ONVIF®

Real Time Streaming using Media2 Device Test Specification

Version 25.12

December 2025

REVISION HISTORY

Vers.	Date	Description
16.06	Apr, 2016	Original publication
16.07	Jun, 2016	Small changes based on feedback received.
16.07	Jul 8, 2016	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
16.07	Jul 28, 2016	Review comments implemented.
16.07	Aug 8, 2016	More comments and spelling errors.
17.01	Sep, 2016	Added the test cases for H.264, H.265, G.711, and AAC streaming over HTTPS: MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSPS/HTTP/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSPS/HTTP/TCP, IPv6) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)
17.01	Nov, 2016	Added the test cases for H.265: MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP) MEDIA2 SET SYNCHRONIZATION POINT – H.265 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv4) MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv6)
17.01	Nov, 2016	Test IDs were updated according #1253.
17.01	Jan 19, 2017	Test specification was converted to new format.

		HTTPS test cases were updated according comments to ticket #1168: MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSPS/HTTPS/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSPS/HTTPS/TCP, IPv6) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)
17.06	Feb 06, 2017	Multicast test cases were updated according to ticket #1297: MEDIA2 STREAMING - H.264 (RTSPMulticast, IPv4) MEDIA2 STREAMING - H.264 (RTP-Multicast,IPv6) MEDIA2 STREAMING - H.265 (RTSPMulticast, IPv4) MEDIA2 STREAMING - H.265 (RTP-Multicast,IPv6) MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv4) MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv6) MEDIA2 STREAMING – AAC (RTP-Multicast, IPv4) MEDIA2 STREAMING – AAC (RTP-Multicast, IPv6)
17.06	Feb 09, 2017	All Video Streaming test cases were updated according to ticket #1306. Annex A.6 Media2 Service Profile Configuration for Video Streaming was updated according to ticket #1306.
17.06	Feb 20, 2017	Audio backchannel test cases were added according to ticket #1164: BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv4) BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4) BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv4) BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv4) BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv4) BACKCHANNEL – G.711 (RTP-Multicast/UDP, IPv4) BACKCHANNEL – AAC (RTP-Multicast/UDP, IPv4) BACKCHANNEL – G.711 (RTP-Unicast/UDP, IPv6)

		BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) BACKCHANNEL – G.711 (RTP/RTSP/TCP, IPv6) BACKCHANNEL – AAC (RTP-Unicast/UDP, IPv6) BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) BACKCHANNEL – AAC (RTP/RTSP/TCP, IPv6) BACKCHANNEL – G.711 (RTP-Multicast/UDP, IPv6) BACKCHANNEL – AAC (RTP-Multicast/UDP, IPv6) Scope/Real Time Streaming section was updated to include audio backchannel streaming.
17.06	Mar 10, 2017	Metadata Streaming test cases were added according to ticket #1158: METADATA STREAMING (RTP-Unicast/UDP) METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP) METADATA STREAMING (RTP/RTSP/TCP) METADATA STREAMING - SET SYNCHRONIZATION POINT METADATA STREAMING (RTP-Unicast/UDP, IPv6) METADATA STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6) METADATA STREAMING (RTP/RTSP/TCP, IPv6) METADATA STREAMING (RTP-Multicast/UDP) METADATA STREAMING (RTP-Multicast/UDP, IPv6) Scope/Real Time Streaming section was updated to include metadata streaming.
17.06	Apr 24, 2017	Annex A.17 added and Annex A.39 updated to add more description.
17.06	Apr 27, 2017	Typo fixes according #1168.
17.06	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)
17.06	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)

		MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/WebSockets, IPv6) BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets) BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets) BACKCHANNEL – G.711 (RTP-Unicast/RTSP/WebSockets, IPv6) BACKCHANNEL – AAC (RTP-Unicast/RTSP/WebSockets, IPv6)
17.06	Jun 20, 2017	The following test cases and Annexes were changed according to #1315: MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP) MEDIA2 SET SYNCHRONIZATION POINT – H.264 MEDIA2 STREAMING – H.264 (RTP-Unicast/UDP, IPv6) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2 STREAMING – H.264 (RTP/RTSP/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP) MEDIA2 SET SYNCHRONIZATION POINT – H.265 MEDIA2 STREAMING – H.265 (RTP-Unicast/UDP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP, IPv6) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv4) MEDIA2 STREAMING – H.264 (RTP-Multicast, IPv6) MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv4) MEDIA2 STREAMING – H.265 (RTP-Multicast, IPv6) MEDIA2 STREAMING – G.711 (RTP-Unicast/UDP) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP)

		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) MEDIA2 STREAMING – AAC (RTP-Unicast/UDP) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2 STREAMING – AAC (RTP/RTSP/TCP) MEDIA2 STREAMING – AAC (RTP-Unicast/UDP, IPv6) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2 STREAMING – AAC (RTP/RTSP/TCP, IPv6) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – G.711 (RTP-Multicast, IPv4) 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:

		MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/UDP) MEDIA2_RTSS-5-1-1 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/UDP) Annex A.45 Removing Configurations from Media Profile Annex A.46 Device Configuration for Audio Streaming using Media Profile that contains only Audio Configurations Annex A.47 Device Configuration for Video and Audio Streaming Annex A.48 Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile The following Annexes were changed according to #1348: Annex A.10 Media Streaming over RTP-Unicast/UDP
17.12	Aug 31, 2017	The following Annex was added according to #1285: Annex A.49 RTSP Authentication Check
17.12	Oct 04, 2017	The following test cases were removed according to #1474: BACKCHANNEL – G.711 (RTP-Multicast/UDP, IPv4) BACKCHANNEL – G.711 (RTP-Multicast/UDP, IPv6) BACKCHANNEL – AAC (RTP-Multicast/UDP, IPv4) BACKCHANNEL – AAC (RTP-Multicast/UDP, IPv6)
17.12	Oct 13, 2017	Pre-Requisite of the following test cases and Annex were updated according to #1475: MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – H.264 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – H.265 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2 STREAMING – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2 STREAMING – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) Annex A.44 Configuring HTTPS if Required
17.12	Oct 19, 2017	The following test cases and Annexes were added according to #1348: MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2 AUDIO STREAMING – G.711 (RTP/RTSP/TCP)

		MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/UDP, IPv6) MEDIA2 AUDIO STREAMING – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2 AUDIO STREAMING – G.711 (RTP/RTSP/TCP, IPv6) MEDIA2 AUDIO STREAMING – AAC (RTP-Unicast/UDP) 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:

		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
17.12	Oct 30, 2017	The following test cases and Annexes were added according to #1501: BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) Annex A.50 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP
17.12	Oct 31, 2017	The following test cases and Annexes were added according to #1497: METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP) METADATA STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) Annex A.51 Metadata Streaming over RTP-Unicast/RTSP/HTTPS/TCP
17.12	Oct 31, 2017	The following test cases and Annexes were added according to #1498: METADATA STREAMING (RTP-Unicast/RTSP/WebSockets) METADATA STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6) Annex A.52 Metadata Streaming over WebSocket
17.12	Nov 29, 2017	The following test cases and Annexes were added according to #1409: MEDIA2_RTSS-1-1-23 VIDEO ENCODER INSTANCES MEDIA2_RTSS-1-1-24 VIDEO ENCODER INSTANCES - H.264 MEDIA2_RTSS-1-1-25 VIDEO ENCODER INSTANCES - H.265 Annex A.53 Remove all non-fixed Media Profiles and remove all configurations from fixed Media Profiles was removed Annex A.55 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration Annex A.54 Get Video Source Configurations List Annex A.56 Concurrent Video Streaming over RTP-Unicast/UDP Annex A.57 Concurrent Video Streaming over RTP-Unicast/UDP

		Annex A.58 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration for Specified Encoding
17.12	Nov 30, 2017	Annex A.41 Device Configuration for Video Streaming was updated according to #1536
18.06	Jan 10, 2018	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).
18.06	Jan 11, 2018	The following were updated according to #1555: Annex A.39 Get Stream Uri
18.06	Jan 24, 2018	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)

		MEDIA2_RTSS-2-2-7 MEDIA2 AUDIO STREAMING – AAC (RTP-Multicast, IPv4) (removed) MEDIA2_RTSS-2-2-8 MEDIA2 AUDIO STREAMING – AAC (RTP-Multicast, IPv6) (removed)
18.06	Jan 24, 2018	Annex A.6 Media2 Service Profile Configuration for Video Streaming was updated according to #1554.
18.06	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)
18.06	Mar 15, 2018	timeout1 variable was renamed to operationDelay variable The following were updated according to #1562: Annex A.15 Configuring HTTPS using Advanced Security (steps 1-3 were added)
18.06	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)
18.06	Apr 10, 2018	Annex A.48 RTSP Authentication Check was updated according to #1590.
18.06	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)
18.06	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)
18.06	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)
18.06	Jun 21, 2018	Reformatting document using new template
18.06	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.")

		Annex A.15 Configuring HTTPS using Advanced Security ("Advanced Security Service" was replaced with "Security Configuration Service" in many places)
18.12	Dec 21, 2018	Switching Hub description in 'Network Configuration for DUT' section was updated according to #1737
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)

		MEDIA2_RTSS-3-1-20 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 and step 6 changed) MEDIA2_RTSS-3-1-23 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) (step 3 and step 4 changed) MEDIA2_RTSS-3-1-24 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 and step 5 changed) MEDIA2_RTSS-3-1-26 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) (step 4 and step 5 changed) MEDIA2_RTSS-3-1-28 BACKCHANNEL STREAMING BY POST – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) (step 5 and step 6 changed) MEDIA2_RTSS-5-1-7 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP) (step 3 and step 6 changed, step 5 added) MEDIA2_RTSS-5-1-8 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP) (step 3 and step 6 changed, step 5 added) MEDIA2_RTSS-5-1-9 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP) (step 3 and step 6 changed, step 5 added) MEDIA2_RTSS-5-1-10 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP, IPv6) (step 4 and step 7 changed, step 6 added) MEDIA2_RTSS-5-1-11 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) (step 4 and step 7 changed, step 6 added) MEDIA2_RTSS-5-1-12 MEDIA2 STREAMING – H.26X/AAC (RTP/RTSP/TCP, IPv6) (step 4 and step 7 changed, step 6 added) MEDIA2_RTSS-5-2-3 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP) (step 3 and step 6 changed, step 5 added) MEDIA2_RTSS-5-2-4 MEDIA2 STREAMING – H.26X/AAC (RTP-Multicast/UDP, IPv6) (step 4 and step 7 changed, step 6 added)
19.06	Jun 07, 2019	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
19.12	Aug 30, 2019	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)

		MEDIA2_RTSS-4-1-5 METADATA STREAMING (RTP-Unicast/UDP, IPv6) (step 4 updated) MEDIA2_RTSS-4-1-6 METADATA STREAMING (RTP-Unicast/ RTSP/HTTP/TCP, IPv6) (step 4 updated) MEDIA2_RTSS-4-1-7 METADATA STREAMING (RTP/RTSP/TCP, IPv6) (step 4 updated) MEDIA2_RTSS-4-1-9 METADATA STREAMING (RTP-Unicast/ RTSP/HTTPS/TCP, IPv6) (step 5 updated) MEDIA2_RTSS-4-1-11 METADATA STREAMING (RTP-Unicast/ RTSP/WebSockets, IPv6) (step 4 updated) MEDIA2_RTSS-4-2-2 METADATA STREAMING (RTP-Multicast/ UDP, IPv6) (step 4 updated) MEDIA2_RTSS-1-1-4 MEDIA2 SET SYNCHRONIZATION POINT – H.264 (step 6 added) MEDIA2_RTSS-1-1-11 MEDIA2 SET SYNCHRONIZATION POINT – H.265 (step 6 added) MEDIA2_RTSS-4-1-4 METADATA STREAMING - SET SYNCHRONIZATION POINT (step 6 added) A.10 Media Streaming over RTP-Unicast/UDP (step 5 added) A.11 Media Streaming over RTP-Unicast/RTSP/HTTP/TCP (step 7 added) A.12 Media Streaming over RTP/RTSP/TCP (step 5 added) A.13 Media Streaming over RTP-Multicast (step 5 added) A.14 Media Streaming over RTP-Unicast/RTSP/HTTPS/TCP (step 6 added) A.21 Audio Backchannel streaming over RTP-Unicast/UDP (step 4 added) A.22 Audio Backchannel over RTP-Unicast/RTSP/HTTP/TCP (step 6 added) A.23 Audio Backchannel Streaming over RTP/RTSP/TCP (step 4 added) A.24 Audio Backchannel Streaming over RTP-Multicast (step 4 added) A.30 Media Streaming over WebSocket (step 6 added) A.34 Metadata Streaming over RTP-Unicast/UDP (step 4 added) A.35 Metadata Streaming over RTP-Unicast/RTSP/HTTP/TCP (step 6 added) A.36 Metadata Streaming over RTP/RTSP/TCP (step 4 added) A.37 Metadata Streaming over RTP-Unicast/UDP (step 4 added) A.42 Backchannel Streaming over WebSocket (step 8 added)

		A.49 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP (step 6 added) A.50 Metadata Streaming over RTP-Unicast/RTSP/HTTPS/TCP (step 6 added) A.51 Metadata Streaming over WebSocket (step 8 added) A.55 Concurrent Video Streaming over RTP-Unicast/UDP (step 1.4 added) A.60 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTP/TCP (step 6 added) A.61 Audio Backchannel by POST over RTP-Unicast/RTSP/HTTPS/TCP (step 6 added) A.40 Device Configuration for Video Streaming (step 5 updated) A.41 Device Configuration for Audio Streaming (step 5 updated) A.45 Device Configuration for Audio Streaming using Media Profile that contains only Audio Configurations (step 6 updated) A.46 Device Configuration for Video and Audio Streaming (step 10 updated) A.20 Media2 Service – Media Profile Configuration for Audio Backchannel Streaming (Input updated, step 7 updated) A.31 Media2 Service – Media Profile Configuration for Metadata Streaming (Input updated, step 8 and step 12 updated)
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)

		MEDIA2_RTSS-4-1-11 METADATA STREAMING (RTP-Unicast/ RTSP/WebSockets, IPv6) MEDIA2_RTSS-4-2-1 METADATA STREAMING (RTP-Multicast/ UDP) MEDIA2_RTSS-4-2-2 METADATA STREAMING (RTP-Multicast/ UDP, IPv6)
19.12	Nov 21, 2019	The following annexes were updated according to #1971: A.54 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration (Profile token parameter added into GetVideoEncoderConfigurationOptions request) A.57 Create New Media Profiles to Get Guaranteed Number of Media Profiles for Video Source Configuration for Specified Encoding (Profile token parameter added into GetVideoEncoderConfigurationOptions request)
20.12	Jul 31, 2020	The following annexes were changed according to #2072: A.46 Device Configuration for Video and Audio Streaming A.47 Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile
20.12	Sep 23, 2020	The following were added according to #2082: MEDIA2_RTSS-6-1-1 MEDIA2 STREAMING – G.711 BACKCHANNEL AND H.26X VIDEO AND G.711/AAC AUDIO (RTP-Unicast/UDP) A.65 Device Configuration for Audio Backchannel and Video and Audio Streaming A.66 Media2 Service – Adding VideoSource, VideoEncoder, AudioSource and AudioEncoder configurations to Media Profile A.67 Media2 Service – Adding AudioSource and AudioEncoder to Media Profile A.68 Audio Backchannel and Media Streaming over RTP-Unicast/ UDP
20.12	Sep 23, 2020	Annex A.47 was renamed in the scope of #2082: Old name: Media2 Service – Adding AudioSource and AudioEncoder configurations to Media Profile New name: Media2 Service – Adding AudioSource and AudioEncoder with Specified Audio Encoder Value to Media Profile
20.12	Nov 17, 2020	Annex A.48 RTSP Authentication Check was updated according to #2073
21.06	Apr 09, 2021	The following annexes were updated according to #2124: A.23 Turn on IPv6 network interface A.24 Restore Network Settings
21.06	May 26, 2021	The following test cases and annexes were removed according to #2215:

		MEDIA2_RTSS-3-1-2 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv4) MEDIA2_RTSS-3-1-5 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2_RTSS-3-1-8 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv4) MEDIA2_RTSS-3-1-11 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2_RTSS-3-1-17 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) MEDIA2_RTSS-3-1-18 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) MEDIA2_RTSS-3-1-19 BACKCHANNEL – G.711 (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2_RTSS-3-1-20 BACKCHANNEL – AAC (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) A.22 Audio Backchannel over RTP-Unicast/RTSP/HTTP/TCP A.49 Audio Backchannel over RTP-Unicast/RTSP/HTTPS/TCP
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)
24.12	Oct 20, 2024	The following test cases were added in the scope of #246 ticket: MEDIA2_RTSS-2-1-22 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/UDP) MEDIA2_RTSS-2-1-23 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2_RTSS-2-1-24 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2_RTSS-2-1-25 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/WebSockets) MEDIA2_RTSS-2-1-26 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/UDP, IPv6) MEDIA2_RTSS-2-1-27 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2_RTSS-2-1-28 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2_RTSS-2-1-29 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/WebSockets, IPv6) MEDIA2_RTSS-2-2-5 MEDIA2 AUDIO STREAMING – OPUS (RTP-Multicast, IPv4)

