returns:** None

**Procedure:**

1. For each Media Profile `profile1` from `configuredProfilesList` repeat the following steps:
   1.1. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters
      • in `RtspUnicast` - Transport protocol
      • in `profile1.@token` - Media profile token
      • out `streamUri1` - Stream URI
   1.2. ONVIF Client invokes `RTSP DESCRIBE` request to `streamUri1` address.
   1.3. The DUT responds with `200 OK` message with parameters
      • Response header =: `responseHeader`
      • SDP information =: `sdp`
   1.4. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
      • in `responseHeader` - header of response to DESCRIBE
      • in `sdp` - SDP information
• in streamUri - Uri for media streaming

1.5. ONVIF Client invokes RTSP SETUP request to uri address, which corresponds to mediaType media type (see [RFC2326] for details), with parameters

  • Transport := RTP/AVP;unicast;client_port=port1-port2

1.6. The DUT responds with 200 OK message with parameters

  • Transport

  • Session =: session

1.7. ONVIF Client invokes RTSP PLAY request to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters

  • Session := session

1.8. The DUT responds with 200 OK message with parameters

  • Session

  • RTP-Info

1.9. If DUT does not send profile1.Configurations.VideoEncoder.Encoding RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

1.10. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

2. For each media stream mediaStream which was invoked at step 1 repeat the following steps:

2.1. ONVIF Client invokes RTSP TEARDOWN request to uri address, which corresponds to aggregate control of mediaStream, with parameters

  • Session := session which corresponds to mediaStream

2.2. The DUT responds with 200 OK message with parameters

  • Session

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –
- DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.
- RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

### A.54 Concurrent Video Streaming over RTP-Unicast/UDP

**Name:** HelperNumberOfInstansesForEncoding

**Procedure Purpose:** Helper procedure to calculate number of instances for specified encoding.

**Pre-requisite:** None.

**Input:** Media stream encoding (encoding). Information about number of instances for Video Source Configuration (info).

**Returns:** Number of instances specified encoding (encodingInstances)

**Procedure:**

1. If info contains Codec.Encoding = encoding:
   1.2. Skip other steps in procedure.
2. Set encodingInstances := info.Total.

### A.55 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration for Specified Encoding

**Name:** HelperFindGuaranteedProfiles1

**Procedure Purpose:** Helper procedure, which tries to create new Media Profiles to reach number of guaranteed encoder instances without changing already configured profiles for specified encoding.

**Pre-requisite:** Media2 Service is supported by the DUT. Profile T is supported by the DUT.

Returns: List of configured Media Profiles (configuredProfilesList).

Procedure:

1. Set configuredProfilesListForVSC1 := empty.

2. If number of items in configuredProfilesListForVSC1 is equal to limitation for H.264 encoding from info which calculates by following the procedure mentioned in Annex A.54, skip other steps of procedure.

3. ONVIF Client invokes CreateProfile request with parameters
   - Name := "testMedia"
   - Configuration list - skipped

4. DUT responds with CreateProfileResponse message with parameters
   - Token := clearProfileToken1

5. ONVIF Client invokes GetVideoSourceConfigurations request with parameters
   - ConfigurationToken skipped
   - ProfileToken := clearProfileToken1

6. The DUT responds with GetVideoSourceConfigurationsResponse with parameters
   - Configurations list := videoSourceConfigurationList1

7. If videoSourceConfigurationList1 does not contain item with @token = videoSourceConfig.@token, FAIL the test and skip other steps.

8. ONVIF Client invokes AddConfiguration request with parameters
   - ProfileToken := clearProfileToken1
   - Name skipped
   - Configuration[0].Type := VideoSource
   - Configuration[0].Token := videoSourceConfig.@token

9. The DUT responds with AddConfigurationResponse message.

10. ONVIF Client invokes GetVideoEncoderConfigurations request with parameters
    - ConfigurationToken skipped
    - ProfileToken := clearProfileToken1
11. The DUT responds with compatible video encoder configurations in `GetVideoEncoderConfigurationsResponse` with parameters

- Configurations list =: `videoEncoderConfList1`

12. If `videoEncoderConfList1` is empty, FAIL the test and skip other steps.

13. If `videoEncoderConfList1` contains only items that were used in Media Profiles from `configuredProfilesList` list, FAIL the test and skip other steps.

14. For each Video Encoder Configuration `videoEncoderConf1` from `videoEncoderConfList1`, which was not used in Media Profiles from `configuredProfilesList` list repeat the following steps:

14.1. ONVIF Client invokes `GetVideoEncoderConfigurationOptions` request with parameters

   - ConfigurationToken := `videoEncoderConf1.@token`
   - ProfileToken := `clearProfileToken1`

14.2. DUT responds with `GetVideoEncoderConfigurationOptionsResponse` message with parameters

   - Options list =: `optionsList1`

14.3. For each Video Encoder Options `vecOptions1` in `optionsList1` repeat the following steps:

14.3.1. If `vecOptions1.Encoding = encoding`:

   14.3.1.1. Set `options1` := `vecOptions1`
   14.3.1.2. Set `videoEncoderConfToAdd1` := `videoEncoderConf1`
   14.3.1.3. Go to step 16.

14.4. Go to the next Video Encoder Configuration for the step 14.

15. FAIL the test and skip other steps.

16. ONVIF Client invokes `SetVideoEncoderConfiguration` request with parameters

   - Configuration.@token := `videoEncoderConfToAdd1.@token`
   - Configuration.Name := `videoEncoderConfToAdd1.Name`
   - Configuration.@GovLength skipped
• Configuration.@Profile skipped
• Configuration.Encoding := options1.Encoding
• Configuration.Resolution := options1.ResolutionsAvailable[0]
• Configuration.RateControl skipped
• Configuration.Multicast := videoEncoderConfToAdd1.Multicast
• Configuration.Quality := options1.QualityRange.Min

17. DUT responds with SetVideoEncoderConfigurationResponse message.

18. ONVIF Client invokes AddConfiguration request with parameters

  • ProfileToken := clearProfileToken1
  • Name skipped
  • Configuration[0].Type := VideoEncoder
  • Configuration[0].Token := videoEncoderConfToAdd.@token

19. The DUT responds with AddConfigurationResponse message.

20. Add Media Profile with @token = clearProfileToken1 to configuredProfilesListForVSC list.

21. Add Media Profile with @token = clearProfileToken1 to configuredProfilesList list.

22. Go to step 2.

Procedure Result:

PASS –

  • DUT passes all assertions.

FAIL –

  • DUT did not send AddConfigurationResponse message.
  • DUT did not send SetVideoEncoderConfigurationResponse message.
  • DUT did not send GetVideoEncoderConfigurationOptionsResponse message.
  • DUT did not send GetVideoEncoderConfigurationsResponse message.
  • DUT did not send GetVideoSourceConfigurationsResponse message.
  • DUT did not send CreateProfileResponse message.
A.56 Determine RSA key length

Name: HelperDetermineRSAKeyLength

Procedure Purpose: Helper procedure to determine the RSA key length to use during testing.

Pre-requisite: Security Configuration Service is received from the DUT. On-board RSA key pair generation is supported by the DUT as indicated by the RSAKeyPairGeneration capability.

Input: None

Returns: The smallest supported RSA key length (keyLength).

Procedure:

1. ONVIF Client gets the service capabilities (out cap) by the following the procedure mentioned in Annex A.25.
2. ONVIF Client loops through the supported Key length list (cap.RSAKeyLengths) and selects the smallest supported key length (keyLength).

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• No supported key length was found at step 2.

A.57 Get WebSocket URI

Name: HelperGetWebSocketURI

Procedure Purpose: Helper procedure to get WebSocket URI.

Pre-requisite: WebSocket is supported by the DUT.

Input: None.

Returns: WebSocket URI uri.

Procedure:

1. ONVIF Client retrieves Media2 Service capabilities by following the procedure mentioned in Annex A.25 with the following input and output parameters
   • out cap - Media2 Service capabilities
2. Set \( \text{uri} := \text{cap.StreamingCapabilities.RTSPWebSocketUri} \)

3. If hierarchical component (hier\_part in [rfc2396]) of \( \text{uri} \) is absolute path construction (abs\_path in [rfc2396]):

   3.1. ONVIF Client configures WebSocket URI (\( \text{uri} \)) with host and port based on \( \text{uri} \), URI of the DUT, and HTTP/HTTPS port of the DUT.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• None.

A.58  Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP

Name: HelperBackchannelStreamingRTPUnicastRTSPHTTPTCP

Procedure Purpose: Helper procedure to verify audio backchannel streaming over RTP-Unicast/RTSP/HTTP/TCP when streaming is sent by POST connection.

Pre-requisite: Audio Backchannel is supported by DUT.

Input: Uri for media streaming (\( \text{streamUri} \)). Expected audio stream encoding (\( \text{encoding} \)).

Returns: None

Procedure:

1. ONVIF Client invokes HTTP GET request to \( \text{streamUri} \) address to establish DUT to ONVIF Client connection for RTP data transfer (\( \text{connection1} \)).

2. ONVIF Client invokes HTTP POST request to \( \text{streamUri} \) address to establish ONVIF Client to DUT connection for RTSP control requests (\( \text{connection2} \)).