		MEDIA2_RTSS-2-2-6 MEDIA2 AUDIO STREAMING – OPUS (RTP-Multicast, IPv6)
24.12	Oct 20, 2024	The following test cases were added in the scope of #245 ticket: MEDIA2_RTSS-3-1-29 BACKCHANNEL – OPUS (RTP-Unicast/UDP, IPv4) MEDIA2_RTSS-3-1-30 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTP/TCP, IPv4) MEDIA2_RTSS-3-1-31 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv4) MEDIA2_RTSS-3-1-32 BACKCHANNEL – OPUS (RTP-Unicast/RTSP/WebSockets) MEDIA2_RTSS-3-1-33 BACKCHANNEL – OPUS (RTP-Unicast/UDP, IPv4) MEDIA2_RTSS-3-1-34 BACKCHANNEL – OPUS (RTP-Unicast/UDP, IPv6) MEDIA2_RTSS-3-1-35 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2_RTSS-3-1-36 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2_RTSS-3-1-37 BACKCHANNEL – OPUS (RTP-Unicast/RTSP/WebSockets, IPv6) MEDIA2_RTSS-3-1-38 BACKCHANNEL – OPUS (RTP/RTSP/TCP, IPv6) Copy/paste issue was fixed in WebSockets Audio Backchannel test cases
24.12	Oct 20, 2024	Video Source Configuration feature was added into Pre-Requisite of the following test cases in the scope of #242 ticket: 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) MEDIA2_RTSS-4-1-11 METADATA STREAMING (RTP-Unicast/ RTSP/WebSockets, IPv6) MEDIA2_RTSS-4-2-1 METADATA STREAMING (RTP-Multicast/ UDP) MEDIA2_RTSS-4-2-2 METADATA STREAMING (RTP-Multicast/ UDP, IPv6)
24.12	Dec 02, 2024	Requirement about DUT configuration with 0 rotation was added to the Pre-Requisite of all test cases involving video streaming in the scope of #270 ticket.
25.06	Dec 30, 2024	The following test and annexes were updated according #209: Annex HelperGetServiceCapabilities_AdvancedSecurity (new annex) Annex HelperConfigureHTTPS (input parameter for capabilities was added, step 4.1 was updated to use capabilities, step 6 was updated to use capabilities) Annex HelperCreateCACertificate (input parameter for capabilities was added, step 4 was updated to use capabilities) Annex HelperAddServerCertAssign_CACertificate (input parameter for capabilities was added, step 2 was added, steps 3 and 6 were updated to use selected algorithm, step 5 was updated to use capabilities) Annex HelperAddServerCertAssign_SSCertificate (input parameter for capabilities was added, step 1 was updated to use capabilities) Annex HelperCheckAndConfigureHTTPS (optional input parameter for capabilities was added, step 5 was added to get capabilities if needed, step 6 was updated to use capabilities) Annex HelperCreateCertificationPath_SelfSigned (new annex) Annex HelperCreateSelfSignedCertificate (new annex) Annex HelperSignatureAlgorithmSelection (new annex) Annex HelperWebSocketHandshake (step 3.5 was added, step 3.6 was updated to use capabilities) Summary: Instead of using fixed signature algorithm, the one from Device capabilities to be used (see Annex HelperSignatureAlgorithmSelection usage). For almost all annexes capabilities were added as input parameter. Capabilities invoke/Annex HelperGetServiceCapabilities_AdvancedSecurity using was removed from all annexes and moved to the tests to prevent multiple capabilities request.
25.06	Jan 6, 2025	The following test cases and annexes were added according to #257:

		MEDIA2_RTSS-4-1-12 METADATA & AUDIO STREAMING (RTP-Unicast/UDP) MEDIA2_RTSS-4-1-13 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTP/TCP) MEDIA2_RTSS-4-1-14 METADATA & AUDIO STREAMING (RTP/RTSP/TCP) MEDIA2_RTSS-4-1-15 METADATA & AUDIO STREAMING - SET SYNCHRONIZATION POINT MEDIA2_RTSS-4-1-16 METADATA & AUDIO STREAMING (RTP-Unicast/UDP, IPv6) MEDIA2_RTSS-4-1-17 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6) MEDIA2_RTSS-4-1-18 METADATA & AUDIO STREAMING (RTP/RTSP/TCP, IPv6) MEDIA2_RTSS-4-1-19 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTPS/TCP) MEDIA2_RTSS-4-1-20 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6) MEDIA2_RTSS-4-1-21 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/WebSockets) MEDIA2_RTSS-4-1-22 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6) MEDIA2_RTSS-4-2-3 METADATA & AUDIO STREAMING (RTP-Multicast/UDP) MEDIA2_RTSS-4-2-4 METADATA & AUDIO STREAMING (RTP-Multicast/UDP, IPv6) A.69 Media2 Service – Media Profile Configuration for Metadata & Audio Streaming
25.06	Jan 10, 2025	The following test and annexes were updated according #271: Annex HelperCheckAndConfigureHTTPS (optional input parameters for Certificate key pair algorithm and CA key pair algorithm were added, step 5 was updated to use Certificate key pair algorithm and CA key pair algorithm) Annex HelperDetermineRSAKeyLength was removed and replaced with Annex HelperDetermineKeyPairGenerationParams Annex HelperCreateCACertificate (input parameter for key pair algorithm was added, key pair was added as output parameter and public key and private key were removed from output parameters, step 1 was updated to use key pair algorithm, step 2 was updated to use Annex HelperGenerateKeyPair, step 3 was updated to use key pair) Annex HelperDeleteRSAKeyPair was renamed and replaced with Annex HelperDeleteKeyPair Annex HelperCreateRSAKeyPair removed and replaced with Annex HelperCreateKeyPair

		Annex HelperAddServerCertAssign_CACertificate (title was updated, input parameters for Certificate key pair algorithm and CA key pair algorithm were added, step 1 was updated to use Annex HelperCreateKeyPair with capabilities and Certificate key pair algorithm as input parameters and key pair ID as output parameter, step 2 was updated to use CA key pair algorithm, step 5 was updated to use CA key pair algorithm) Annex HelperAddServerCertAssign_SSCertificate (title was updated, pre-requisite was updated to use both RSA and ECC, input parameter for key pair algorithm was added, step 1 was updated to use key pair algorithm) Annex HelperConfigureHTTPS (input parameters for Certificate key pair algorithm and CA key pair algorithm were added, step 4.1 was updated to use Certificate key pair algorithm, step 5 was updated to use Certificate key pair algorithm and CA key pair algorithm) Annex HelperCreateCertificationPath_SelfSigned (pre-requisite was updated to use both RSA and ECC, input parameter for key pair algorithm was added, step 1 was updated to use key pair algorithm) Annex HelperCreateSelfSignedCertificate (pre-requisite was updated to use both RSA and ECC, input parameter for key pair algorithm was added, step 1 was updated to use Annex HelperCreateKeyPair, step 2 was updated to use key pair algorithm) Annex HelperSignatureAlgorithmSelection (input parameter for key pair algorithm was added, step 1 was updated to algorithm selection for RSA key pair algorithm, step 2 was added to algorithm selection for ECC, step 3 was added) Annex HelperGenerateKeyPair (new annex)
25.12	Aug 10, 2025	The following test and annexes were updated according #334: MEDIA2_RTSS-1-3-1 MEDIA2 STREAMING – H.264 (WebRTC, Default Profile) (new) MEDIA2_RTSS-1-3-2 VIDEO ENCODER INSTANCES (WebRTC, Non-Default Profile) (new) MEDIA2_RTSS-1-3-3 VIDEO ENCODER INSTANCES - H.264 (WebRTC, Non-Default Profile) (new) MEDIA2_RTSS-1-3-4 MEDIA2 STREAMING – H.264 (WebRTC, FIR and PLI) (new) MEDIA2_RTSS-7-1-1 MEDIA2 STREAMING – WebRTC Connection Management (new) MEDIA2_RTSS-7-1-2 MEDIA2 STREAMING – WebRTC Signaling Server Error Response (new) MEDIA2_RTSS-7-1-3 MEDIA2 STREAMING – WebRTC Session Extension (new) MEDIA2_RTSS-7-1-4 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) (new) MEDIA2_RTSS-7-1-5 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, private_key_jwt) (new)

		MEDIA2_RTSS-7-1-6 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Signaling Server Certificate (new) MEDIA2_RTSS-7-1-7 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Authentication Server Certificate (new) Annex HelperAuthServerTypeAndMethodSelection Authorization Server Configuration Type And Authentication Method Selection (new) Annex HelperStreamingWebRTCInstances Concurrent Video Streaming over WebRTC (new) Annex HelperConfigureAndStartAuthServer Configure Authorization Server On Device and Start It (new) Annex HelperProfileConfigurationForWebRTCVideoStreaming Device Configuration for WebRTC Video Streaming (new) Annex HelperStreamingWebRTCDefaultProfile Media Streaming over WebRTC with Default Profile (new) Annex HelperAuthServerTypeAndMethodSelection Authorization Server Configuration Type And Authentication Method Selection (new) Annex HelperStreamingWebRTCRTCPFeedback Media Streaming over WebRTC - RTCP Feedback (new)
25.12	Oct 02, 2025	The following test and annexes were updated in the scope of #428 and #334: Annex HelperConfigureWebRTCAndPrepareEnvironment Configure WebRTC On Device and Prepare Environment for Testing (Media Profile become mandatory parameter) Annex HelperFindMediaProfileForStreaming Find Media Profile for Streaming (new) MEDIA2_RTSS-1-3-2 VIDEO ENCODER INSTANCES (WebRTC, Non-Default Profile) (media profile token was added for WebRTC Configuration) MEDIA2_RTSS-1-3-3 VIDEO ENCODER INSTANCES - H.264 (WebRTC, Non-Default Profile) (media profile token was added for WebRTC Configuration) MEDIA2_RTSS-7-1-4 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) (step 7.1 was added to find profile for WebRTC Configuration, media profile token was added for WebRTC Configuration) MEDIA2_RTSS-7-1-5 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, private_key_jwt) (step 7.1 was added to find profile for WebRTC Configuration, media profile token was added for WebRTC Configuration) MEDIA2_RTSS-7-1-6 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Signaling Server Certificate (step 7.1

		was added to find profile for WebRTC Configuration, media profile token was added for WebRTC Configuration) MEDIA2_RTSS-7-1-7 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Authentication Server Certificate (step 7.1 was added to find profile for WebRTC Configuration, media profile token was added for WebRTC Configuration)
25.12	Oct 02, 2025	The following test and annexes were updated in the scope of #429 (Authorization server uri was replaced with Authentication server metadata endpoint): Annex HelperConfigureAndStartAuthServer Configure Authorization Server On Device and Start It Annex Annex_HelperConfigureWebRTCAndPrepareEnvironment MEDIA2_RTSS-1-3-1 MEDIA2 STREAMING – H.264 (WebRTC, Default Profile) MEDIA2_RTSS-1-3-2 VIDEO ENCODER INSTANCES (WebRTC, Non-Default Profile) MEDIA2_RTSS-1-3-3 VIDEO ENCODER INSTANCES - H.264 (WebRTC, Non-Default Profile) MEDIA2_RTSS-1-3-4 MEDIA2 STREAMING – H.264 (WebRTC, FIR and PLI) MEDIA2_RTSS-7-1-1 MEDIA2 STREAMING – WebRTC Connection Management MEDIA2_RTSS-7-1-2 MEDIA2 STREAMING – WebRTC Signaling Server Error Response MEDIA2_RTSS-7-1-3 MEDIA2 STREAMING – WebRTC Session Extension MEDIA2_RTSS-7-1-4 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) MEDIA2_RTSS-7-1-5 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, private_key_jwt) MEDIA2_RTSS-7-1-6 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Signaling Server Certificate MEDIA2_RTSS-7-1-7 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Authentication Server Certificate
25.12	Oct 08, 2025	The following test and annexes were updated in the scope of #334: MEDIA2_RTSS-7-1-1 MEDIA2 STREAMING – WebRTC Connection Management (connection status check at WebRTC configuration was added) MEDIA2_RTSS-7-1-3 MEDIA2 STREAMING – Device Capabilities and WebRTC Session Extension (test was renamed, capabilities consistency check was added)

		Description of interaction with ONVIF Signaling Server was improved.
25.12	Oct 14, 2025	The following test and annexes were updated in the scope of #368: MEDIA2_RTSS-2-3-1 MEDIA2 AUDIO STREAMING – G.711 (WebRTC, Default Profile) (new) MEDIA2_RTSS-2-3-2 MEDIA2 AUDIO STREAMING – OPUS (WebRTC, Default Profile) (new) MEDIA2_RTSS-5-3-1 MEDIA2 STREAMING – H.26X/G.711 (WebRTC, Default Profile) (new) MEDIA2_RTSS-5-3-2 MEDIA2 STREAMING – H.26X/OPUS (WebRTC, Default Profile) (new) HelperProfileConfigurationForWebRTCAudioOnlyStreaming Device Configuration for WebRTC Audio Streaming using Media Profile that contains only Audio Configurations (new) HelperDeviceConfigurationForVideoAndAudioStreaming Device Configuration for Video and Audio WebRTC Streaming (new) HelperSetAEC Set Audio Encoder Configuration for Streaming (Transport protocol and IP version input parameters become optional) HelperSetVEC Set Video Encoder Configuration for Streaming (Transport protocol and IP version input parameters become optional)
25.12	Oct 22, 2025	The following test and annexes were added in the scope of #361: Annex HelperConfigMediaProfileForBackchannelWebRTCStreaming Configure Media2 Service – Media Profile Configuration for Audio Backchannel WebRTC Streaming Annex HelperBackchannelStreamingWebRTCDefaultProfile Backchannel Audio Streaming over WebRTC with Default Profile Annex HelperDeviceConfigurationForAllStreamingWebRTC Device Configuration for Audio Backchannel and Video and Audio Streaming Annex HelperAllStreamingWebRTCDefaultProfile Backchannel Audio, Audio, and Video Streaming over WebRTC with Default Profile MEDIA2_RTSS-3-3-1 MEDIA2 STREAMING – BACKCHANNEL G.711 (WebRTC, Default Profile) MEDIA2_RTSS-3-3-2 MEDIA2 STREAMING – BACKCHANNEL OPUS (WebRTC, Default Profile) MEDIA2_RTSS-6-3-1 MEDIA2 STREAMING – BACKCHANNEL G.711 AND H.26X VIDEO AND G.711/OPUS AUDIO (WebRTC, Default Profile)

Table of Contents

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 or ONFIG Signaling Server.

The scope of this specification covers the following media streams:

- Video
  - H.264
  - H.265
- Audio
  - G.711
  - AAC
  - OPUS
- Audio backchannel
  - G.711
  - AAC
  - OPUS
- Metadata

The scope of this specification covers the following real time streaming options and functionality:

- Media Control with RTSP

- RTSP control requests
- RTCP
- RTP Unicast over UDP
- RTP Multicast
- RTP over RTSP over TCP
- RTP over RTSP over HTTP over TCP
- RTP over WebSockets

- Media Control with ONVIF Signaling Service
  - WebRTC

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/
- [ISO/IEC Directives, Part 2] ISO/IEC Directives, Part 2, Annex H:
  http://www.iso.org/directives
- [ISO 16484-5] ISO 16484-5:2014-09 Annex P:
  https://www.iso.org/obp/ui/#!iso:std:63753:en
- [SOAP 1.2, Part 1] W3C SOAP 1.2, Part 1, Messaging Framework:
  http://www.w3.org/TR/soap12-part1/
- [XML-Schema, Part 1] W3C XML Schema Part 1: Structures Second Edition:
  http://www.w3.org/TR/xmlschema-1/
- [XML-Schema, Part 2] W3C XML Schema Part 2: Datatypes Second Edition:
  http://www.w3.org/TR/xmlschema-2/

- [WS-Security] "Web Services Security: SOAP Message Security 1.1 (WS-Security 2004)", OASIS Standard, February 2006.:

  http://www.oasis-open.org/committees/download.php/16790/wss-v1.1-spec-os-SOAPMessageSecurity.pdf

- 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.

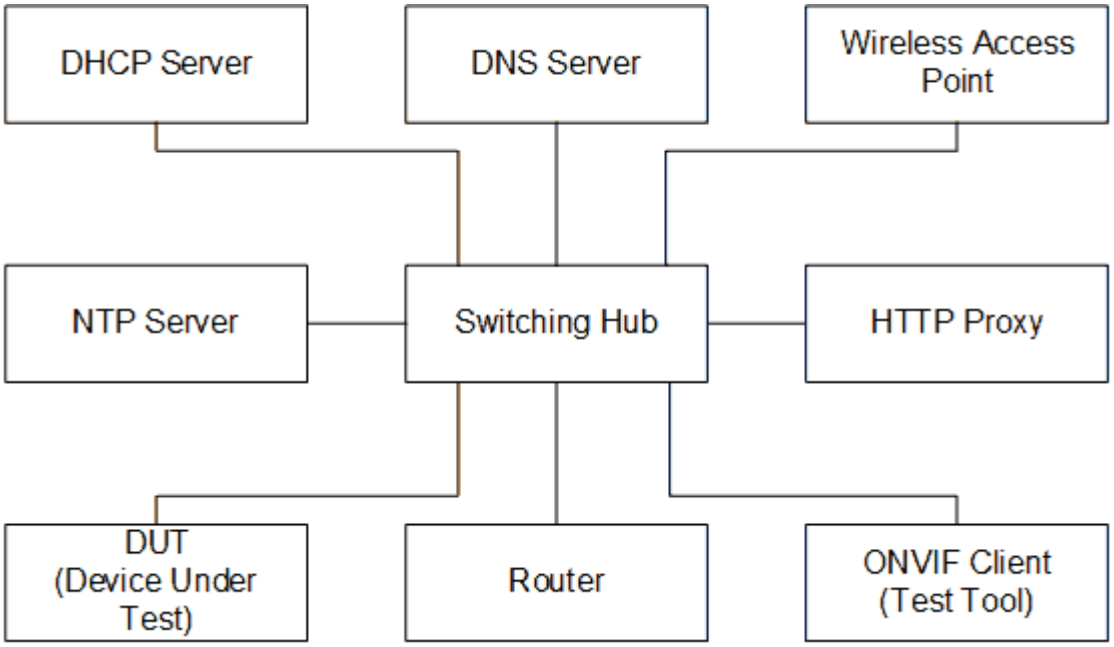
4.1 Test Setup

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 Media2 Configuration test cases. So, Media2 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.

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.7 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.8 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.7 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.7 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 with the following input and output parameters
   - in H265 - 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.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.6 for Name and Token Parameters Length limitations.

5.1.1.10 MEDIA2 STREAMING – H.265 (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-1-1-10

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

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

WSDL Reference: None

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

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.8 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.7 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.15.
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.1 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.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 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.6 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.15.
4. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.1 with the following input and output parameters
   - 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.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
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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.15.
5. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.1 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.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
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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.15.
5. ONVIF Client configures a media profile and retrieves a stream uri for video streaming by following the procedure mentioned in Annex A.1 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.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
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.14 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.6 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

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

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.30 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.

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

Test Case ID: MEDIA2_RTSS-1-1-20

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

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.30 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

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

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.30 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.14 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.30 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.14 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 concurent 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.32 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.36 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*
   7.3. Set *infoList1*[*videoSourceConfig1*.@token] := *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 all Total values from *infoList1* list.
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.37 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.38 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.39 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 concurent 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.32 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.36 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*
   7.3. Set *infoList1*[*videoSourceConfig1*.@token] := *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.40.
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.37 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.41 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.40, 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.39 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 concurent 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.32 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.36 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*

   7.3. Set *infoList1*[*videoSourceConfig1*.@token] := *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.40.

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.37 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.41 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.40, 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.39 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.42 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.42 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.1 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.42 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.1 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.42 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.14 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.6 for Name and Token Parameters Length limitations.

5.1.3 WebRTC

5.1.3.1 MEDIA2 STREAMING – H.264 (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-1-3-1

Specification Coverage: Video (ONVIF WebRTC Specification)

Feature Under Test: Video H.264 Streaming over WebRTC

WSDL Reference: media2.wsdl

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

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. H.264 encoding is supported by DUT. WebRTC streaming is

supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video streaming by following the procedure mentioned in Annex A.43 with the following input and output parameters
   - in H264 - required video encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token

- in *scope1* - authorization scope
- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *profileToken1* - media profile token
- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in video - media type
   - in H.264 - expected media stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

5.1.3.2 VIDEO ENCODER INSTANCES (WebRTC, Non-Default Profile)

Test Case ID: MEDIA2_RTSS-1-3-2

Specification coverage: Get video encoder instance information (Media2), Video (ONVIF WebRTC Specification), Media Profile Management (Profile V)

Feature under test: GetVideoEncoderInstances, Video H.264 Streaming over WebRTC

WSDL Reference: media2.wsdl

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

Pre-Requisite: Profile V is supported by DUT as indicated by receiving the GetScopesResponse. Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

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.32 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.36 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*

7.3. Set *infoList1*[*videoSourceConfig1*.@token] := *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 all Total values from *infoList1* list.
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, restore configuration, and skip other steps.
14. If *numberOfProfilesToBeCreated1* > *numberOfVEC1*, FAIL the test, restore configuration, 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.37 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.38 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, restore configuration, and skip other steps.

17. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
    - in *cap* - Security Configuration Service Capabilities
    - out *authServerToken1* - authorization server token
    - out *scope1* - authorization scope
    - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
18. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
    - in *cap* - Security Configuration Service Capabilities
    - in *authServerToken1* - authorization server token
    - in *scope1* - authorization scope
    - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
    - in *configuredProfilesList1*[0] - media profile token
    - out *signalingServerUri1* - signaling server uri
19. ONVIF Client tries to start and decode media streaming over WebRTC for each configured media profile by following the procedure mentioned in Annex A.54 with the following input and output parameters
    - in *signalingServerUri1* - signaling server uri
    - in *configuredProfilesList1* - Media Profiles list
20. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

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

5.1.3.3 VIDEO ENCODER INSTANCES - H.264 (WebRTC, Non-Default Profile)

Test Case ID: MEDIA2_RTSS-1-3-3

Specification coverage: Get video encoder instance information (Media2), Video (ONVIF WebRTC Specification), Media Profile Management (Profile V)

Feature under test: GetVideoEncoderInstances, Video H.264 Streaming over WebRTC, 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 concurent H.264 video streams over WebRTC as the number of instances, which is returned by GetVideoEncoderInstances for that video source configuration token.

Pre-Requisite: Profile V is supported by DUT as indicated by receiving the GetScopesResponse. H.264 encoding is supported by DUT. Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

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.32 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.36 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*
   7.3. Set *infoList1*[*videoSourceConfig1*.@token] := *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 all Total values from *infoList1* list.
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, restore configuration, and skip other steps.

14. If *numberOfProfilesToBeCreated1* > *numberOfVEC1*, FAIL the test, restore configuration, 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.37 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.41 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.40, FAIL the test, restore configuration, and skip other steps.

17. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters

    - in *cap* - Security Configuration Service Capabilities
    - out *authServerToken1* - authorization server token
    - out *scope1* - authorization scope
    - out *authServerMetadataEndpoint1* - authentication server metadata endpoint

18. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters

- in *cap* - Security Configuration Service Capabilities
- in *authServerToken1* - authorization server token
- in *scope1* - authorization scope
- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *configuredProfilesList1*[0] - media profile token
- out *signalingServerUri1* - signaling server uri

19. ONVIF Client tries to start and decode media streaming over WebRTC for each configured media profile by following the procedure mentioned in Annex A.54 with the following input and output parameters
    - in *signalingServerUri1* - signaling server uri
    - in *configuredProfilesList1* - Media Profiles list
20. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

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

5.1.3.4 MEDIA2 STREAMING – H.264 (WebRTC, FIR and PLI)

Test Case ID: MEDIA2_RTSS-1-3-4

Specification Coverage: Feedback mechanisms (ONVIF WebRTC Specification)

Feature Under Test: Video H.264 Streaming over WebRTC, FIR, PLI

WSDL Reference: media2.wsdl

Test Purpose: To verify RTCP feedback mechanisms over WebRTC using FIR message. To verify RTCP feedback mechanisms over WebRTC using PLI message.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. H.264 encoding is supported by DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video streaming by following the procedure mentioned in Annex A.43 with the following input and output parameters
   - in H264 - required video encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities

- in *authServerToken1* - authorization server token
- in *scope1* - authorization scope
- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *profileToken1* - media profile token
- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.55 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in video - media type
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

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.56 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.7 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.6 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.56 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.6 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.56 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.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

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.13 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.56 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.7 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.14 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.6 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.13 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.56 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.14 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.6 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.13 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.56 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
   - 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.14 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.6 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.56 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.7 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.6 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.56 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.6 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.56 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.6 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.13 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.56 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 *aacEncoding* - AAC audio encoding that is set in profile
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.7 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.14 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.6 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.13 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.56 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.14 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.6 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.13 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.56 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 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.14 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.6 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.15.
4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.56 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.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 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.6 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.15.
4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.56 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
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTPS/TCP 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 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.6 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.13 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.15.
5. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.56 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.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
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.14 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.6 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.13 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.15.
5. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.56 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.29 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.14 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.6 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

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

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.56 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.30 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

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

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.56 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.30 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

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

Feature Under Test: Streaming over WebSocket for IPv6.

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.13 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.56 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.30 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.14 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

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

Feature Under Test: Streaming over WebSocket for IPv6.

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.13 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.56 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.30 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.14 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.59 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.7 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.6 for Name and Token Parameters Length limitations.

5.2.1.22 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-2-1-22

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

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

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. OPUS 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.59 with the following input and output parameters
   - in OPUS - 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.7 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in OPUS - 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.6 for Name and Token Parameters Length limitations.

5.2.1.23 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/ RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-2-1-23

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

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

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. OPUS 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.59 with the following input and output parameters
   - in OPUS - 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 OPUS - 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.6 for Name and Token Parameters Length limitations.

5.2.1.24 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-2-1-24

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, OPUS

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. OPUS 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.15.
4. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.59 with the following input and output parameters
   - in OPUS - 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.29 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in OPUS - 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.6 for Name and Token Parameters Length limitations.

5.2.1.25 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-2-1-25

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

Feature Under Test: Streaming over WebSocket

WSDL Reference: None

Test Purpose: To verify OPUS media streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. OPUS 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.59 with the following input and output parameters
   - in OPUS - 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.30 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in OPUS - 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.

5.2.1.26 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/ UDP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-26

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

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

WSDL Reference: None

Test Purpose: To verify OPUS 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. OPUS 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.13 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.59 with the following input and output parameters
   - in OPUS - 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.7 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in OPUS - expected media stream encoding
6. ONVIF Client restores settings changed at step 4.

7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.14 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.6 for Name and Token Parameters Length limitations.

5.2.1.27 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/ RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-27

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

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

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. OPUS 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.13 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.59 with the following input and output parameters
   - in OPUS - 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 OPUS - expected media stream encoding
6. ONVIF Client restores settings changed at step 4.
7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.14 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.6 for Name and Token Parameters Length limitations.

5.2.1.28 MEDIA2 AUDIO STREAMING – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-28

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, OPUS, IPv6

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. OPUS 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.13 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.15.
5. ONVIF Client configures a media profile and retrieves a stream uri for audio streaming by following the procedure mentioned in Annex A.59 with the following input and output parameters
   - in OPUS - 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.29 with the following input and output parameters

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

7. ONVIF Client restores settings 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.14 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.6 for Name and Token Parameters Length limitations.

5.2.1.29 MEDIA2 STREAMING – OPUS (RTP-Unicast/RTSP/ WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-2-1-29

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

Feature Under Test: Streaming over WebSocket for IPv6.

WSDL Reference: None

Test Purpose: To verify OPUS 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. OPUS 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.13 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.59 with the following input and output parameters
   - in OPUS - 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.30 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in OPUS - expected media stream encoding
6. ONVIF Client restores settings changed at step 4.
7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.14 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.

5.2.2 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.56 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.42 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 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.6 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.13 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.56 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.42 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.14 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.6 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.56 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.42 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.6 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.13 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.56 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 *aacEncoding* - AAC audio encoding that is set in profile

5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.42 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - 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.14 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.6 for Name and Token Parameters Length limitations.

5.2.2.5 MEDIA2 AUDIO STREAMING – OPUS (RTP-Multicast, IPv4)

Test Case ID: MEDIA2_RTSS-2-2-5

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

Feature Under Test: Streaming over RTP-Multicast, OPUS

WSDL Reference: None

Test Purpose: To verify OPUS 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. OPUS 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.59 with the following input and output parameters
   - in OPUS - 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.42 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in audio - media type
   - in *OPUS* - expected media stream encoding
   - in IPv4 - IP version for multicast streaming
5. ONVIF Client restores settings changed at step 3.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

5.2.2.6 MEDIA2 AUDIO STREAMING – OPUS (RTP-Multicast/ UDP, IPv6)

Test Case ID: MEDIA2_RTSS-2-2-6

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

Feature Under Test: Streaming over RTP-Multicast/UDP, OPUS, IPv6

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio streaming is supported by DUT. OPUS 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.13 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.59 with the following input and output parameters
   - in OPUS - 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.42 with the following input and output parameters
   - in *streamUri* - Uri for media streaming

- in audio - media type
- in *OPUS* - expected media stream encoding
- in IPv6 - IP version for multicast streaming

6. ONVIF Client restores settings changed at step 4.
7. ONVIF Client restores network settings by following the procedure mentioned in Annex A.14 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.6 for Name and Token Parameters Length limitations.

5.2.3 WebRTC

5.2.3.1 MEDIA2 AUDIO STREAMING – G.711 (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-2-3-1

Specification Coverage: Audio (ONVIF WebRTC Specification)

Feature Under Test: Audio G.711 Streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify G.711 media streaming based on WebRTC Transport if there is only Audio Source Configuration and Audio Encoder Configuration in Media Profile.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Audio streaming is supported by the DUT. G.711 encoding is supported by the DUT. WebRTC streaming is supported by the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one

of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for audio only streaming by following the procedure mentioned in Annex A.60 with the following input and output parameters
   - in PCMU - required audio encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint

- in *profileToken1* - media profile token
- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in audio - media type
   - in PCMU - expected media stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

5.2.3.2 MEDIA2 AUDIO STREAMING – OPUS (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-2-3-2

Specification Coverage: Audio (ONVIF WebRTC Specification)

Feature Under Test: Audio OPUS Streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify OPUS media streaming based on WebRTC Transport if there is only Audio Source Configuration and Audio Encoder Configuration in Media Profile.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Audio streaming is supported by the DUT. OPUS encoding is supported by the DUT. WebRTC streaming is supported by the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of

authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for audio only streaming by following the procedure mentioned in Annex A.60 with the following input and output parameters
   - in OPUS - required audio encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token

- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in audio - media type
   - in OPUS - expected media stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

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.62 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.63 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.62 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.64 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.13 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.62 with the following input and output parameters
   - in PCMU - 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

5. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.63 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.14 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.

5.3.1.4 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.13 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.62 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.64 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.14 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 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.62 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.63 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.62 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.64 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.13 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.62 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.63 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.14 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.13 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.62 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.64 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.14 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.

5.3.1.9 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.62 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 WebSocket by following the procedure mentioned in Annex A.65 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.62 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 WebSocket by following the procedure mentioned in Annex A.65 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.13 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.62 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 WebSocket by following the procedure mentioned in Annex A.65 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.14 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.13 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.62 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 WebSocket by following the procedure mentioned in Annex A.65 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.14 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.62 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.66 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.13 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.62 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.66 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.14 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 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.62 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.66 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.13 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.62 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.66 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.14 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.15.
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.62 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

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.67 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 HTTPS settings which was changed at step 3.

Test Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

5.3.1.18 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.15.
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.62 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.67 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.13 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.15.
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.62 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.67 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in G.711 - 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.14 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.13 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.15.
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.62 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.67 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.14 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.

5.3.1.21 BACKCHANNEL – OPUS (RTP-Unicast/UDP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-29

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

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

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.62 with the following input and output parameters
   - in OPUS - 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.63 with the following input and output parameters

- in *streamUri* - Uri for media streaming
- in OPUS - 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.

5.3.1.22 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTP/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-30

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

Feature under test: Audio Backchannel OPUS, RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS 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. OPUS 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.62 with the following input and output parameters
   - in OPUS - 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.66 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.

5.3.1.23 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-31

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 OPUS, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS 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. OPUS 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.15.
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.62 with the following input and output parameters
   - in OPUS - 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
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.67 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.

5.3.1.24 BACKCHANNEL – OPUS (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-3-1-32

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 OPUS over WebSocket, IPv4

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS audio streaming over WebSocket for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.62 with the following input and output parameters

- in OPUS - 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 WebSocket by following the procedure mentioned in Annex A.65 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.

5.3.1.25 BACKCHANNEL – OPUS (RTP/RTSP/TCP, IPv4)

Test Case ID: MEDIA2_RTSS-3-1-33

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

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

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.62 with the following input and output parameters
   - in OPUS - 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.64 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.

5.3.1.26 BACKCHANNEL – OPUS (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-34

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

Feature under test: Audio Backchannel OPUS, RTP-Unicast/UDP, IPv6

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.13 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.62 with the following input and output parameters
   - in OPUS - 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

5. ONVIF Client tries to start audio backchannel streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.63 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.14 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.

5.3.1.27 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-35

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

Feature under test: Audio Backchannel OPUS, RTP-Unicast/RTSP/HTTP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS 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. OPUS 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.13 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.62 with the following input and output parameters
   - in OPUS - 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.66 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.14 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.

5.3.1.28 BACKCHANNEL STREAMING BY POST – OPUS (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-36

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 OPUS, Streaming over RTP-Unicast/RTSP/HTTPS/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS 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. OPUS 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.13 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.15.
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.62 with the following input and output parameters
   - in OPUS - 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.67 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.14 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.

5.3.1.29 BACKCHANNEL – OPUS (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-37

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 OPUS over WebSocket, IPv6

WSDL Reference: None

Test Purpose: To verify DUT Backchannel for OPUS audio streaming over WebSocket for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.13 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.62 with the following input and output parameters
   - in OPUS - 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 WebSocket by following the procedure mentioned in Annex A.65 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.14 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.

5.3.1.30 BACKCHANNEL – OPUS (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-3-1-38

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

Feature under test: Audio Backchannel OPUS, RTP/RTSP/TCP, IPv6

WSDL Reference: None

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

Pre-Requisite: Media2 Service is received from the DUT. Audio Backchannel is supported by DUT. OPUS 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.13 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.62 with the following input and output parameters
   - in OPUS - 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.64 with the following input and output parameters
   - in *streamUri* - Uri for media streaming
   - in OPUS - 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.14 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.

5.3.2 WebRTC

5.3.2.1 MEDIA2 STREAMING – BACKCHANNEL G.711 (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-3-3-1

Specification Coverage: Audio (ONVIF WebRTC Specification), Back channel connection (ONVIF Streaming Specification)

Feature Under Test: Audio backchannel G.711 streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify G.711 backchannel media streaming based on WebRTC transport.

Pre-Requisite:

- Security Configuration Service is received from the DUT.
- Media2 Service is received from the DUT.
- Audio output is supported by DUT.
- G.711 decoder is supported by DUT.
- WebRTC streaming is supported by DUT.
- Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.
- At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability.
- At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
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 by following the procedure mentioned in Annex A.68 with the following input and output parameters
   - in PCMU - required audio decoding
   - out *profileToken1* - media profile token
   - out *profileAudioDecoding* - audio decoding set at media profile
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token

- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start audio backchannel streaming over WebRTC by following the procedure mentioned in Annex A.69 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in *profileAudioDecoding* - expected audio backchannel stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

5.3.2.2 MEDIA2 STREAMING – BACKCHANNEL OPUS (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-3-3-2

Specification Coverage: Audio (ONVIF WebRTC Specification), Back channel connection (ONVIF Streaming Specification)

Feature Under Test: Audio backchannel OPUS streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify OPUS backchannel media streaming based on WebRTC transport.

Pre-Requisite:

- Security Configuration Service is received from the DUT.
- Media2 Service is received from the DUT.
- Audio output is supported by DUT.
- OPUS decoder is supported by DUT.
- WebRTC streaming is supported by DUT.

- Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.
- At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability.
- At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
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 by following the procedure mentioned in Annex A.68 with the following input and output parameters
   - in OPUS - required audio decoding
   - out *profileToken1* - media profile token
   - out *profileAudioDecoding* - audio decoding set at media profile
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters

- in *cap* - Security Configuration Service Capabilities
- in *authServerToken1* - authorization server token
- in *scope1* - authorization scope
- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *profileToken1* - media profile token
- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start audio backchannel streaming over WebRTC by following the procedure mentioned in Annex A.69 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in *profileAudioDecoding* - expected audio backchannel stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed 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. Video Source Configuration 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.70 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.73 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.6 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. Video Source Configuration 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.70 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.74 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.6 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. Video Source Configuration 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.70 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.75 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.6 for Name and Token Parameters Length limitations.