3. ONVIF Client invokes RTSP DESCRIBE request with "Require: www.onvif.org/ver20/backchannel" tag to \( \text{streamUri} \) address converted to rtsp address on \( \text{connection2} \).

4. The DUT responds with 200 OK message with parameters on \( \text{connection1} \)

   • Response header =: \( \text{responseHeader} \)

   • SDP information =: \( \text{sdp} \)
5. If sdп does not contain Media Type = audio and with a=sendonly and with rtpmap value corresponding to encoding, FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   • in responseHeader - header of response to DESCRIBE
   • in sdп - SDP information
   • in streamUri - Uri for media streaming

7. ONVIF Client invokes RTSP SETUP request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to mediaType media type (see [RFC2326] for details) on connection2, with parameters
   • Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

8. The DUT responds with 200 OK message on connection1 with parameters
   • Transport
   • Session =: session

9. ONVIF Client invokes RTSP PLAY request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
   • Session := session

10. The DUT responds with 200 OK message on connection1 with parameters
    • Session
    • RTP-Info

11. ONVIF Client sends audio stream with encoding to DUT over connection2.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
    • Session := session

14. ONVIF Client closes connection2.
15. The DUT responds with **HTTP 200 OK** message on *connection1* and closes *connection1*.

**Procedure Result:**

**PASS** –

- DUT passes all assertions.

**FAIL** –

- DUT did not send **RTSP 200 OK** response for **RTSP DESCRIBE**, **RTSP SETUP** and **RTSP PLAY** requests.
- RTSP Session is terminated by DUT during media streaming.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.59 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP

**Name:** HelperBackchannelStreamingRTPUnicastRTSPHTTPSTCP

**Procedure Purpose:** Helper procedure to verify audio backchannel streaming over RTP-Unicast/RTSP/HTTPS/TCP.

**Pre-requisite:** Audio Backchannel is supported by DUT. HTTPS is configured on the DUT.

**Input:** Uri for media streaming (*streamUri*). Expected audio stream encoding (*encoding*).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes **HTTP GET** request to *streamUri* address to establish DUT to ONVIF Client secured connection for RTP data transfer (*connection1*).

2. ONVIF Client invokes **HTTP POST** request to *streamUri* address to establish ONVIF Client to DUT secured connection for RTSP control requests (*connection2*).

3. ONVIF Client invokes **RTSP DESCRIBE** request with "Require: www.onvif.org/ver20/backchannel" tag to *streamUri* address converted to rtsp address on *connection2*.

4. The DUT responds with **200 OK** message with parameters on *connection1*
5. If \(sdp\) does not contain Media Type = audio and with a=sendonly and with rtpmap value corresponding to \(encoding\), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in \(responseHeader\) - header of response to DESCRIBE
   - in \(sdp\) - SDP information
   - in \(streamUri\) - Uri for media streaming

7. ONVIF Client invokes RTSP SETUP request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to mediaType media type (see [RFC2326] for details) on connection2, with parameters
   - Transport := RTP/AVP/TCP;unicast;client_port=port1-port2

8. The DUT responds with 200 OK message on connection1 with parameters
   - Transport
   - Session =: session

9. ONVIF Client invokes RTSP PLAY request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
   - Session := session

10. The DUT responds with 200 OK message on connection1 with parameters
    - Session
    - RTP-Info

11. ONVIF Client sends audio stream with \(encoding\) to DUT over connection2.

12. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

13. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details) on connection2, with parameters
• Session := session

14. ONVIF Client closes connection2.

15. The DUT responds with HTTP 200 OK message on connection1 and closes connection1.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send RTSP 200 OK response for RTSP DESCRIBE, RTSP SETUP and RTSP PLAY requests.

• RTSP Session is terminated by DUT during media streaming.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

Note: If encoding = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.60 Check of IP address type in response to RTSP DESCRIBE

Name: HelperIPAddressTypeInRTSP

Procedure Purpose: Helper procedure to check IP addresses types returned by DUT in response to RTSP DESCRIBE.

Pre-requisite: None.


Returns: None.

Procedure:

1. Set ipType := streamUri IP type.

2. For each Content-Base field in responseHeader (contentBase) that has absolute IP value:

   2.1. If contentBase IP value does not correspond to ipType, FAIL the test and skip other steps (see [RFC2326] for details).
3. For each **Content-Location** field in responseHeader (**contentLocation**) that has absolute IP value:

3.1. If **contentLocation** IP value does not correspond to **ipType**, FAIL the test and skip other steps (see [RFC2326] for details).

4. For each "**a=control**" attribute in **sdp** (**aControl**) that has absolute IP value:

4.1. If **aControl** IP value does not correspond to **ipType**, FAIL the test and skip other steps (see [RFC2326] for details).

5. If **ipType** = IPv4:

5.1. If **sdp** contains at least one origin field (**"o="**) with **addrtype** != "IP4", FAIL the test and skip other steps (see [RFC4566] for details).

5.2. If **sdp** contains at least one origin field (**"o="**) with IP type of **unicast-address** sub-field != IPv4 type, FAIL the test and skip other steps (see [RFC4566] for details).

5.3. If **sdp** contains at least one connection data field (**"c="**) with **addrtype** != "IP4", FAIL the test and skip other steps (see [RFC4566] for details).

5.4. If **sdp** contains at least one connection data field (**"c="**) with IP type of **connection address** sub-field != IPv4 type, FAIL the test and skip other steps (see [RFC4566] for details).

6. If **ipType** = IPv6:

6.1. If **sdp** contains at least one origin field (**"o="**) with **addrtype** != "IP6", FAIL the test and skip other steps (see [RFC4566] for details).

6.2. If **sdp** contains at least one origin field (**"o="**) with IP type of **unicast-address** sub-field != IPv6 type, FAIL the test and skip other steps (see [RFC4566] for details).

6.3. If **sdp** contains at least one connection data field (**"c="**) with **addrtype** != "IP6", FAIL the test and skip other steps (see [RFC4566] for details).

6.4. If **sdp** contains at least one connection data field (**"c="**) with IP type of **connection address** sub-field != IPv6 type, FAIL the test and skip other steps (see [RFC4566] for details).

**Procedure Result:**

**PASS** –

- DUT passes all assertions.
FAIL –

• None.

A.61 Set Video Encoder Configuration for Streaming

Name: HelperSetVEC

Procedure Purpose: Helper procedure to configure video encoder configuration for streaming.

Pre-requisite: Media2 is supported by the DUT.

Input: Media profile with video encoder configuration (profile), video encoder configuration options (vecOptions), Transport protocol (protocol), IP version (ipVersion).

Returns: None.

Procedure:

1. ONVIF Client invokes SetVideoEncoderConfiguration request with parameters

   • Configuration.@token := profile.Configurations.VideoEncoder.@token
   • Configuration.Name := profile.Configurations.VideoEncoder.Name
   • Configuration.@GovLength := minimum item from vecOptions.@GovLengthRange list (or skipped if vecOptions.@GovLengthRange skipped)
   • Configuration.@Profile := highest value from vecOptions.@ProfilesSupported list as the order is High/Extended/Main/Baseline (or skipped if vecOptions.@ProfilesSupported skipped)
   • Configuration.Encoding := vecOptions.Encoding
   • Configuration.Resolution := resolution closest to 640x480 from vecOptions.ResolutionsAvailable list
   • if vecOptions.@FrameRatesSupported skipped and profile.Configurations.VideoEncoder.RateControl skipped:

      • Configuration.RateControl skipped
   • if vecOptions.@FrameRatesSupported or profile.Configurations.VideoEncoder.RateControl is not skipped:
• Configuration.RateControl.@ConstantBitRate := vecOptions.@ConstantBitRateSupported

• Configuration.RateControl.FrameRateLimit := value closest to 25 but greater than 1 from vecOptions.@FrameRatesSupported list (or profile.Configurations.VideoEncoder.RateControl.FrameRateLimit if vecOptions.@FrameRatesSupported skipped)


• if protocol is not equal to RtspMulticast:
  • Configuration.Multicast := profile.Configurations.VideoEncoder.Multicast

• if protocol = RtspMulticast and ipVersion = IPv4:
  • Configuration.Multicast.Address.Type := IPv4
  • Configuration.Multicast.Address.IPv4Address := multicast IPv4 address
  • Configuration.Multicast.Address.IPv6Address skipped
  • Configuration.Multicast.Port := port for multicast streaming
  • Configuration.Multicast.TTL := 1
  • Configuration.Multicast.AutoStart := false

• if protocol = RtspMulticast and ipVersion = IPv6:
  • Configuration.Multicast.Address.Type := IPv6
  • Configuration.Multicast.Address.IPv4Address skipped
  • Configuration.Multicast.Address.IPv6Address := multicast IPv6 address
  • Configuration.Multicast.Port := port for multicast streaming
  • Configuration.Multicast.TTL := 1
  • Configuration.Multicast.AutoStart := false

• Configuration.Quality := vecOptions.QualityRange.Min

2. The DUT responds with `SetVideoEncoderConfigurationResponse` message.
Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send SetVideoEncoderConfigurationResponse message.