5.4.1.4 METADATA STREAMING - SET SYNCHRONIZATION POINT

Test Case ID: MEDIA2_RTSS-4-1-4

Specification Coverage: RTP for Metadata stream, Synchronization Points.

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. Video Source Configuration 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.70 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.8 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.6 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. Video Source Configuration 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.13 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.70 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.73 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.14 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.6 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. Video Source Configuration 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.13 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.70 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
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.74 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.14 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.6 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. Video Source Configuration 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.13 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.70 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.75 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.14 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.6 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. Video Source Configuration 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.15.
4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.70 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.76 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.6 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. Video Source Configuration 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.13 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.15.
5. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.70 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.76 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.14 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.6 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

Specification Coverage: WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

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. Video Source Configuration 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.70 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.77 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.6 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

Specification Coverage: WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

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. Video Source Configuration 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.13 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.70 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.77 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.1.12 METADATA & AUDIO STREAMING (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-4-1-12

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP-Unicast/UDP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on RTP/UDP Unicast Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. Profile O 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.78 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.73 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.6 for Name and Token Parameters Length limitations.

5.4.1.13 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTP/TCP)

Test Case ID: MEDIA2_RTSS-4-1-13

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 & Audio Streaming, RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on HTTP Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. Profile O 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.78 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.74 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.6 for Name and Token Parameters Length limitations.

5.4.1.14 METADATA & AUDIO STREAMING (RTP/RTSP/TCP)

Test Case ID: MEDIA2_RTSS-4-1-14

Specification Coverage: RTP/RTSP/TCP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP/RTSP/TCP

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on RTP/RTSP/TCP Unicast Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/TCP is supported by DUT. Profile O 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.78 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.75 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.6 for Name and Token Parameters Length limitations.

5.4.1.15 METADATA & AUDIO STREAMING - SET SYNCHRONIZATION POINT

Test Case ID: MEDIA2_RTSS-4-1-15

Specification Coverage: RTP for Metadata stream, Synchronization Points.

Feature Under Test: Synchronization Points for Metadata & Audio Streaming

WSDL Reference: None

Test Purpose: To request synchronization point from DUT for metadata & audio streaming.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. Profile O 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.78 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.8 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.6 for Name and Token Parameters Length limitations.

5.4.1.16 METADATA & AUDIO STREAMING (RTP-Unicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-16

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP-Unicast/UDP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio 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. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. Profile O 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.13 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.78 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.73 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.1.17 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-17

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 & Audio Streaming, RTP-Unicast/RTSP/HTTP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on HTTP Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. Profile O 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.13 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.78 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
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/RTSP/HTTP/TCP by following the procedure mentioned in Annex A.74 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.1.18 METADATA & AUDIO STREAMING (RTP/RTSP/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-18

Specification Coverage: RTP/RTSP/TCP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP/RTSP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio 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. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. RTP/RTSP/TCP is supported by DUT. IPv6 is supported by DUT. Profile O 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.13 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.78 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.75 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.1.19 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTPS/TCP)

Test Case ID: MEDIA2_RTSS-4-1-19

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 & Audio Streaming, Streaming over RTP-Unicast/RTSP/HTTP/TCP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on HTTPS Transport.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration 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. Profile O 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.15.
4. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.78 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.76 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.6 for Name and Token Parameters Length limitations.

5.4.1.20 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/HTTPS/TCP, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-20

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 & Audio Streaming, Streaming over RTP-Unicast/RTSP/HTTP/TCP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming based on HTTPS Transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration 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. Profile O 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.13 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.15.
5. ONVIF Client selects a Media Profile with Metadata Configuration by following the procedure mentioned in Annex A.78 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.76 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.1.21 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/WebSockets)

Test Case ID: MEDIA2_RTSS-4-1-21

Specification Coverage: WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

Feature Under Test: Metadata & Audio Streaming, Streaming over WebSocket, IPv4

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming over WebSocket.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. WebSocket is supported by the DUT. Profile O 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.78 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.77 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.6 for Name and Token Parameters Length limitations.

5.4.1.22 METADATA & AUDIO STREAMING (RTP-Unicast/RTSP/WebSockets, IPv6)

Test Case ID: MEDIA2_RTSS-4-1-22

Specification Coverage: WebSocket transport for RTP/RTSP/TCP (ONVIF Streaming Specification).

Feature Under Test: Metadata & Audio Streaming, Streaming over WebSocket, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming over WebSocket for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. IPv6 is supported by DUT. WebSocket is supported by the DUT. Profile O 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.13 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.78 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.77 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.14 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.6 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

Test Purpose: To verify metadata streaming using RTP-Multicast/UDP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Video Source Configuration 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.70 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.79 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.6 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

Test Purpose: To verify metadata streaming using RTP-Multicast/UDP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Video Source Configuration 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.13 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.70 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.79 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.14 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.6 for Name and Token Parameters Length limitations.

5.4.2.3 METADATA & AUDIO STREAMING (RTP-Multicast/UDP)

Test Case ID: MEDIA2_RTSS-4-2-3

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP-Multicast/UDP, IPv4

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming using RTP-Multicast/UDP transport for IPv4.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. RTP-Multicast/UDP is supported by DUT. Profile O 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.78 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.79 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.6 for Name and Token Parameters Length limitations.

5.4.2.4 METADATA & AUDIO STREAMING (RTP-Multicast/UDP, IPv6)

Test Case ID: MEDIA2_RTSS-4-2-4

Specification Coverage: RTP data transfer via UDP, RTP for Metadata stream, RTCP, Stream control, RTSP session for a Metadata stream.

Feature Under Test: Metadata & Audio Streaming, RTP-Multicast/UDP, IPv6

WSDL Reference: None

Test Purpose: To verify metadata & audio streaming using RTP-Multicast/UDP transport for IPv6.

Pre-Requisite: Media2 Service is received from the DUT. Metadata feature is supported by the DUT. Audio Source Configuration is supported by the DUT. Real-time streaming is supported by DUT. RTP-Multicast/UDP is supported by DUT. IPv6 is supported by DUT. Profile O 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.13 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.78 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.79 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.7 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.6 for Name and Token Parameters Length limitations.

5.5.1.2 MEDIA2 STREAMING – H.26X/G.711 (RTP-Unicast/RTSP/HTTP/TCP)

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
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
   - 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
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.6 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

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 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.7 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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 *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
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 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.14 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.6 for Name and Token Parameters Length limitations.

5.5.1.7 MEDIA2 STREAMING – H.26X/AAC (RTP-Unicast/UDP)

Test Case ID: MEDIA2_RTSS-5-1-7

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 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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
4. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
6. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.7 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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
4. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding

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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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
4. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
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 –

- DUT passes all assertions.

FAIL –

- DUT does not pass all assertions.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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

5. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
7. ONVIF Client tries to start and decode media streaming over RTP-Unicast/UDP by following the procedure mentioned in Annex A.7 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.14 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.6 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

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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
5. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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
5. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.42 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.6 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

Specification Coverage: RTP data transfer via UDP, RTP, RTCP, Stream control, RTSP, IPv6.

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.42 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.14 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.80 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
4. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
6. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.42 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.6 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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.13 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.80 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

5. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
6. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
7. ONVIF Client tries to start and decode media streaming over RTP-Multicast by following the procedure mentioned in Annex A.42 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.14 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.6 for Name and Token Parameters Length limitations.

5.5.3 WebRTC

5.5.3.1 MEDIA2 STREAMING – H.26X/G.711 (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-5-3-1

Specification Coverage: Video (ONVIF WebRTC Specification), Audio (ONVIF WebRTC Specification)

Feature Under Test: Audio G.711 Streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify H.264/G.711 or H.265/G.711 media streaming based on WebRTC Transport.

Pre-Requisite:

- Security Configuration Service is received from the DUT.
- Media2 Service is received from the DUT.
- Video streaming is supported by the DUT.
- H.264 encoding OR H.265 encoding is supported by the DUT.
- The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.
- Audio streaming is supported by the DUT.
- G.711 encoding is supported by the DUT.
- WebRTC streaming is supported by the DUT.
- Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.
- At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability.
- At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video and audio streaming by following the procedure mentioned in Annex A.83 with the following input and output parameters

- in PCMU - required audio encoding
- out *profileToken1* - profile token

5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token
   - out *signalingServerUri1* - signaling server uri
7. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
8. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in video - 1st media type
   - in audio - 2nd media type
   - in *videoEncoding* - expected video stream encoding
   - in PCMU - expected audio stream encoding

9. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

5.5.3.2 MEDIA2 STREAMING – H.26X/OPUS (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-5-3-2

Specification Coverage: Video (ONVIF WebRTC Specification), Audio (ONVIF WebRTC Specification)

Feature Under Test: Audio OPUS Streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify H.264/OPUS or H.265/OPUS media streaming based on WebRTC Transport.

Pre-Requisite:

- Security Configuration Service is received from the DUT.
- Media2 Service is received from the DUT.
- Video streaming is supported by the DUT.
- H.264 encoding OR H.265 encoding is supported by the DUT.
- The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.
- Audio streaming is supported by the DUT.
- OPUS encoding is supported by the DUT.
- WebRTC streaming is supported by the DUT.
- Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.

- At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability.
- At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video and audio streaming by following the procedure mentioned in Annex A.83 with the following input and output parameters
   - in OPUS - required audio encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope

- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *profileToken1* - media profile token
- out *signalingServerUri1* - signaling server uri

7. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
8. ONVIF Client tries to start and decode media streaming over WebSocket with default profile by following the procedure mentioned in Annex A.44 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in video - 1st media type
   - in audio - 2nd media type
   - in *videoEncoding* - expected video stream encoding
   - in OPUS - expected audio stream encoding
9. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

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. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported.

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.84 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
4. Set *videoEncoding* := *profile*.Configurations.VideoEncoder.Encoding
5. Set *audioEncoding* := *profile*.Configurations.AudioEncoder.Encoding
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.87 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.6 for Name and Token Parameters Length limitations.

5.6.2 WebRTC

5.6.2.1 MEDIA2 STREAMING – BACKCHANNEL G.711 AND H.26X VIDEO AND G.711/OPUS AUDIO (WebRTC, Default Profile)

Test Case ID: MEDIA2_RTSS-6-3-1

Specification Coverage: Video (ONVIF WebRTC Specification), Audio (ONVIF WebRTC Specification), Back channel connection (ONVIF Streaming Specification)

Feature Under Test: Audio backchannel G.711 with Video and Audio streaming over WebRTC

WSDL Reference: media2.wsdl

Test Purpose: To verify G.711 backchannel media streaming based on WebRTC transport.

Pre-Requisite:

- Security Configuration Service is received from the DUT.
- Media2 Service is received from the DUT.
- G.711 decoder is supported by DUT.
- H.264 OR H.265 encoding is supported by DUT.
- G.711 OR OPUS encoding is supported by DUT.
- WebRTC streaming is supported by DUT.

- Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.
- At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability.
- At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for audio backchannel, video and audio streaming by following the procedure mentioned in Annex A.88 with the following input and output parameters:
   - in PCMU - required supported audio decoder
   - out *profile* - media profile
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities

- in *authServerToken1* - authorization server token
- in *scope1* - authorization scope
- in *authServerMetadataEndpoint1* - authentication server metadata endpoint
- in *profile*.token - media profile token
- out *signalingServerUri1* - signaling server uri

7. ONVIF Client tries to start audio backchannel streaming and start and decode media streaming over WebRTC by following the procedure mentioned in Annex A.89 with the following input and output parameters
   - in *signalingServerUri1* - signaling server uri
   - in PCMU - audio backchannel stream encoding
   - in *profile*.Configurations.AudioEncoder.Encoding - audio stream encoding
   - in *profile*.Configurations.VideoEncoder.Encoding - video stream encoding
8. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT does not pass all assertions.

5.7 General

5.7.1 WebRTC

5.7.1.1 MEDIA2 STREAMING – WebRTC Connection Management

Test Case ID: MEDIA2_RTSS-7-1-1

Specification Coverage: WebSocket Connection Management (ONVIF WebRTC Specification)

Feature Under Test: Signaling Protocol - WebSocket Connection Management

WSDL Reference: media2.wsdl

Test Purpose: To verify that device can perform registration at signaling server. To verify that device uses 'webrtc.onvif.org' sub protocol for WebSocket connection. To verify that device reconnects automatically. To verify that device uses JSON-RPC version 2 for communication protocol. To verify that device reports connection status to WebRTC configuration.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. H.264 encoding is supported by DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video streaming by following the procedure mentioned in Annex A.43 with the following input and output parameters
   - in H264 - required video encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope

- out *authServerMetadataEndpoint1* - authentication server metadata endpoint

6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token
   - out *signalingServerUri1* - signaling server uri
7. The DUT perform registration at ONVIF signaling server:
   7.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.
   7.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.
   7.3. The DUT invokes **register** request with parameters
      - authorization := *accessToken1*
      - id (if specified by the DUT)
      - name (if specified by the DUT)
      - capabilities (if specified by the DUT)
   7.4. ONVIF Signaling Server responds with the following parameters:
      - id =: *endpointId1*
8. ONVIF Signaling Server closes connection with the DUT.
9. The DUT perform registration at ONVIF signaling server:
   9.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

9.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

9.3. The DUT invokes **register** request with parameters

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities (if specified by the DUT)

9.4. ONVIF Signaling Server responds with the following parameters:

- id =: *endpointId1*

10. ONVIF Client invokes **GetWebRTCConfigurations** request.
11. The DUT responds with **GetWebRTCConfigurationsResponse** message with the following parameters:
    - WebRTCConfiguration[0].SignalingServer
    - WebRTCConfiguration[0].CertPathValidationPolicyID
    - WebRTCConfiguration[0].AuthorizationServer
    - WebRTCConfiguration[0].DefaultProfile
    - WebRTCConfiguration[0].Enabled
    - WebRTCConfiguration[0].Connected =: *connectionStatus1*
    - WebRTCConfiguration[0].Error (if specified by the DUT)
12. If *connectionStatus1* is not equal to true, FAIL the test, restore the DUT state, and skip other steps.
13. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not establish WebSocket connection to signaling server at steps 7 and 9.
- DUT did not use 'webrtc.onvif.org' as sub protocol at steps 7 and 9.
- DUT did not send **register** request(s).

Note: *connectionStatus1* checking repeats from step 10 untill get required value during operation delay timeout

5.7.1.2 MEDIA2 STREAMING – WebRTC Signaling Server Error Response

Test Case ID: MEDIA2_RTSS-7-1-2

Specification Coverage: error (ONVIF WebRTC Specification)

Feature Under Test: Signaling Protocol - error

WSDL Reference: media2.wsdl

Test Purpose: To verify that device can perform registration at signaling server. To verify that device uses 'webrtc.onvif.org' sub protocol for WebSocket connection. To verify that device reconnects automatically. To verify that device uses JSON-RPC version 2 for communication protocol.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. H.264 encoding is supported by DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:

- out *cap* - Security Configuration Service Capabilities

4. ONVIF Client configures a media profile for video streaming by following the procedure mentioned in Annex A.43 with the following input and output parameters
   - in H264 - required video encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token
   - out *signalingServerUri1* - signaling server uri
7. ONVIF Client performs registration at ONVIF Signaling Server:
   - 7.1. ONVIF Client opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server.
   - 7.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:
     - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)

- id is skipped
- name is skipped

7.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:

- id =: *clientId1*

8. The DUT performs registration at ONVIF Signaling Server:

8.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

8.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

8.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities (if specified by the DUT)

8.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

8.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

9. The DUT and ONVIF Client performs connection exchange:

9.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*
- authorization := *clientAccessToken1*
- profile is skipped

9.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1*
- profile is skipped
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped

9.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities (if specified by the DUT)

9.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped
- capabilities (if received from the DUT)

10. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:
    - session := *sessionId1*
    - offer := *SDP for default profile*
    - subprotocols (if specified by the DUT)
11. ONVIF Signaling Server responds with **error** response with the following parameters:
    - code := 1002
    - message := "Peer disconnected"
12. If DUT closes connection to ONVIF Signaling Server, FAIL the test, restore DUT settings, and skip other steps.
13. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not send **register** request.
- DUT did not send **connect** request.
- DUT did not send **invite** request.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

5.7.1.3 MEDIA2 STREAMING – Device Capabilities and WebRTC Session Extension

Test Case ID: MEDIA2_RTSS-7-1-3

Specification Coverage: extend (ONVIF WebRTC Specification), Session Capabilities (ONVIF WebRTC Specification)

Feature Under Test: Signaling Protocol - Session Extension, Signaling Protocol - Capabilities

WSDL Reference: media2.wsdl

Test Purpose: To verify that device return the same capabilities at registration and connection. To verify that device can accepts extend command if it is supported by device.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. H.264 encoding is supported by DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

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

3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client configures a media profile for video streaming by following the procedure mentioned in Annex A.43 with the following input and output parameters
   - in H264 - required video encoding
   - out *profileToken1* - profile token
5. ONVIF Client configures an authorization server on Device and starts authorization server by following the procedure mentioned in Annex A.46 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - out *authServerToken1* - authorization server token
   - out *scope1* - authorization scope
   - out *authServerMetadataEndpoint1* - authentication server metadata endpoint
6. ONVIF Client configures WebRTC on Device and prepare environment for WebRTC streaming by following the procedure mentioned in Annex A.53 with the following input and output parameters
   - in *cap* - Security Configuration Service Capabilities
   - in *authServerToken1* - authorization server token
   - in *scope1* - authorization scope
   - in *authServerMetadataEndpoint1* - authentication server metadata endpoint
   - in *profileToken1* - media profile token
   - out *signalingServerUri1* - signaling server uri
7. ONVIF Client performs registration at ONVIF Signaling Server:
   7.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.
   7.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
- id is skipped
- name is skipped

7.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:

- id =: *clientId1*

8. The DUT performs registration at ONVIF Signaling Server:

8.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

8.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

8.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities =: *capabilities1*

8.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

8.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

9. The DUT and ONVIF Client performs connection exchange:

9.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*

- authorization := *clientAccessToken1*
- profile is skipped

9.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1*
- profile is skipped
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds := 240

9.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities =: *capabilities2*

9.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds := 240
- capabilities := *capabilities2*

10. If *capabilities1* is not same with *capabilities2*, FAIL the test, restore the DUT state, and skip other steps.

11. If DUT did not return *capabilities1*, PASS the test, restore the DUT state, and skip other steps.

12. If DUT did not return "extend" at *capabilities1*, PASS the test, restore the DUT state, and skip other steps.

13. The DUT and ONVIF Client performs invitation procedure:

13.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

- session := *sessionId1*
- offer := *SDP for default profile*
- subprotocols (if specified by the DUT)

13.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

13.3. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for video)

13.4. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

14. ONVIF Client and ONVIF Device completes setup of WebRTC peer-to-peer connection to start video streaming using **trickle** request(s) with parameters:
    - session := *sessionId1*
    - candidate := ICE Candidate SDP update based on SDP
15. If DUT does not send RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test, restore the DUT state, and skip other steps.
16. Wait for 100 seconds.
17. If DUT stops sending RTP media stream or close WebRTC peer-to-peer connection, FAIL the test, restore the DUT state, and skip other steps.
18. ONVIF Client invokes **extend** request to ONVIF Signaling Server over established connection with parameters:
    - session := *sessionId1*
    - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken2*)
    - expiryTimeSeconds is skipped
19. ONVIF Signaling Server invokes **extend** request to the DUT over established connection with parameters:
    - session := *sessionId1*

- authorization is skipped
- expiryTimeSeconds := 30

20. The DUT responds to ONVIF Signaling Server on **extend** request with parameters:
    - expiryTimeSeconds =: *expiryTimeSecondsFromDevice1*
21. ONVIF Signaling Server responds to ONVIF Client on **extend** request with parameters:
    - expiryTimeSeconds =: *expiryTimeSecondsFromDevice1*
22. If *expiryTimeSecondsFromDevice1* > 30, FAIL the test, restore the DUT state, and skip other steps.
23. Wait for 30 seconds.
24. If DUT do not close WebRTC peer-to-peer connection, FAIL the test, restore the DUT state, and skip other steps.
25. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- The DUT did not send **register** request.
- The DUT did not send response for **connect** request.
- The DUT did not send **invite** request.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

Note: The following fields are compared at step 10:

- subProtocols
- extend

5.7.1.4 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic)

Test Case ID: MEDIA2_RTSS-7-1-4

Specification Coverage: Device authentication and authorization (ONVIF Security Service Specification), WebSocket Connection Management (ONVIF WebRTC Specification)

Feature Under Test: WebSocket Connection to Signaling Server using access token authentication using OAuthClientCredentials and client_secret_basic settings with authentication server certificate validation.