A.62 Set Audio Encoder Configuration for Streaming

Name: HelperSetAEC

Procedure Purpose: Helper procedure to configure audio encoder configuration for streaming.

Pre-requisite: Media2 is supported by the DUT. Media2 Audio is supported by the DUT.

Input: Media profile with audio encoder configuration (profile), audio encoder configuration options (aecOptions), Transport protocol (protocol), IP version (ipVersion).

Returns: None.

Procedure:

1. ONVIF Client invokes SetAudioEncoderConfiguration request with parameters

   • Configuration.@token := profile.Configurations.AudioEncoder.@token
   • Configuration.Name := profile.Configurations.AudioEncoder.Name
   • Configuration.UseCount := profile.Configurations.AudioEncoder.UseCount
   • Configuration.Encoding := aecOptions.Encoding
   • if protocol is not equal to RtspMulticast:
     • Configuration.Multicast := profile.Configurations.AudioEncoder.Multicast
   • if protocol = RtspMulticast and ipVersion = IPv4:
     • Configuration.Multicast.Address.Type := IPv4
     • Configuration.Multicast.Address.IPv4Address := multicast IPv4 address
     • Configuration.Multicast.Address.IPv6Address skipped
     • Configuration.Multicast.Port := port for multicast streaming
     • Configuration.Multicast.TTL := 1
• Configuration.Multicast.AutoStart := false

• if protocol = RtspMulticast and ipVersion = IPv6:

  • Configuration.Multicast.Address.Type := IPv6
  
  • Configuration.Multicast.Address.IPv4Address skipped
  
  • Configuration.Multicast.Address.IPv6Address := multicast IPv6 address
  
  • Configuration.Multicast.Port := port for multicast streaming
  
  • Configuration.Multicast.TTL := 1
  
  • Configuration.Multicast.AutoStart := false


  • Configuration.SampleRate := the nearest value to profile.Configurations.AudioEncoder.SampleRate from aecOptions.SampleRateList.Items list

2. The DUT responds with SetAudioEncoderConfigurationResponse message.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send SetAudioEncoderConfigurationResponse message.

A.63 Device Configuration for Audio Backchannel and Video and Audio Streaming

Name: HelperDeviceConfigurationForBackchannelAndVideoAndAudioStreaming

Procedure Purpose: Helper procedure to configure Media profile, Video Encoder Configuration, Audio Encoder Configuration, Audio Decoder Configuration, and get stream URI from the DUT for audio backchannel and video and audio streaming.

Pre-requisite: Media2 Service is received from the DUT. Video is supported by the DUT. Audio is supported by the DUT. Audio outputs is supported by the DUT.
Input: Required audio decoder (`requiredAudioDecoder`), Transport protocol (`protocol`), IP version (`ipVersion`).

Returns: Stream Uri (`streamUri`). Media profile with required configurations (`profile`).

Procedure:

1. ONVIF Client invokes `GetProfiles` request with parameters  
   - Token skipped  
   - Type[0] := All

2. The DUT responds with `GetProfilesResponse` message with parameters  
   - Profiles list =: `profileList`

3. Set `profile` = `profileList`[0].

4. Set `confTypeList` := (configurations that are contained in profile `profile`)

5. ONVIF Client removes all configurations from the Media Profile by following the procedure mentioned in Annex A.43 with the following input and output parameters  
   - in `confTypeList` - list of configuration type to remove from Media Profile  
   - in `profile` - Media Profile to update

6. ONVIF Client invokes `GetAudioOutputConfigurations` request with parameters  
   - ConfigurationToken skipped  
   - ProfileToken := `profile`.@token

7. The DUT responds with `GetAudioOutputConfigurationsResponse` with parameters  
   - Configurations list =: `audioOutputConfList`

8. For each Audio Output Configuration `audioOutputConfiguration` in `audioOutputConfList` repeat the following steps:

   8.1. ONVIF Client invokes `AddConfiguration` request with parameters  
       - ProfileToken := `profile`.@token  
       - Name skipped  
       - Configuration[0].Type := AudioOutput  
       - Configuration[0].Token := `audioOutputConfiguration`.@token
8.2. The DUT responds with **AddConfigurationResponse** message.