WSDL Reference: media2.wsdl, advancedsecurity.wsdl

Test Purpose: To verify that DUT can receive access token from the authentication server using OAuthClientCredentials authentication method with client_secret_basic type. To verify that DUT can establish WebSocket connection to Signaling Server using access token. To verify that DUT will reuse token if it is not expired. To verify that DUT will renew token when authentication parameters will be changed.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. OAuthClientCredentials authentication method is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. client_secret_basic authentication is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability. Access token authentication is supported by the DUT as indicated by the AuthorizationModes = AccessToken capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client deletes one authorization server configuration if maximum is reached by following the procedure described in Annex A.47 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - out *itemToRestore1* - deleted authorization server configuration if any
5. Set:

- *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.

6. ONVIF Client configures authentication server connection using the following steps:

6.1. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "CN=ONVIF TT AuthServer 1,C=US" - CA certificate subject
- in "Test CertPathValidationPolicy AuthServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDAuthServer* - certification path validation policy identifier
- out *certIDAuthServer* - certificate identifier
- out *keyIDAuthServer* - RSA key pair identifier
- out *CACertAuthServer* - CA certificate
- out *privateKeyCACertAuthServer* - CA certificate private key

6.2. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "CN=ONVIF TT AuthServer 2,C=US" - certificate subject
- in *CACertAuthServer* - CA-certificate
- in *privateKeyCACertAuthServer* - private key of CA-certificate for certificate signature
- out *certAuthServer* - certificate
- out *publicKeyAuthServer* - public key of certificate

- out *privateKeyAuthServer* - private key of certificate

6.3. ONVIF Client starts Authorization server with metadata endpoint *authServerMetadataEndpoint1* conforming to RFC8414 with following settings:

- It is configured to *certAuthServer* as a server certificate.
- It is configured to accept OAuth2 client credentials grant flow per [RFC 6749] authentication method only.
- It is configured to accept client_secret_basic authentication method only.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope1* is added to be authorized.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope2* is added to be authorized.

6.4. ONVIF Client invokes **CreateAuthorizationServerConfiguration** request with parameters

- Type := **"OAuthClientCredentials"**
- ClientAuth := **"client_secret_basic"**
- ServerUri := *authServerMetadataEndpoint1*
- ClientID := *clientID1*
- ClientSecret := *clientSecret1*
- Scope := *scope1*
- KeyID is skipped
- CertificateID is skipped
- CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

6.5. The DUT responds with **CreateAuthorizationServerConfigurationResponse** message with parameters

- Token =: *authServerToken1*

7. ONVIF Client prepares WebRTC configuration using the following steps:

7.1. ONVIF Client gets media profile token applicable for streaming by following the procedure mentioned in Annex A.90 with the following input and output parameters:

- out *profileToken1* - media profile token

7.2. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "C=US,O=ONVIF,CN=ONVIF TT SignalingServer 1" - CA certificate subject
- in "Test CertPathValidationPolicy SignalingServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDSignalingServer* - certification path validation policy identifier
- out *certIDSignalingServer* - certificate identifier
- out *keyIDSignalingServer* - RSA key pair identifier
- out *CACertSignalingServer* - CA certificate
- out *privateKeyCACertSignalingServer* - CA certificate private key

7.3. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "C=US,O=ONVIF,CN=*Signaling Server IP Address*,C=US" - certificate subject
- in "*Signaling Server IP Address*" - certificate SAN
- in *CACertSignalingServer* - CA-certificate
- in *privateKeyCACertSignalingServer* - private key of CA-certificate for certificate signature
- out *certSignalingServer* - certificate

- out *publicKeySignalingServer* - public key of certificate
- out *privateKeySignalingServer* - private key of certificate

7.4. ONVIF Client starts ONVIF Signaling Server with address *signalingServerUri1* with following settings:

- It is configured to use *certSignalingServer* as a server certificate.
- It is configured to use *authServerMetadataEndpoint1* as a authentication server and accepts authentication tokens for authorization scope (*scope*).

7.5. ONVIF Client invokes **SetWebRTCConfigurations** request with parameters

- WebRTCConfiguration[0].SignalingServer := *signalingServerUri1*
- WebRTCConfiguration[0].CertPathValidationPolicyID := *certPathValidationPolicyIDSignalingServer*
- WebRTCConfiguration[0].AuthorizationServer := *authServerConfToken*
- WebRTCConfiguration[0].DefaultProfile := *profileToken1*
- WebRTCConfiguration[0].Enabled := true
- WebRTCConfiguration[0].Connected is skipped
- WebRTCConfiguration[0].Error is skipped

7.6. The DUT responds with **SetWebRTCConfigurationsResponse** message.

8. ONVIF Signaling Server verifies initial connection establishment:

8.1. The DUT opens connection to *authServerMetadataEndpoint1* with client identifier *clientID1* and client secret *clientSecret1* using client_secret_basic method authentication and OAuth2 client credentials grant flow.

8.2. The DUT verifies certificate provided by authentication server based on *certPathValidationPolicyIDAuthServer* certification path validation policy.

8.3. The DUT receives access token *accessToken1* from authorization server for scope *scope1*.

8.4. ONVIF Signaling Server awaits device connecting to *signalingServerUri1* endpoint.

8.5. DUT opens connection to *signalingServerUri1* with *accessToken1*.

8.6. DUT verifies certificate provided by ONVIF Signaling Server at WebSocket connection establishment based on *certPathValidationPolicyIDSignalingServer* certification path validation policy.

8.7. ONVIF Signaling Server verify access token received from the DUT with Authentication Server. If received access token *accessToken1* is not valid for *scope1*, FAIL the test, restore the DUT state, and skip other steps.

9. ONVIF Signaling Server verifies that access token will be reused if it is not expired:

9.1. ONVIF Signaling Server close device connection to *signalingServerUri1* endpoint.

9.2. ONVIF Signaling Server awaits device connecting to *signalingServerUri1* endpoint.

9.3. DUT opens connection to *signalingServerUri1* with *accessToken1*.

9.4. DUT verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on *certPathValidationPolicyIDSignalingServer* certification path validation policy.

9.5. ONVIF Signaling Server verify access token received from the DUT with Authentication Server. If received access token *accessToken1* is not the same as was used at step 8.5, FAIL the test, restore the DUT state, and skip other steps.

10. ONVIF Signaling Server verifies connection establishment after connection parameters were changed:

10.1. ONVIF Client invokes **SetAuthorizationServerConfiguration** request with the following parameters:

- @token := *authServerToken1*
- Data.Type := **"OAuthClientCredentials"**
- Data.ClientAuth := **"client_secret_basic"**
- Data.ServerUri := *authServerMetadataEndpoint1*
- Data.ClientID := *clientID1*
- Data.ClientSecret := *clientSecret1*
- Data.Scope := *scope2*
- Data.KeyID is skipped

- Data.CertificateID is skipped
- Data.CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

10.2. The DUT responds with **SetAuthorizationServerConfigurationResponse** message.

10.3. ONVIF Signaling Server closes device connection to *signalingServerUri1* endpoint.

10.4. The DUT opens connection to *signalingServerUri1* with client identifier *clientID1* and client secret *clientSecret1* using client_secret_basic method authentication and OAuth2 client credentials grant flow.

10.5. The DUT receives access token *accessToken2* from authorization server for scope *scope2*.

10.6. ONVIF Signaling Server awaits device connecting to *signalingServerUri1* endpoint.

10.7. The DUT opens connection to *signalingServerUri1* with *accessToken2*.

10.8. The DUT verifies certificate provided by ONVIF Signaling Server at WebSocket connection establishment based on *certPathValidationPolicyIDSignalingServer* certification path validation policy.

10.9. ONVIF Signaling Server verify access token received from the DUT with Authentication Server. If received access token *accessToken2* is not valid for *scope2*, FAIL the test, restore the DUT state, and skip other steps.

11. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not send **CreateAuthorizationServerConfigurationResponse** message.
- DUT did not send **SetWebRTCConfigurationsResponse** message.
- DUT did not send **SetAuthorizationServerConfigurationResponse** message.
- DUT does not establish connection at step 8.5.
- DUT does not establish connection at step 9.3.
- DUT requests additional authentication at steps 10.1 and 10.2.

- DUT does not establish connection at step 10.7.

5.7.1.5 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, private_key_jwt)

Test Case ID: MEDIA2_RTSS-7-1-5

Specification Coverage: Device authentication and authorization (ONVIF Security Service Specification), WebSocket Connection Management (ONVIF WebRTC Specification)

Feature Under Test: WebSocket Connection to Signaling Server using access token authentication using OAuthClientCredentials and private_key_jwt settings with authentication server certificate validation.

WSDL Reference: media2.wsdl, advancedsecurity.wsdl

Test Purpose: To verify that DUT can receive access token from the authentication server using OAuthClientCredentials authentication method with private_key_jwt type. To verify that DUT can establish WebSocket connection to Signaling Server using access token.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. OAuthClientCredentials authentication method is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. private_key_jwt authentication is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability. Access token authentication is supported by the DUT as indicated by the AuthorizationModes = AccessToken capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client deletes one authorization server configuration if maximum is reached by following the procedure described in Annex A.47 with the following input and output parameters:

- in *cap* - DUT capabilities
- out *itemToRestore1* - deleted authorization server configuration if any

5. Set:
   - *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.
6. ONVIF Client configures authentication server connection using the following steps:
   6.1. ONVIF Client creates a key pair and get public key from device by following the procedure described in Annex A.52 with the following input and output parameters:
      - in *cap* - DUT capabilities
      - in *keyAlgorithm* - CSR key pair algorithm
      - out *keyID1Auth1* - key pair
      - out *publicKeyAuth1* - public key

   6.2. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters
      - in *cap* - DUT capabilities
      - in *keyAlgorithm* - CSR key pair algorithm
      - in "CN=ONVIF TT AuthServer 1,C=US" - CA certificate subject
      - in "Test CertPathValidationPolicy AuthServer Alias" - certification path validation policy alias
      - out *certPathValidationPolicyIDAuthServer* - certification path validation policy identifier
      - out *certIDAuthServer* - certificate identifier
      - out *keyIDAuthServer* - RSA key pair identifier
      - out *CACertAuthServer* - CA certificate
      - out *privateKeyCACertAuthServer* - CA certificate private key

   6.3. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding

private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "CN=ONVIF TT AuthServer 2,C=US" - certificate subject
- in *CACertAuthServer* - CA-certificate
- in *privateKeyCACertAuthServer* - private key of CA-certificate for certificate signature
- out *certAuthServer* - certificate
- out *publicKeyAuthServer* - public key of certificate
- out *privateKeyAuthServer* - private key of certificate

6.4. ONVIF Client starts Authorization server with metadata endpoint *authServerMetadataEndpoint1* conforming to RFC8414 with following settings:

- It is configured to *certAuthServer* as a server certificate.
- It is configured to accept OAuth2 client credentials grant flow per [RFC 6749] authentication method only.
- It is configured to accept private_key_jwt authentication method only.
- Client with client identifier *clientID1* with client secret *clientSecret1*, *publicKeyAuth1* as key, and scope *scope1* is added to be authorized.
- Client with client identifier *clientID1* with client secret *clientSecret1*, *publicKeyAuth1* as key, and scope *scope2* is added to be authorized.

6.5. ONVIF Client invokes **CreateAuthorizationServerConfiguration** request with parameters

- Type := **"OAuthClientCredentials"**
- ClientAuth := **"private_key_jwt"**
- ServerUri := *authServerMetadataEndpoint1*
- ClientID := *clientID1*
- ClientSecret := *clientSecret1*

- Scope := *scope1*
- KeyID := *publicKeyAuth1*
- CertificateID is skipped
- CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

6.6. The DUT responds with **CreateAuthorizationServerConfigurationResponse** message with parameters

- Token =: *authServerToken1*

7. ONVIF Client prepares WebRTC configuration using the following steps:

7.1. ONVIF Client gets media profile token applicable for streaming by following the procedure mentioned in Annex A.90 with the following input and output parameters:

- out *profileToken1* - media profile token

7.2. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "C=US,O=ONVIF,CN=ONVIF TT SignalingServer 1" - CA certificate subject
- in "Test CertPathValidationPolicy SignalingServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDSignalingServer* - certification path validation policy identifier
- out *certIDSignalingServer* - certificate identifier
- out *keyIDSignalingServer* - RSA key pair identifier
- out *CACertSignalingServer* - CA certificate
- out *privateKeyCACertSignalingServer* - CA certificate private key

7.3. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding

private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "C=US,O=ONVIF,CN=*Signaling Server IP Address*,C=US" - certificate subject
- in "*Signaling Server IP Address*" - certificate SAN
- in *CACertSignalingServer* - CA-certificate
- in *privateKeyCACertSignalingServer* - private key of CA-certificate for certificate signature
- out *certSignalingServer* - certificate
- out *publicKeySignalingServer* - public key of certificate
- out *privateKeySignalingServer* - private key of certificate

7.4. ONVIF Client starts ONVIF Signaling Server with address *signalingServerUri1* with following settings:

- It is configured to use *certSignalingServer* as a server certificate.
- It is configured to use *authServerMetadataEndpoint1* as a authentication server and accepts authentication tokens for authorization scope (*scope*).

7.5. ONVIF Client invokes **SetWebRTCConfigurations** request with parameters

- WebRTCConfiguration[0].SignalingServer := *signalingServerUri1*
- WebRTCConfiguration[0].CertPathValidationPolicyID := *certPathValidationPolicyIDSignalingServer*
- WebRTCConfiguration[0].AuthorizationServer := *authServerConfToken*
- WebRTCConfiguration[0].DefaultProfile := *profileToken1*
- WebRTCConfiguration[0].Enabled := true
- WebRTCConfiguration[0].Connected is skipped
- WebRTCConfiguration[0].Error is skipped

7.6. The DUT responds with **SetWebRTCConfigurationsResponse** message.

8. ONVIF Signaling Server verifies initial connection establishment:

8.1. The DUT opens connection to *authServerMetadataEndpoint1* with client identifier *clientID1* and client secret *clientSecret1* using client_secret_basic method authentication and OAuth2 client credentials grant flow.

8.2. The DUT verifies certificate provided by authentication server based on *certPathValidationPolicyIDAuthServer* certification path validation policy.

8.3. The DUT receives access token *accessToken1* from authorization server for scope *scope1*.

8.4. ONVIF Signaling Server awaits device connecting to *signalingServerUri1* endpoint.

8.5. The DUT opens connection to *signalingServerUri1* with *accessToken1*.

8.6. The DUT verifies certificate provided by ONVIF Signaling Server at WebSocket connection establishment based on *certPathValidationPolicyIDSignalingServer* certification path validation policy.

8.7. ONVIF Signaling Server verify access token received from the DUT with Authentication Server. If received access token *accessToken1* is not valid for *scope1*, FAIL the test, restore the DUT state, and skip other steps.

9. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not send **CreateAuthorizationServerConfigurationResponse** message.
- DUT did not send **SetWebRTCConfigurationsResponse** message.
- DUT does not establish connection at step 8.5.

5.7.1.6 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Signaling Server Certificate

Test Case ID: MEDIA2_RTSS-7-1-6

Specification Coverage: Device authentication and authorization (ONVIF Security Service Specification), WebSocket Connection Management (ONVIF WebRTC Specification)

Feature Under Test: WebSocket Connection to Signaling Server using access token authentication when token received from authentication server using OAuthClientCredentials and client_secret_basic settings with authentication server certificate validation.

WSDL Reference: media2.wsdl, advancedsecurity.wsdl

Test Purpose: To verify that DUT will not establish connection with Signaling Server which has invalid certificate.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. OAuthClientCredentials authentication method is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. client_secret_basic authentication is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability. Access token authentication is supported by the DUT as indicated by the AuthorizationModes = AccessToken capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client deletes one authorization server configuration if maximum is reached by following the procedure described in Annex A.47 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - out *itemToRestore1* - deleted authorization server configuration if any
5. Set:
   - *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.
6. ONVIF Client configures authentication server connection using the following steps:

6.1. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "CN=ONVIF TT AuthServer 1,C=US" - CA certificate subject
- in "Test CertPathValidationPolicy AuthServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDAuthServer* - certification path validation policy identifier
- out *certIDAuthServer* - certificate identifier
- out *keyIDAuthServer* - RSA key pair identifier
- out *CACertAuthServer* - CA certificate
- out *privateKeyCACertAuthServer* - CA certificate private key

6.2. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "CN=ONVIF TT AuthServer 2,C=US" - certificate subject
- in *CACertAuthServer* - CA-certificate
- in *privateKeyCACertAuthServer* - private key of CA-certificate for certificate signature
- out *certAuthServer* - certificate
- out *publicKeyAuthServer* - public key of certificate
- out *privateKeyAuthServer* - private key of certificate

6.3. ONVIF Client starts Authorization server with metadata endpoint *authServerMetadataEndpoint1* conforming to RFC8414 with following settings:

- It is configured to *certAuthServer* as a server certificate.
- It is configured to accept OAuth2 client credentials grant flow per [RFC 6749] authentication method only.
- It is configured to accept client_secret_basic authentication method only.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope1* is added to be authorized.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope2* is added to be authorized.

6.4. ONVIF Client invokes **CreateAuthorizationServerConfiguration** request with parameters

- Type := **"OAuthClientCredentials"**
- ClientAuth := **"client_secret_basic"**
- ServerUri := *authServerMetadataEndpoint1*
- ClientID := *clientID1*
- ClientSecret := *clientSecret1*
- Scope := *scope1*
- KeyID is skipped
- CertificateID is skipped
- CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

6.5. The DUT responds with **CreateAuthorizationServerConfigurationResponse** message with parameters

- Token =: *authServerToken1*

7. ONVIF Client prepares WebRTC configuration using the following steps:

7.1. ONVIF Client gets media profile token applicable for streaming by following the procedure mentioned in Annex A.90 with the following input and output parameters:

- out *profileToken1* - media profile token

7.2. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "C=US,O=ONVIF,CN=ONVIF TT SignalingServer 1" - CA certificate subject
- in "Test CertPathValidationPolicy SignalingServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDSignalingServer* - certification path validation policy identifier
- out *certIDSignalingServer* - certificate identifier
- out *keyIDSignalingServer* - RSA key pair identifier
- out *CACertSignalingServer* - CA certificate
- out *privateKeyCACertSignalingServer* - CA certificate private key

7.3. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "C=US,O=ONVIF,CN=*Signaling Server IP Address*,C=US" - certificate subject
- in "*Signaling Server IP Address*" - certificate SAN
- in *CACertSignalingServer* - CA-certificate
- in *privateKeyCACertSignalingServer* - private key of CA-certificate for certificate signature
- out *certSignalingServer* - certificate
- out *publicKeySignalingServer* - public key of certificate
- out *privateKeySignalingServer* - private key of certificate

7.4. ONVIF Client starts ONVIF Signaling Server with address *signalingServerUri1* with following settings:

- It is configured to use *certSignalingServer* as a server certificate.
- It is configured to use *authServerMetadataEndpoint1* as a authentication server and accepts authentication tokens for authorization scope (*scope*).

7.5. ONVIF Client invokes **SetWebRTCConfigurations** request with parameters

- WebRTCConfiguration[0].SignalingServer := *signalingServerUri1*
- WebRTCConfiguration[0].CertPathValidationPolicyID := *certPathValidationPolicyIDSignalingServer*
- WebRTCConfiguration[0].AuthorizationServer := *authServerConfToken*
- WebRTCConfiguration[0].DefaultProfile := *profileToken1*
- WebRTCConfiguration[0].Enabled := true
- WebRTCConfiguration[0].Connected is skipped
- WebRTCConfiguration[0].Error is skipped

7.6. The DUT responds with **SetWebRTCConfigurationsResponse** message.

8. ONVIF Signaling Server verifies initial connection establishment:

8.1. The DUT opens connection to *authServerMetadataEndpoint1* with client identifier *clientID1* and client secret *clientSecret1* using client_secret_basic method authentication and OAuth2 client credentials grant flow.

8.2. The DUT verifies certificate provided by authentication server based on *certPathValidationPolicyIDAuthServer* certification path validation policy.

8.3. The DUT receives access token *accessToken1* from authorization server for scope *scope1*.

8.4. ONVIF Signaling Server awaits device connecting to *signalingServerUri1* endpoint.

8.5. The DUT opens connection to *signalingServerUri1* with *accessToken1*.

8.6. The DUT verifies certificate provided by ONVIF Signaling Server at WebSocket connection establishment based on *certPathValidationPolicyIDSignalingServer* certification path validation policy and prevent connection.

9. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not send **CreateAuthorizationServerConfigurationResponse** message.
- DUT did not send **SetWebRTCConfigurationsResponse** message.
- DUT did not send **SetAuthorizationServerConfigurationResponse** message.
- DUT establishes connection at step 8.6 during *operationDelay* timeout.

Note: *operationDelay* will be taken from Operation Delay field of ONVIF Device Test Tool.

5.7.1.7 WebSocket Connection to Signaling Server with access token authentication (OAuthClientCredentials, client_secret_basic) - Invalid Authentication Server Certificate

Test Case ID: MEDIA2_RTSS-7-1-7

Specification Coverage: Device authentication and authorization (ONVIF Security Service Specification), WebSocket Connection Management (ONVIF WebRTC Specification)

Feature Under Test: WebSocket Connection to Signaling Server using access token authentication when token received from authentication server using OAuthClientCredentials and client_secret_basic settings with authentication server certificate validation.

WSDL Reference: media2.wsdl, advancedsecurity.wsdl

Test Purpose: To verify that DUT will not establish connection with invalid authentication server certificate.

Pre-Requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. OAuthClientCredentials authentication method is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. client_secret_basic authentication is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability. Access token authentication is supported by the DUT as indicated by the AuthorizationModes = AccessToken capability.

Test Configuration: ONVIF Client and DUT

Test Procedure:

1. Start an ONVIF Client.
2. Start the DUT.
3. ONVIF Client gets the security configuration service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
4. ONVIF Client deletes one authorization server configuration if maximum is reached by following the procedure described in Annex A.47 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - out *itemToRestore1* - deleted authorization server configuration if any
5. Set:
   - *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.
6. ONVIF Client configures authentication server connection using the following steps:
   6.1. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters
      - in *cap* - DUT capabilities
      - in *keyAlgorithm* - DUT capabilities
      - in "CN=ONVIF TT AuthServer 1,C=US" - CA certificate subject
      - in "Test CertPathValidationPolicy AuthServer Alias" - certification path validation policy alias
      - out *certPathValidationPolicyIDAuthServer* - certification path validation policy identifier
      - out *certIDAuthServer* - certificate identifier
      - out *keyIDAuthServer* - RSA key pair identifier
      - out *CACertAuthServer* - CA certificate

- out *privateKeyCACertAuthServer* - CA certificate private key

6.2. ONVIF Client starts Authorization server with metadata endpoint *authServerMetadataEndpoint1* conforming to RFC8414 with following settings:

- It is configured to any certificate that will **not** pass *certPathValidationPolicyIDAuthServer* validation as a server certificate.
- It is configured to accept OAuth2 client credentials grant flow per [RFC 6749] authentication method only.
- It is configured to accept client_secret_basic authentication method only.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope1* is added to be authorized.
- Client with client identifier *clientID1* with client secret *clientSecret1* and scope *scope2* is added to be authorized.

6.3. ONVIF Client invokes **CreateAuthorizationServerConfiguration** request with parameters

- Type := **"OAuthClientCredentials"**
- ClientAuth := **"client_secret_basic"**
- ServerUri := *authServerMetadataEndpoint1*
- ClientID := *clientID1*
- ClientSecret := *clientSecret1*
- Scope := *scope1*
- KeyID is skipped
- CertificateID is skipped
- CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

6.4. The DUT responds with **CreateAuthorizationServerConfigurationResponse** message with parameters

- Token =: *authServerToken1*

7. ONVIF Client prepares WebRTC configuration using the following steps:

7.1. ONVIF Client gets media profile token applicable for streaming by following the procedure mentioned in Annex A.90 with the following input and output parameters:

- out *profileToken1* - media profile token

7.2. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "C=US,O=ONVIF,CN=ONVIF TT SignalingServer 1" - CA certificate subject
- in "Test CertPathValidationPolicy SignalingServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDSignalingServer* - certification path validation policy identifier
- out *certIDSignalingServer* - certificate identifier
- out *keyIDSignalingServer* - RSA key pair identifier
- out *CACertSignalingServer* - CA certificate
- out *privateKeyCACertSignalingServer* - CA certificate private key

7.3. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "C=US,O=ONVIF,CN=*Signaling Server IP Address*,C=US" - certificate subject
- in "*Signaling Server IP Address*" - certificate SAN
- in *CACertSignalingServer* - CA-certificate
- in *privateKeyCACertSignalingServer* - private key of CA-certificate for certificate signature
- out *certSignalingServer* - certificate

- out *publicKeySignalingServer* - public key of certificate
- out *privateKeySignalingServer* - private key of certificate

7.4. ONVIF Client starts ONVIF Signaling Server with address *signalingServerUri1* with following settings:

- It is configured to use *certSignalingServer* as a server certificate.
- It is configured to use *authServerMetadataEndpoint1* as a authentication server and accepts authentication tokens for authorization scope (*scope*).

7.5. ONVIF Client invokes **SetWebRTCConfigurations** request with parameters

- WebRTCConfiguration[0].SignalingServer := *signalingServerUri1*
- WebRTCConfiguration[0].CertPathValidationPolicyID := *certPathValidationPolicyIDSignalingServer*
- WebRTCConfiguration[0].AuthorizationServer := *authServerConfToken*
- WebRTCConfiguration[0].DefaultProfile := *profileToken1*
- WebRTCConfiguration[0].Enabled := true
- WebRTCConfiguration[0].Connected is skipped
- WebRTCConfiguration[0].Error is skipped

7.6. The DUT responds with **SetWebRTCConfigurationsResponse** message.

8. ONVIF Signaling Server verifies initial connection establishment:

8.1. The DUT opens connection to *authServerMetadataEndpoint1* with client identifier *clientID1* and client secret *clientSecret1* using client_secret_basic method authentication and OAuth2 client credentials grant flow.

8.2. The DUT verifies certificate provided by authentication server based on *certPathValidationPolicyIDAuthServer* certification path validation policy and prevent connection.

9. ONVIF Client restores the DUT state.

Test Result:

PASS –

- DUT passed all assertions.

FAIL –

- DUT did not send **CreateAuthorizationServerConfigurationResponse** message.
- DUT did not send **SetWebRTCConfigurationsResponse** message.
- DUT establishes connection at step 8.2 during *operationDelay* timeout.

Note: *operationDelay* will be taken from Operation Delay field of ONVIF Device Test Tool.

Annex A Helper Procedures and Additional Notes

A.1 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.2 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.4 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)
  - Configuration.RateControl.BitrateLimit := min {max {*profile*.Configurations.VideoEncoder.RateControl.BitrateLimit, *vecOptions*.BitrateRange.Min}, *vecOptions*.BitrateRange.Max}
- 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

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.5 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.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

A.2 Media2 Service Profile Configuration for Video Streaming

Name: HelperFindMediaProfileForVideoStreaming

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification

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.3 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

- Options list =: *optionsList*

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.3 Removing Configurations from Media Profile

Name: HelperRemoveConfigurationsFromMediaProfile

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper Procedure to remove configuartions 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.4 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.5 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.

Input: Protocol (*protocol*). Media Profile token (*token*). IP type (*ipType*) (optional parameter, IPv4 by default).

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.6 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.7 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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

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.8 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.

Input: Header of response to DESCRIBE (*responseHeader*). SDP (*sdp*). Stream Uri (*streamUri*).

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.9 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.10 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.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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

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.13 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.
3. Set *initialNetworkSettings* := available network interface.
4. If **GetNetworkInterfacesResponse** message contains NetworkInterfaces.IPv6 and NetworkInterfaces.IPv6.Enabled=true, then ONVIF Client checks NetworkInterfaces.IPv6.Config.DHCP. Otherwise, go to step 11.
5. If NetworkInterfaces.IPv6.Config.DHCP=Off, then ONVIF Client checks NetworkInterfaces.IPv6.Config.Manual element. Otherwise, go to step 8.
6. If NetworkInterfaces.IPv6.Config.Manual element is present and not empty, then ONVIF Client skips other steps and run test using NetworkInterfaces.IPv6.Config.Manual value

as device IP. Otherwise, ONVIF Client checks NetworkInterfaces.IPv6.Config.LinkLocal element.

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 applaied. 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.14 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.15 Configuring HTTPS if Required

Name: HelperCheckAndConfigureHTTPS

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

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: The service capabilities (*cap*) (optional input parameter, could be skipped).

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. If *cap* is empty, ONVIF Client gets the service capabilities by following the procedure mentioned in Annex A.16 with the following input and output parameters:
   - out *cap* - Security Configuration Service Capabilities
6. ONVIF Client configures HTTPS by following the procedure mentioned in Annex A.17 with the following input parameters:
   - in *cap* - DUT capabilities

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **GetNetworkProtocolsResponse** message.

A.16 Get service capabilities for Advanced Security service

Name: HelperGetServiceCapabilities_AdvancedSecurity

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification
- ONVIF Media2 Configuration Device Test Specification

Procedure Purpose: Helper procedure to get service capabilities.

Pre-requisite: Security Configuration Service is received from the DUT.

Input: None

Returns: The service capabilities (*cap*).

Procedure:

1. ONVIF Client invokes **GetServiceCapabilities**
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.17 Configuring HTTPS using Security Configuration Service

Name: HelperConfigureHTTPS

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

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. The DUT shall have enough free storage capacity for one additional 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: The service capabilities (*cap*). The key pair algorithm (*certKeyPairAlgorithm*) for Certificate. The key pair algorithm (*caKeyPairAlgorithm*) for CA.

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 by following the procedure mentioned in Annex A.18 with the following input and output parameters:
      - in *cap* - DUT capabilities
      - in *certKeyAlgorithm* - key pair algorithm
      - out *certPathID* - certification path
      - out *certID* - self-signed certificate

- out *keyID* - RSA key pair

4.2. Go to the step 6.

5. ONVIF Client creates a certification path based on CA-signed certificate and related key pair and a corresponding CA certificate and related key pair by following the procedure mentioned in Annex A.26 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *certKeyPairAlgorithm* - key pair algorithm for Certificate
   - in *caKeyPairAlgorithm* - key pair algorithm for CA
   - out *certPathID* - certification path
   - out *certID* - certificate
   - out *keyID* - key pair
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.18 Add server certificate assignment with corresponding certification path, self-signed certificate and key pair

Name: HelperAddServerCertAssign_SSCertificate

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to add server certificate assignment with corresponding certification path, self-signed certificate and key pair.

Pre-requisite: Security Configuration Service is received from the DUT. Create self-signed certificate supported by the DUT as indicated by the SelfSignedCertificateCreation or SelfSignedCertificateCreationWithRSA capability. On-board ECC or RSA key pair generation is supported by the DUT as indicated by the ECCKeyPairGeneration or RSAKeyPairGeneration capability. TLS is supported by the DUT as indicated by the TLSServerSupported capability. The DUT shall have enough free storage capacity for one additional 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.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: The identifiers of the new certification path (*certPathID*), certificate (*certID*) and key pair (*keyID*).

Procedure:

1. ONVIF Client creates a certification path based on self-signed certificate and related key pair by following the procedure mentioned in Annex A.19 with the following input and output parameters:
   - in *cap* - service capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyID* - key pair ID
   - out *certID1* - certificate ID
   - out *certPathID* - certification path ID

2. ONVIF Client invokes **AddServerCertificateAssignment** with parameters
   - CertificationPathID := *certPathID*
3. The DUT responds with **AddServerCertificateAssignmentResponse** message.
4. ONVIF Client waits for time *operationDelay*.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **AddServerCertificateAssignmentResponse** message.

A.19 Create a certification path based on self-signed certificate

Name: HelperCreateCertificationPath_SelfSigned

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to create a certification path based on self-signed certificate.

Pre-requisite: Security Configuration Service is received from the DUT. Create self-signed certificate supported by the DUT as indicated by the SelfSignedCertificateCreationWithRSA capability. RSA key pair generation supported by the DUT as indicated by the RSAKeyPairGeneration capability. TLS is supported by the DUT as indicated by the TLSServerSupported capability. 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.

Input: The service capabilities (*cap*).

Returns: The identifier of the new certification path (*certPathID*), certificate (*certID*) and RSA key pair (*keyID*).

Procedure:

1. ONVIF Client creates a self-signed certificate and related RSA key pair by following the procedure mentioned in Annex A.20 with the following input and output parameters:
   - in *cap* - service capabilities
   - out *keyID* - key pair ID
   - out *certID* - certificate ID
2. ONVIF Client invokes **CreateCertificationPath** request with parameters
   - CertficateIDs.CertificateID[0] := *certID*
   - Alias := "ONVIF_Test"
3. The DUT responds with **CreateCertificationPathResponse** message with parameters
   - CertificationPathID =: *certPathID*

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreateCertificationPathResponse** message.

A.20 Create a self-signed certificate

Name: HelperCreateSelfSignedCertificate

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to create a self-signed certificate.

Pre-requisite: Security Configuration Service is received from the DUT. Create self-signed certificate supported by the DUT as indicated by the SelfSignedCertificateCreation or SelfSignedCertificateCreationWithRSA capability. On-board ECC or RSA key pair generation is supported by the DUT as indicated by the ECCKeyPairGeneration or RSAKeyPairGeneration capability.

The DUT shall have enough free storage capacity for one additional key pair. The DUT shall have enough free storage capacity for one additional certificate.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: The identifier of the new certificate (*certID*) and key pair (*keyID*).