8.3. ONVIF Client invokes **GetAudioDecoderConfigurations** request with parameters

- ConfigurationToken skipped
- ProfileToken := `profile.@token`

8.4. The DUT responds with **GetAudioDecoderConfigurationsResponse** with parameters

- Configurations list := `audioDecoderConfList`

8.5. For each Audio Decoder Configuration `audioDecoderConfiguration` in `audioDecoderConfList` repeat the following steps:

8.5.1. ONVIF Client invokes **GetAudioDecoderConfigurationOptions** request with parameters

- ConfigurationToken := `audioDecoderConfiguration.@token`
- ProfileToken := `profile.@token`

8.5.2. DUT responds with **GetAudioDecoderConfigurationOptionsResponse** message with parameters

- Options list := `adcOptionsList`

8.5.3. If `requiredAudioDecoder` = AAC:

8.5.3.1. If `adcOptionsList` list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

8.5.3.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := `profile.@token`
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := `audioDecoderConfiguration.@token`
8.5.3.1.2. The DUT responds with AddConfigurationResponse message.

8.5.3.1.3. Set \textit{requiredAudioDecoder} := "MP4A-LATM" if \textit{adcOptionsList} contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

8.5.4. If \textit{requiredAudioDecoder} = !AAC:

8.5.4.1. If \textit{adcOptionsList} list contains item with Encoding = \textit{requiredAudioDecoding}:

8.5.4.1.1. ONVIF Client invokes AddConfiguration request with parameters

- ProfileToken := \textit{profile}.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := \textit{audioDecoderConfiguration}.@token

8.5.4.1.2. The DUT responds with AddConfigurationResponse message.

8.5.5. If Audio Decoder was added at step 8.5.3 or at step 8.5.4:

8.5.5.1. ONVIF Client tries to add VideoSource Configuration, VideoEncoder Configuration, AudioSource Configuration and AudioEncoder Configuration to the Media Profile by following the procedure mentioned in Annex A.64 with the following input and output parameters

- in \textit{profile} - Media profile
- out (optional) \textit{vecOptions} - Video Encoder Configuration Options for the Media Profile
- out (optional) \textit{aecOptions} - Audio Encoder Configuration Options for the Media Profile

8.5.5.2. If \textit{profile} was configured with Video and Audio configurations by step 8.5.5.1, go to step 10.
8.5.5.3. ONVIF Client invokes **RemoveConfiguration** request with parameters

- **ProfileToken =** `profile.@token`
- **Configuration[0].Type =** AudioDecoder
- **Configuration[0].Token skipped**

8.5.5.4. The DUT responds with **RemoveConfigurationResponse** message.

9. If `profile` was not configured with AudioOutput, AudioDecoder, VideoSource, VideoEncoder, AudioSource, and AudioEncoder at step 4.3, FAIL the test, restore DUT settings, and skip other steps.

10. ONVIF Client invokes **SetAudioOutputConfiguration** request with parameters

- **Configuration.@token :=** `profile.Configurations.AudioOutput.@token`
- **Configuration.Name :=** `profile.Configurations.AudioOutput.Name`
- **Configuration.UseCount :=** `profile.Configurations.AudioOutput.UseCount`
- **Configuration.SendPrimacy skipped**
- **Configuration.OutputLevel :=** `profile.Configurations.AudioOutput.OutputLevel`

11. DUT responds with **SetAudioOutputConfigurationResponse** message.

12. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.38 with the following input and output parameters

- **in protocol** - Transport protocol
- **in ipVersion** - IP Type
- **in profile.@token** - Media profile token
- **out uri** - Stream URI

**Procedure Result:**

**PASS –**
• DUT passes all assertions.

FAIL –

• DUT did not send `GetProfilesResponse` message.

• DUT did not send `GetAudioOutputConfigurationsResponse` message.

• DUT did not send `AddConfigurationResponse` message.

• DUT did not send `GetAudioDecoderConfigurationsResponse` message.

• DUT did not send `SetAudioOutputConfigurationResponse` message.

• DUT did not send `RemoveConfigurationResponse` message.

• DUT did not send `GetVideoSourceConfigurationsResponse` message.

• DUT did not send `GetVideoEncoderConfigurationsResponse` message.

• DUT did not send `GetAudioSourceConfigurationsResponse` message.

• DUT did not send `GetAudioEncoderConfigurationsResponse` message.

• DUT did not send `SetVideoEncoderConfigurationResponse` message.

• DUT did not send `SetAudioEncoderConfigurationResponse` message.

Note: See Annex A.3 for Name and Token Parameters Length limitations.

A.64 Media2 Service – Adding VideoSource, VideoEncoder, 
AudioSource and AudioEncoder configurations to Media Profile

**Name:** HelperAddVideoAndAudioConfigurationsToMediaProfile

**Procedure Purpose:** Helper procedure to add VideoSource Configuration, VideoEncoder 
Configuration, AudioSource Configuration and AudioEncoder Configuration to the Media Profile.