Procedure:

1. ONVIF Client creates a key pair by following the procedure mentioned in Annex A.21 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyID* - key pair ID
2. ONVIF Client selects signature algorithm by following the procedure mentioned in Annex A.24 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - Key Pair Algorithm
   - out *signatureAlgorithm* - signature algorithm
3. ONVIF Client invokes **CreateSelfSignedCertificate** with parameters
   - X509Version skipped
   - KeyID := *keyID*
   - Subject := subject (see Annex A.25)
   - Alias skipped
   - notValidBefore skipped
   - notValidAfter skipped
   - SignatureAlgorithm := *signatureAlgorithm*
   - SignatureAlgorithm.parameters skipped
   - SignatureAlgorithm.anyParameters skipped
   - Extension skipped

4. The DUT responds with **CreateSelfSignedCertificateResponse** message with parameters
   - CertificateID =: *certID*

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreateSelfSignedCertificateResponse** message.

A.21 Create a key pair

Name: HelperCreateKeyPair

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to create ECC or RSA key pair

Pre-requisite: Security Configuration Service is received from the DUT. On-board ECC or RSA key pair generation is supported by the DUT as indicated by the ECCKeyPairGeneration or RSAKeyPairGeneration capability. The DUT shall have enough free storage capacity for one additional key pair.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: The identifier of the new key pair (*keyID*).

Procedure:

1. ONVIF Client determines the key pair generation params by following the procedure mentioned in Annex A.22 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyGenParams* - key pair generation params

2. If *keyGenParams*.algorithm = RSA:
   a. ONVIF Client invokes **CreateRSAKeyPair** with parameter
      - KeyLength := *keyGenParams*.keyLength
   b. The DUT responds with **CreateRSAKeyPairResponse** message with parameters
      - KeyID =: *keyID*
      - EstimatedCreationTime =: *duration*
3. If *keyGenParams*.algorithm = ECC:
   a. ONVIF Client invokes **CreateECCKeyPair** with parameter
      - EllipticCurve := *keyGenParams*.ellipticCurve
   b. The DUT responds with **CreateECCKeyPairResponse** message with parameters
      - KeyID =: *keyID*
      - EstimatedCreationTime =: *duration*
4. Until *operationDelay* + *duration* expires repeat the following steps:
   4.1. ONVIF Client waits for 5 seconds.
   4.2. ONVIF Client invokes **GetKeyStatus** with parameters
      - KeyID := *keyID*
   4.3. The DUT responds with **GetKeyStatusResponse** message with parameters
      - KeyStatus =: *keyStatus*
   4.4. If *keyStatus* is equal to "ok", *keyID* will be return as a result of the procedure, other steps will be skipped.
   4.5. If *keyStatus* is equal to "corrupt", FAIL the procedure and deletes the key pair (*keyID*) by following the procedure mentioned in Annex A.23.
5. If *operationDelay* + *duration* expires for step 4 and the last *keyStatus* is other than "ok", FAIL the procedure and deletes the key pair (*keyID*) by following the procedure mentioned in Annex A.23.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreateRSAKeyPairResponse** or **CreateECCKeyPairResponse** message.
- DUT did not send **GetKeyStatusResponse** message(s).

Note: *operationDelay* will be taken from Operation Delay field of ONVIF Device Test Tool.

A.22 Determine key pair generation params

Name: HelperDetermineKeyPairGenerationParams

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to determine the key pair generation params to use during testing.

Pre-requisite: Security Configuration Service is received from the DUT. On-board ECC or RSA key pair generation is supported by the DUT as indicated by the ECCKeyPairGeneration or RSAKeyPairGeneration capability.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: The key pair generation params (*keyGenParams*).

Procedure:

1. If *keyAlgorithm* = RSA:
   a. ONVIF Client loops through the supported Key length list (*cap*.KeystoreCapabilities .RSAKeyLengths) and selects the smallest supported key length (*keyLength*).
   b. ONVIF Client creates the RSA key generation params (*keyGenParams*) with the key length (*keyLength*).
2. If *keyAlgorithm* = ECC:

a. ONVIF Client loops through the supported elliptic curves list (*cap*.KeystoreCapabilities.EllipticCurves) and selects the simplest elliptic curve (*ellipticCurve*).

b. ONVIF Client creates the ECC key generation params (*keyGenParams*) with the elliptic curve (*ellipticCurve*).

3. If previous steps is done with empty key pair generation params (*keyGenParams*): FAIL the procedure.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- No supported RSA key length was found at step 1.1 or no supported ECC elliptic curves was found at step 2.1.

A.23 Delete a key pair

Name: HelperDeleteKeyPair

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to delete a key pair.

Pre-requisite: Security Configuration Service is received from the DUT. On-board RSA or ECC key pair generation is supported by the DUT as indicated by the RSAKeyPairGeneration or ECCKeyPairGeneration capability.

Input: The identifier of the key pair (*keyID*) to delete.

Returns: None

Procedure:

1. ONVIF Client invokes **DeleteKey** with parameters

- KeyID := *keyID*

2. DUT responds with a **DeleteKeyResponse** message.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **DeleteKeyResponse** message.

A.24 Signature Algorithm Selection

Name: HelperSignatureAlgorithmSelection

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to select signature algorithm wich will be used for tests based on Device capabilities.

Pre-requisite: Security Configuration Service is received from the DUT.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: The signature algorithm (*signatureAlgorithm*).

Procedure:

1. If *keyAlgorithm* = RSA: ONVIF Client selects signature algorithm (*signatureAlgorithm*) that will be used for the test from the list provided by DUT at *cap*.KeystoreCapabilities.SignatureAlgorithms. Selection is done among the following list of signature algorithms supported by the Client by priority from first to last:
   - 1.2.840.113549.1.1.13 (OID of SHA-512 with RSA Encryption algorithm)
   - 1.2.840.113549.1.1.12 (OID of SHA-384 with RSA Encryption algorithm)
   - 1.2.840.113549.1.1.11 (OID of SHA-256 with RSA Encryption algorithm)

- 1.2.840.113549.1.1.14 (OID of SHA-224 with RSA Encryption algorithm)
- 1.2.840.113549.1.1.5 (OID of SHA-1 with RSA Encryption algorithm)

2. If *keyAlgorithm* = ECC: ONVIF Client selects signature algorithm (*signatureAlgorithm*) that will be used for the test from the list provided by DUT at *cap*.KeystoreCapabilities.SignatureAlgorithms. Selection is done among the following list of signature algorithms supported by the Client by priority from first to last:
   - 1.2.840.10045.4.3.4 (OID of SHA-512 with ECC Encryption algorithm)
   - 1.2.840.10045.4.3.3 (OID of SHA-384 with ECC Encryption algorithm)
   - 1.2.840.10045.4.3.2 (OID of SHA-256 with ECC Encryption algorithm)
   - 1.2.840.10045.4.3.1 (OID of SHA-224 with ECC Encryption algorithm)
   - 1.2.840.10045.4.1 (OID of SHA-1 with ECC Encryption algorithm)
3. If the previous steps is done with empty signature algorithm (*signatureAlgorithm*): FAIL the procedure.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not return any of signature algorithms listed at step 1 or 2.

A.25 Subject for a server certificate

Name: HelperSubjectForServerCertificate

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Use the following subject for test cases:

- Subject.Country := "US"

- Subject.CommonName := <DUT IP-address>

A.26 Add server certificate assignment with corresponding certification path, CA certificate and key pair

Name: HelperAddServerCertAssign_CACertificate

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

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. Key pair generation is supported by the DUT. The DUT shall have enough free storage capacity for one additional 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: The service capabilities (*cap*). The key pair algorithm (*certKeyPairAlgorithm*) for Certificate. The key pair algorithm (*caKeyPairAlgorithm*) for CA.

Returns: The identifiers of the new certification path (*certPathID*), certificate (*certID*) and key pair (*keyID*).

Procedure:

1. ONVIF Client creates a key pair by following the procedure mentioned in Annex A.21 with the following input and output parameters
   - in *cap* - DUT capabilities
   - in *certKeyAlgorithm* - key pair algorithm
   - out *keyID* - key pair ID
2. ONVIF Client selects signature algorithm by following the procedure mentioned in Annex A.24 with the following input and output parameters:
   - in *cap* - DUT capabilities

- in *caKeyAlgorithm* - key pair algorithm
- out *signatureAlgorithm* - signature algorithm

3. ONVIF Client invokes **CreatePKCS10CSR** with parameter
   - Subject := subject (see Annex A.25)
   - KeyID := *keyID*
   - CSRAttribute skipped
   - SignatureAlgorithm.algorithm := *signatureAlgorithm*
4. The DUT responds with **CreatePKCS10CSRResponse** message with parameters
   - PKCS10CSR =: *pkcs10*
5. ONVIF Client creates an CA certificate by following the procedure mentioned in Annex A.27 with the following input and output parameters
   - in *cap* - DUT capabilities
   - in *caKeyAlgorithm* - key pair algorithm
   - out *CAcert* - CA certificate
   - out *privateKey* - private key for the CA certificate
   - out *publicKey* - public key for the CA certificate
6. Create an [RFC5280] compliant X.509 certificate (*cert*) from the PKCS#10 request (*pkcs10*) with the following properties:
   - version:= v3
   - signature := *signatureAlgorithm*
   - 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*)

7. ONVIF Client invokes **UploadCertificate** with parameters
   - Certificate := *cert*
   - Alias := "ONVIF_Test1"
   - PrivateKeyRequired := true
8. The DUT responds with a **UploadCertificateResponse** message with parameters
   - CertificateID =: *certID*
   - KeyID =: *keyID*
9. ONVIF Client invokes **CreateCertificationPath** with parameters
   - CertficateIDs.CertificateID[0] := *certID*
   - Alias := "ONVIF_Test2"
10. The DUT responds with a **CreateCertificationPathResponse** message with parameters
    - CertificationPathID =: *certPathID*
11. ONVIF Client invokes **AddServerCertificateAssignment** with parameters
    - CertificationPathID := *certPathID*
12. The DUT responds with an **AddServerCertificateAssignmentResponse** message.
13. 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.27 Provide CA certificate

Name: HelperCreateCACertificate

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

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). The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: An X.509 CA certificate (*CAcert*) that is compliant to [RFC 5280] and a corresponding key pair (*keyPair*) with private key and public key.

Procedure:

1. ONVIF Client selects signature algorithm by following the procedure mentioned in Annex A.24 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *signatureAlgorithm* - signature algorithm
2. ONVIF Client generates a key pair by following the procedure mentioned in Annex A.28 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyPair* - key pair
3. If *subject* is skipped set:
   - *subject* := "CN=ONVIF TT,C=US"
4. ONVIF Client creates an X.509 self-signed CA certificate that is compliant to [RFC 5280] and has the following properties:

- version := v3
- signature := *signatureAlgorithm*
- validity := not before 19700101000000Z and not after 99991231235959Z
- subject := *subject*
- public key := *keyPair* .publicKey
- private key to be used := *keyPair*.privateKey

Note: ONVIF Client may return the same CA certificate in subsequent invocations of this procedure for the same subject.

A.28 Generate a key pair

Name: HelperGenerateKeyPair

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Security Configuration Device Test Specification
- ONVIF Base Device Test Specification

Procedure Purpose: Helper procedure to generate a key pair.

Pre-requisite: None.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*).

Returns: A [RFC 3447] compliant RSA or [RFC 5480, RFC 5915] compliant ECC key pair (*keyPair*) with new public key and private key.

Procedure:

1. ONVIF Client determines the key pair generation params by following the procedure mentioned in Annex A.22 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyGenParams* - key pair generation params
2. If *keyGenParams*.algorithm = RSA:

a. Create an [RFC 3447] compliant RSA key pair (out *keyPair*) with new public key and private key with the following properties:

- KeyLength := *keyGenParams*.keyLength

3. If *keyGenParams*.algorithm = ECC:

a. Create an [RFC 5480, RFC 5915] compliant ECC key pair (out *keyPair*) with new public key and private key with the following properties:

- EllipticCurve := *keyGenParams*.ellipticCurve

A.29 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 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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.30 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.31 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.33 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.8 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
   - Transport := RTP/AVP/TCP;unicast;interleaved=0-1
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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.31 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.32 with the following input and output parameters
   - out *cap* - Media2 Service capabilities
2. Set *uri* := *cap*.StreamingCapabilities.RTSPWebSocketUri
3. If hierarchical component (hier_part in [rfc2396]) of *uri* is absolute path construction (abs_path in [rfc2396]):

3.1. ONVIF Client confugures WebSocket URI (*uri*) with host and port based on *uri*, URI of the DUT, and HTTP/HTTPS port of the DUT.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- None.

A.32 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.33 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.34 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 3.7.

3.5. ONVIF Client gets the service capabilities (out *cap*) by following the procedure mentioned in Annex A.16.

3.6. ONVIF Client configures HTTPS by following the procedure mentioned in Annex A.17 with the following input parameters:

- in *cap* - DUT capabilities

3.7. ONVIF Client performs a TLS handshake by following the procedure mentioned in Annex A.35

3.8. ONVIF Client invokes **HTTPS GET** request to *uri* with parameters

- Upgrade =: "websocket"
- Connection =: "Upgrade"
- Sec-WebSocket-Key =: *webSocketKey*
- Sec-WebSocket-Protocol =: "rtsp.onvif.org"
- Sec-WebSocket-Version =: "13"

3.9. 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.34 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:

1. ONVIF Client generates a nonce consisting of a randomly selected 16-byte Sec-WebSocket-Key value that has been base64-encoded (see Section 4 of [RFC4648] and section 4.1 of [RFC6455]).

A.35 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.CertificateID =: *CertificateID*
   - 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*
6. ONVIF Client computes *MasterSecret* using ClientRandom[32], ServerRandom[32] and PreMasterSecret.
7. The DUT TLS server computes *MasterSecret* using *ClientRandom[32]*, *ServerRandom[32]* and *PreMasterSecret*.
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.36 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.37 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.38 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.

Input: Information about guaranteed encoder instances (*info*). Video Source Configuration (*videoSourceConfig*). List of configured media profiles (*configuredProfilesList*).

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
    - 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 *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 := *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.39 Concurrent Video Streaming over RTP-Unicast/UDP

Name: HelperStreamingRTPUnicastUDPInstances

Procedure Purpose: Helper procedure to verify concurent 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.5 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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.40 Concurrent Video Streaming over RTP-Unicast/UDP

Name: HelperNumberOfInstansesForEncoding

Procedure Purpose: Helper procedure to culculate 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*:
    1.1. Set *encodingInstances* := *info*.Codec[Encoding = *encoding*].Number.
    1.2. Skip other steps in procedure.
2. Set *encodingInstances* := *info*.Total.

A.41 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.

Input: Information about guaranteed encoder instances (*info*). Video Source Configuration (*videoSourceConfig*). List of configured media profiles (*configuredProfilesList*). Encoding (*encoding*).

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.40, 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.42 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.8 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;multicast;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;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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

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.43 Device Configuration for WebRTC Video Streaming

Name: HelperProfileConfigurationForWebRTCVideoStreaming

Procedure Purpose: Helper procedure to configure Media profile, Video Encoder Configuration, for WebRTC video streaming.

Pre-requisite: Media2 Service is received from the DUT.

Input: Required video encoding (*requiredVideoEncoding*).

Returns: Profile token (*profileToken*).

Procedure:

1. ONVIF Client selects a Media Profile with required video encoding support by following the procedure mentioned in Annex A.2 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. 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)
  - Configuration.RateControl.BitrateLimit := min {max {*profile*.Configurations.VideoEncoder.RateControl.BitrateLimit, *vecOptions*.BitrateRange.Min}, *vecOptions*.BitrateRange.Max}
- Configuration.Multicast := *profile*.Configurations.VideoEncoder.Multicast
- Configuration.Quality := *vecOptions*.QualityRange.Min

3. The DUT responds with **SetVideoEncoderConfigurationResponse** message.
4. Set:
   - *profileToken* := *profile*.@token

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **SetVideoEncoderConfigurationResponse** message.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

A.44 Media Streaming over WebRTC with Default Profile

Name: HelperStreamingWebRTCDefaultProfile

Procedure Purpose: Helper procedure to verify media streaming over WebRTC with default media profile usage.

Pre-requisite: None

Input: Uri for signaling server (*signalingServerUri*). 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 performs registration at ONVIF Signaling Server:
   1.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.
   1.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:
      - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
      - id is skipped
      - name is skipped
   1.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:
      - id =: *clientId1*
2. The DUT perform registration at ONVIF signaling server:
   2.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

2.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

2.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities (if specified by the DUT)

2.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

2.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

3. The DUT and ONVIF Client performs connection exchange:

3.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*
- authorization := *clientAccessToken1*
- profile is skipped

3.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1*
- profile is skipped
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped

3.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities (if specified by the DUT)

3.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped
- capabilities (if received from the DUT)

4. The DUT and ONVIF Client performs invitation procedure:

4.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

- session := *sessionId1*
- offer := *SDP for default profile*
- subprotocols (if specified by the DUT)

4.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

4.3. If *mediaType* = audio and *sdpOffer1* does not contain m=*mediaType* with rtpmap value corresponding to *encoding* and session attribute "sendonly" (a=sendonly) or "sendrecv" (a=sendrecv) or omitted, FAIL the test and skip other steps.

4.4. If *mediaType* = video and *sdpOffer1* does not contain m=*mediaType* with rtpmap value corresponding to *encoding* and session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4.5. If *mediaType2* is specified and *mediaType2* = audio and *sdpOffer1* does not contain m=*mediaType2* with rtpmap value corresponding to *encoding2* and session attribute "sendonly" (a=sendonly) or "sendrecv" (a=sendrecv) or omitted, FAIL the test and skip other steps.

4.6. If *mediaType2* is specified and *mediaType2* = video and *sdpOffer1* does not contain m=*mediaType2* with rtpmap value corresponding to *encoding2* and session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4.7. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for video)

4.8. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

5. ONVIF Client and ONVIF Device completes setup of WebRTC peer-to-peer connection to start *mediaType* and *mediaType2* (if specified) streaming using **trickle** request(s) with parameters:
   - session := *sessionId1*
   - candidate := ICE Candidate SDP update based on SDP
6. If DUT does not send *encoding* RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test and skip other steps.
7. If *mediaType2* is specified and DUT does not send *encoding2* RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test and skip other steps.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **register** request.
- DUT did not send response for **connect** request.
- DUT did not send **invite** request.
- WebRTC peer-to-peer session is terminated by DUT during media streaming.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

Note: See Annex A.9 for invalid RTP header definition.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at steps 4.3 and 4.5.