**Pre-requisite:** Media2 Service is received from the DUT. Video is supported by DUT. Audio is supported by DUT.

**Input:** Media Profile (`profile`)

**Returns:** Video Encoder Configuration Options for the Media Profile (`vecOptions`) (optional, 
returned in case profile was configured with video and audio). Audio Encoder Configuration Options 
for the Media Profile (`aecOptions`) (optional, returned in case profile was configured with video and audio).

**Procedure:**
1. ONVIF Client invokes **GetVideoSourceConfigurations** request with parameters

   - ConfigurationToken skipped
   - ProfileToken := profile.@token

2. The DUT responds with **GetVideoSourceConfigurationsResponse** with parameters

   - Configurations list =: videoSourceConfList

3. For each Video Source Configuration `videoSourceConfiguration` in `videoSourceConfList` repeat the following steps:

   3.1. ONVIF Client invokes **AddConfiguration** request with parameters

       - ProfileToken := profile.@token
       - Name skipped
       - Configuration[0].Type := VideoSource
       - Configuration[0].Token := videoSourceConfiguration.@token

   3.2. The DUT responds with **AddConfigurationResponse** message.

   3.3. ONVIF Client invokes **GetVideoEncoderConfigurations** request with parameters

       - ConfigurationToken skipped
       - ProfileToken := profile.@token

   3.4. The DUT responds with **GetVideoEncoderConfigurationsResponse** with parameters

       - Configurations list =: videoEncoderConfList

   3.5. For each Video Encoder Configuration `videoEncoderConfiguration` in `videoEncoderConfList` repeat the following steps:

      3.5.1. ONVIF Client invokes **GetVideoEncoderConfigurationOptions** request with parameters

          - ConfigurationToken := videoEncoderConfiguration.@token
          - ProfileToken := profile.@token

      3.5.2. DUT responds with **GetVideoEncoderConfigurationOptionsResponse** message with parameters
3.5.3. If `optionsList` list contains item with Encoding = H264 or H265:

3.5.3.1. ONVIF Client invokes `AddConfiguration` request with parameters

- ProfileToken := `profile.@token`
- Name skipped
- Configuration[0].Type := VideoEncoder
- Configuration[0].Token := `videoEncoderConfiguration.@token`

3.5.3.2. The DUT responds with `AddConfigurationResponse` message.

3.5.3.3. Set `vecOptions` := item with Encoding = H264 from `optionsList` list if present, otherwise item with Encoding = H265.

3.5.3.4. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.61 with the following input and output parameters

- in `profile` - Media profile
- in `vecOptions` - video encoder configuration options
- in `protocol` - Transport protocol
- in `ipVersion` - IP Type

3.5.3.5. ONVIF Client tries to add AudioSource Configuration and AudioEncoder Configuration to the Media Profile by following the procedure mentioned in Annex A.65 with the following input and output parameters

- in `profile` - Media profile
- out (optional) `aecOptions` - Audio Encoder Configuration Options for the Media Profile

3.5.3.6. If `aecOptions` != NULL

3.5.3.6.1. ONVIF Client sets audio encoder configuration by following the procedure mentioned in Annex A.62 with the following input and output parameters
• in profile - Media profile
• in aecOptions - audio encoder configuration options
• in protocol - Transport protocol
• in ipVersion - IP Type

3.5.3.6.2. Skip other steps.

3.5.3.7. ONVIF Client invokes RemoveConfiguration request with parameters

• ProfileToken = profile.@token
• Configuration[0].Type = VideoEncoder
• Configuration[0].Token skipped

3.5.3.8. The DUT responds with RemoveConfigurationResponse message.

3.6. ONVIF Client invokes RemoveConfiguration request with parameters

• ProfileToken = profile.@token
• Configuration[0].Type = VideoSource
• Configuration[0].Token skipped

3.7. The DUT responds with RemoveConfigurationResponse message.

Procedure Result:

PASS –

• DUT passes all assertions.

FAIL –

• DUT did not send GetAudioEncoderConfigurationOptionsResponse message.
• DUT did not send GetAudioSourceConfigurationsResponse message.
• DUT did not send AddConfigurationResponse message.
• DUT did not send GetAudioEncoderConfigurationsResponse message.
• DUT did not send RemoveConfigurationResponse message.
A.65 Media2 Service – Adding AudioSource and AudioEncoder to Media Profile

Name: HelperAddAudioConfigurationsToMediaProfile

Procedure Purpose: Helper procedure to add AudioSource Configuration and AudioEncoder Configuration to the Media Profile.

Pre-requisite: Media2 Service is received from the DUT. Audio is supported by DUT.

Input: Media Profile (profile)

Returns: Video Encoder Configuration Options for the Media Profile (vecOptions) (optional, returned in case profile was configured with audio). Audio Encoder Configuration Options for the Media Profile (aecOptions) (optional, returned in case profile was configured with audio).

Procedure:

1. ONVIF Client tries to add AudioSource Configuration and AudioEncoder Configuration with required audio encoding support to the Media Profile by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in PCMU - required audio encoding
   - in profile - Media profile
   - out (optional) aecOptions - Audio Encoder Configuration Options for the Media Profile

2. If aecOptions != NULL, skip other steps in procedure.

3. ONVIF Client tries to add AudioSource Configuration and AudioEncoder Configuration with required audio encoding support to the Media Profile by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in AAC - required audio encoding
   - in profile - Media profile
   - out (optional) aecOptions - Audio Encoder Configuration Options for the Media Profile

Procedure Result:

PASS –
   - DUT passes all assertions.

FAIL –
A.66 Audio Backchannel and Media Streaming over RTP-Unicast/UDP

**Name:** HelperBackchannelAndMediaStreamingRTPUnicastUDP

**Procedure Purpose:** Helper procedure to verify audio backchannel, video, and audio streaming over RTP-Unicast/UDP.

**Pre-requisite:** Audio Backchannel is supported by DUT. Audio is supported by DUT. Video is supported by DUT. Real-time streaming is supported by DUT.

**Input:** Uri for media streaming (streamUri). Audio backchannel stream encoding (audioBackchannelEncoding). Expected video stream encoding (videoEncoding). Expected audio stream encoding (audioEncoding).

**Returns:** None

**Procedure:**

1. ONVIF Client invokes RTSP DESCRIBE request with "Require: www.onvif.org/ver20/backchannel" tag to streamUri address.

2. The DUT responds with 200 OK message with parameters
   - Response header =: responseHeader
   - SDP information =: sdp

3. If sdp does not contain Media Type = audio and with a=sendonly and with rtpmap value corresponding to audioBackchannelEncoding, FAIL the test and skip other steps.

4. If sdp does not contain Media Type = video with rtpmap value corresponding to videoEncoding and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

5. If sdp does not contain Media Type = audio with rtpmap value corresponding to audioEncoding and without session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

6. ONVIF Client checks types of IP addresses returned in response to DESCRIBE by following the procedure mentioned in Annex A.60 with the following input parameters
   - in responseHeader - header of response to DESCRIBE
• in `sdp` - SDP information
• in `streamUri` - Uri for media streaming

7. ONVIF Client invokes **RTSP SETUP** request with "**Require: www.onvif.org/ver20/backchannel**" tag to uri address, which corresponds to audio backchannel media type (see [RFC2326] for details), with parameters
   • Transport := RTP/AVP;unicast;client_port=port1-port2

8. The DUT responds with **200 OK** message with parameters
   • Transport
   • Session =: `session`

9. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to video media type (see [RFC2326] for details), with parameters
   • Transport := RTP/AVP;unicast;client_port=port3-port4

10. The DUT responds with **200 OK** message with parameters
    • Transport
    • Session =: `session`

11. ONVIF Client invokes **RTSP SETUP** request to uri address, which corresponds to audio media type (see [RFC2326] for details), with parameters
    • Transport := RTP/AVP;unicast;client_port=port5-port6
    • The DUT responds with **200 OK** message with parameters
    • Transport
    • Session =: `session`

12. ONVIF Client invokes **RTSP PLAY** request with "**Require: www.onvif.org/ver20/backchannel**" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
    • Session := `session`

13. The DUT responds with **200 OK** message with parameters
    • Session
14. ONVIF Client sends RTP Unicast audio stream with `audioBackchannelEncoding` to DUT over UDP.

15. If DUT does not send `videoEncoding` RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

16. If DUT does not send `audioEncoding` RTP media stream to ONVIF Client over UDP, FAIL the test and skip other steps.

17. If DUT does not send valid RTCP packets, FAIL the test and skip other steps.

18. ONVIF Client invokes RTSP TEARDOWN request with "Require: www.onvif.org/ver20/backchannel" tag to uri address, which corresponds to aggregate control (see [RFC2326] for details), with parameters
   
   • Session := `session`

19. The DUT responds with **200 OK** message with parameters
   
   • Session

**Procedure Result:**

**PASS** –

• DUT passes all assertions.

**FAIL** –

• DUT did not send **RTSP 200 OK** response for RTSP DESCRIBE, RTSP SETUP, RTSP PLAY and RTSP TEARDOWN requests.

• RTSP Session is terminated by DUT during media streaming.

**Note:** See Annex A.1 for invalid RTP header definition.

**Note:** ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.47.

**Note:** If `audioBackchannelEncoding` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

**Note:** If `audioEncoding` = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.