A.45 Authorization Server Configuration Type And Authentication Method Selection

Name: HelperAuthServerTypeAndMethodSelection

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to select type and authentication method for authorization server configuration which will be used for tests based on Security Configuration Service capabilities.

Pre-requisite: Security Configuration Service is received from the DUT.

Input: The service capabilities (*cap*).

Returns: The authorization server configuration type (*authServerType*). The authentication method (*authMethod*).

Procedure:

1. ONVIF Client selects authorization server configuration type (*authServerType*) that will be used for the test from the list provided by DUT at *cap*.AuthorizationServer.ConfigurationTypesSupported. Selection is done among the following list of server configuration type supported by the ONVIF Client by priority from first to last:
   - OAuthClientCredentials
2. ONVIF Client selects authentication method (*authMethod*) that will be used for the test from the list provided by DUT at *cap*.AuthorizationServer.ClientAuthenticationMethodsSupported. Selection is done among the following list of server configuration type supported by the ONVIF Client by priority from first to last:
   - client_secret_basic
   - private_key_jwt
3. If after the previous steps execution authorization server configuration type (*authServerType*) is empty, FAIL the procedure.
4. If after the previous steps execution authentication method (*authMethod*) is empty, FAIL the procedure.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not return any of signature algorithms listed at step 1 or 2.

A.46 Configure Authorization Server On Device and Start It

Name: HelperConfigureAndStartAuthServer

Procedure Purpose: Helper procedure configures connection Authorization Server on Device and starts Authorization Server.

Pre-requisite: Security Configuration Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. OAuthClientCredentials authentication method is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. client_secret_basic authentication is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability. Access token authentication is supported by the DUT as indicated by the AuthorizationModes = AccessToken capability.

Input: Security Configuration Service Capabilities (*cap*).

Returns: Authentication server configuration token (*authServerConfToken*). Authentication scope (*scope1*). Authentication server metadata endpoint (*authServerMetadataEndpoint1*).

Procedure:

1. ONVIF Client deletes one authorization server configuration if maximum is reached by following the procedure described in Annex A.47 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - out *itemToRestore1* - deleted authorization server configuration if any
2. Set:
   - *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.
3. ONVIF Client selects authorization server type and authentication method by following the procedure mentioned in Annex A.45 with the following input and output parameters:

- in *cap* - DUT capabilities
- in *authServerType* - authorization server configuration type
- out *authMethod* - authentication method

4. ONVIF Client configures authentication server connection using the following steps:

4.1. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters

- in *cap* - DUT capabilities
- in *keyAlgorithm* - DUT capabilities
- in "C=US,O=ONVIF,CN=ONVIF TT AuthServer 1" - CA certificate subject
- in "Test CertPathValidationPolicy AuthServer Alias" - certification path validation policy alias
- out *certPathValidationPolicyIDAuthServer* - certification path validation policy identifier
- out *certIDAuthServer* - certificate identifier
- out *keyIDAuthServer* - RSA key pair identifier
- out *CACertAuthServer* - CA certificate
- out *privateKeyCACertAuthServer* - CA certificate private key

4.2. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:

- in *cap* - DUT capabilities
- in "C=US,O=ONVIF,CN=*Authorization Server IP Address*" - certificate subject
- in "*Authorization Server IP Address*" - certificate SAN
- in *CACertAuthServer* - CA-certificate
- in *privateKeyCACertAuthServer* - private key of CA-certificate for certificate signature

- out *certAuthServer* - certificate
- out *publicKeyAuthServer* - public key of certificate
- out *privateKeyAuthServer* - private key of certificate

4.3. ONVIF Client starts Authorization server with metadata endpoint *authServerMetadataEndpoint1* conforming to RFC8414 with following settings:

- It is configured to *certAuthServer* as a server certificate.
- It is configured *authServerType* authorization server type.
- It is configured to accept *authMethod* authentication method.

4.4. If *authMethod* is private_key_jwt ONVIF Client configures key pair using the following steps:

4.4.1. ONVIF Client creates a key pair and get public key from device by following the procedure described in Annex A.52 with the following input and output parameters:

- in *cap* - DUT capabilities
- in *keyAlgorithm* - CSR key pair algorithm
- out *keyID1Auth1* - key pair
- out *publicKeyAuth1* - public key

4.5. ONVIF Client configures Authorization Server with the following credentials to be authorized:

- client identifier *clientID1*
- client secret *clientSecret1*
- scope *scope1*
- public key *publicKeyAuth1* assigned if *authMethod* is private_key_jwt

4.6. ONVIF Client invokes **CreateAuthorizationServerConfiguration** request with parameters

- Type := *authServerType*
- ClientAuth := *authMethod*

- ServerUri := *authServerMetadataEndpoint1*
- ClientID := *clientID1*
- ClientSecret := *clientSecret1*
- Scope := *scope1*
- KeyID := *keyID1Auth1* if *authMethod* is private_key_jwt, otherwise is skipped
- CertificateID is skipped
- CertPathValidationPolicyID := *certPathValidationPolicyIDAuthServer*

4.7. The DUT responds with **CreateAuthorizationServerConfigurationResponse** message with parameters

- Token =: *authServerConfToken*

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreateAuthorizationServerConfigurationResponse** message.

A.47 Make Sure That At Least One Authorization Server Configuration Could Be Created

Name: HelperEmptySpaceForOneAuthorizationServerConfiguration

Notes: Annex is used at:

- ONVIF Security Configuration Device Test Specification
- ONVIF Uplink Test Specification
- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to remove one authorization server configuration if maximum is reached.

Pre-requisite: Security Configuration Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.

Input: The service capabilities (*cap*).

Returns: Removed authorization server configuration (*removedAuthServerConfiguration*), could be empty.

Procedure:

1. ONVIF Client gets current authorization server configurations by following the procedure mentioned in Annex A.48 with the following input and output parameters:
   - out *authServerConfigurations1* list - authorization server configurations
2. If *authServerConfigurations1* items number is equal to *cap*.AuthorizationServer.MaxConfigurations:
   2.1. Set the following:
      - *removedAuthServerConfiguration* := *authServerConfigurations1*[0]
   2.2. ONVIF Client invokes **DeleteAuthorizationServerConfiguration** with parameter
      - Token := *removedAuthServerConfiguration*.token
   2.3. The DUT responds with **DeleteAuthorizationServerConfigurationResponse** message.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **DeleteAuthorizationServerConfigurationResponse** message.

A.48 Get Authorization Server Configurations List

Name: HelperGetAuthorizationServerConfigurations

Notes: Annex is used at:

- ONVIF Security Configuration Device Test Specification
- ONVIF Uplink Test Specification
- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to get authorization server configurations list.

Pre-requisite: Security Configuration Service is received from the DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.

Input: None

Returns: Authorization server configurations list (*authServerConfigurations*).

Procedure:

1. ONVIF Client invokes **GetAuthorizationServerConfigurations** request with parameters
   - Token is skipped
2. The DUT responds with **GetAuthorizationServerConfigurationsResponse** message with parameters
   - Configuration list =: *authServerConfigurations*

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **GetAuthorizationServerConfigurationsResponse** message.

A.49 Create a certification path validation policy for authentication server configuration

Name: HelperCreateCertPathValidationPolicyForAuthServer

Notes: Annex is used at:

- ONVIF Security Configuration Device Test Specification

- ONVIF Uplink Test Specification
- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Media2 Configuration Device Test Specification

Procedure Purpose: Helper procedure to create a certification path validation policy for authentication server configuration.

Pre-requisite: Security Configuration Service is received from the DUT. Certification path validation policy supported by the DUT as indicated by the MaximumNumberOfCertificationPathValidationPolicies capability. UploadCertificate is supported by the DUT as indicated by the PKCS10ExternalCertificationWithRSA or PKCS10 capability. The DUT shall have enough free storage capacity for one additional certification path validation policy. The DUT shall have enough free storage capacity for one additional certification path. The DUT shall have enough free storage capacity for one additional certificate. The DUT shall have enough free storage capacity for one additional key pair.

Input: The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*). The certification path validation policy alias (*certPathValidationPolicyAlias*). The subject (*subject*) of CA certificate (optional input parameter, could be skipped).

Returns: The certification path validation policy identifier (*certPathValidationPolicyID*), related certificate (*certID*), key pair (*keyID*), CA certificate (out *CAcert*) CA certificate private key (out *privateKey*).

Procedure:

1. ONVIF Client creates a CA certificate and a corresponding private key by following the procedure described in Annex A.27 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - out *CAcert* - CA certificate
   - out *privateKey* - private key
2. ONVIF Client invokes **UploadCertificate** with parameters
   - Certificate := *CAcert*
   - Alias := "ONVIF Test"
   - PrivateKeyRequired : = false
3. The DUT responds with a **UploadCertificateResponse** message with parameters

- CertificateID =: *certID*
- KeyID =: *keyID*

4. ONVIF Client creates certification path validation policy identifier with specified alias and the certificate identifier for trust anchor by following the procedure mentioned in Annex A.50 with the following input and output parameters:.
   - in *certID* - certificate identifier for trust anchor
   - in *certPathValidationPolicyAlias* - certification path validation policy alias
   - out *certPathValidationPolicyID* - certification path validation policy identifier

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **UploadCertificateResponse** message.

A.50 Create a certification path validation policy with provided certificate identifier

Name: HelperCreateCertPathValidationPolicyWithCertID

Notes: Annex is used at:

- ONVIF Security Configuration Device Test Specification
- ONVIF Uplink Test Specification
- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to create a certification path validation policy with provided certificate identifier.

Pre-requisite: Security Configuration Service is received from the DUT. Certification path validation policy supported by the DUT as indicated by the MaximumNumberOfCertificationPathValidationPolicies capability. The DUT shall have enough free storage capacity for one additional certification path validation policy.

Input: The certification path validation policy alias (*alias*) and the certificate identifier (*certID*) for trust anchor.

Returns: The certification path validation policy identifier (*certPathValidationPolicyID*).

Procedure:

1. ONVIF Client invokes **CreateCertPathValidationPolicy** with parameters
   - Alias := *alias*
   - Parameters.RequireTLSWWWClientAuthExtendedKeyUsage skipped
   - Parameters.UseDeltaCRLs = true
   - Parameters.anyParameters skipped
   - TrustAnchor[0].CertificateID := *certID*
   - anyParameters skipped
2. The DUT responds with **CreateCertPathValidationPolicyResponse** message with parameters
   - CertPathValidationPolicyID := *certPathValidationPolicyID*

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreateCertPathValidationPolicyResponse** message.

A.51 Provide certificate signed by private key of other certificate

Name: HelperCreateSignedCertificate

Notes: Annex is used at:

- ONVIF Security Configuration Device Test Specification
- ONVIF Uplink Test Specification

- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to create an X.509 certificate signed by private key of other certificate.

Pre-requisite: None.

Input: The subject (*subject*) of certificate and private key (*inputPrivateKey*) of the CA-certificate (*cert*). The service capabilities (*cap*). The key pair algorithm (*keyAlgorithm*). Certificate SAN (*certSAN*, optional).

Returns: An X.509 certificate (*cert*) signed by input private key that is compliant to [RFC 5280] and a corresponding key pair (*keyPair*) with the corresponding private key and public key.

Procedure:

1. ONVIF Client generates a key pair by following the procedure mentioned in Annex A.28 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *keyAlgorithm* - key pair algorithm
   - out *keyPair* - key pair
2. ONVIF Client selects signature algorithm by following the procedure mentioned in Annex A.24 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *inputPrivateKey*.algorithm - key pair algorithm
   - out *signatureAlgorithm* - signature algorithm
3. ONVIF Client creates an X.509 certificate signed by *inputPrivateKey* that is compliant to [RFC 5280] and has the following properties:
   - version:= v3
   - signature := *signatureAlgorithm*
   - publicKey := *keyPair*.publicKey
   - validity := validity from *cert*
   - subject := *subject*
   - SAN := *certSAN*

- issuerDN := subjectDN from *cert*

Note: ONVIF Client may return the same certificate in subsequent invocations of this procedure for the same subject and private key.

A.52 Create Key Pair and Receive Public Key

Name: HelperCreateKeyPairAndReceivePublicKey

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification
- ONVIF Uplink Test Specification

Procedure Purpose: Helper procedure to create a key pair and get public key from the device.

Pre-requisite: Security Configuration Service is received from the DUT. Create PCKS#10 supported by the DUT as indicated by the PKCS10 or PKCS10ExternalCertificationWithRSA capability. On-board ECC or RSA key pair generation is supported by the DUT as indicated by the ECCKeyPairGeneration or RSAKeyPairGeneration capability. The DUT shall have enough free storage capacity for one additional key pair. Current time of the DUT shall be at least Jan 01, 1970.

Input: The service capabilities (*cap*). The CSR key pair algorithm (*csrKeyAlgorithm*).

Returns: The identifier of the new key pair (*keyID*), a public key (*publicKey*).

Procedure:

1. ONVIF Client creates a key pair by following the procedure mentioned in Annex A.21 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in *csrKeyAlgorithm* - key pair algorithm
   - out *csrKeyID* - key pair ID
2. ONVIF Client selects signature algorithm by following the procedure mentioned in Annex A.24 with the following input and output parameters:
   - in *cap* - DUT capabilities
   - in csrKeyAlgorithm - key pair algorithm

- out *caSignatureAlgorithm* - signature algorithm

3. ONVIF Client invokes **CreatePKCS10CSR** with parameters
   - Subject := *subject* (see Annex A.25)
   - KeyID := *csrKeyID*
   - CSRAttribute skipped
   - SignatureAlgorithm.algorithm := *signatureAlgorithm*
4. The DUT responds with **CreatePKCS10CSRResponse** message with parameters
   - PKCS10CSR =: *PKCS10request*
5. ONVIF Client extracts public key *publicKey* from *PKCS10request*.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **CreatePKCS10CSRResponse** message.

A.53 Configure WebRTC On Device and Prepare Environment for Testing

Name: HelperConfigureWebRTCAndPrepareEnvironment

Procedure Purpose: Helper procedure configures WebTRC on Device and starts signaling service.

Pre-requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. WebRTC streaming is supported by DUT. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability.

Input: Security Configuration Service Capabilities (*cap*). Authorization server configuration token (*authServerConfToken*). Authorization scope (*scope*). Authentication server metadata endpoint (*authServerMetadataEndpoint1*). Media Profile token (*mediaProfileToken*).

Returns: Signaling server uri (*signalingServerUri1*).

Procedure:

1. Set:
   - *keyAlgorithm* := **"ECC"** if *cap*.KeystoreCapabilities.ECCKeyPairGeneration = true; **"RSA"** otherwise.
2. ONVIF Client prepares WebRTC configuration using the following steps:
   2.1. ONVIF Client creates certification path validation policy by following the procedure mentioned in Annex A.49 with the following input and output parameters
      - in *cap* - DUT capabilities
      - in *keyAlgorithm* - DUT capabilities
      - in "C=US,O=ONVIF,CN=ONVIF TT SignalingServer 1" - CA certificate subject
      - in "Test CertPathValidationPolicy SignalingServer Alias" - certification path validation policy alias
      - out *certPathValidationPolicyIDSignalingServer* - certification path validation policy identifier
      - out *certIDSignalingServer* - certificate identifier
      - out *keyIDSignalingServer* - RSA key pair identifier
      - out *CACertSignalingServer* - CA certificate
      - out *privateKeyCACertSignalingServer* - CA certificate private key

   2.2. ONVIF Client creates a certificate signed by private key of the CA-certificate with subject and a corresponding public key in the certificate along with the corresponding private key by following the procedure described in Annex A.51 with the following input and output parameters:
      - in *cap* - DUT capabilities
      - in "C=US,O=ONVIF,CN=*Signaling Server IP Address*,C=US" - certificate subject
      - in "*Signaling Server IP Address*" - certificate SAN
      - in *CACertSignalingServer* - CA-certificate
      - in *privateKeyCACertSignalingServer* - private key of CA-certificate for certificate signature

- out *certSignalingServer* - certificate
- out *publicKeySignalingServer* - public key of certificate
- out *privateKeySignalingServer* - private key of certificate

2.3. ONVIF Client starts ONVIF signaling server with address *signalingServerUri1* with following settings:

- It is configured to use *certSignalingServer* as a server certificate.
- It is configured to use *authServerMetadataEndpoint1* as a authentication server and accepts authentication tokens for authorization scope (*scope*).

2.4. ONVIF Client invokes **SetWebRTCConfigurations** request with parameters

- WebRTCConfiguration[0].SignalingServer := *signalingServerUri1*
- WebRTCConfiguration[0].CertPathValidationPolicyID := *certPathValidationPolicyIDSignalingServer*
- WebRTCConfiguration[0].AuthorizationServer := *authServerConfToken*
- WebRTCConfiguration[0].DefaultProfile := *mediaProfileToken*
- WebRTCConfiguration[0].Enabled := true
- WebRTCConfiguration[0].Connected is skipped
- WebRTCConfiguration[0].Error is skipped

2.5. The DUT responds with **SetWebRTCConfigurationsResponse** message.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **SetWebRTCConfigurationsResponse** message.

A.54 Concurrent Video Streaming over WebRTC

Name: HelperStreamingWebRTCInstances

Procedure Purpose: Helper procedure to verify concurrent video streaming over WebRTC for provided list of media profiles.

Pre-requisite: Security Configuration Service is received from the DUT. Media2 Service is received from the DUT. WebRTC streaming is supported by DUT. The DUT is configured without rotation (either 0 degrees or rotation is OFF) if rotation is supported. Authorization Server Configuration is supported by the DUT as indicated by the AuthorizationServer.MaxConfigurations capability. At least one of authorization server configuration types mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ConfigurationTypesSupported capability. At least one of authentication method mentioned at Annex A.45 is supported by the DUT as indicated by the AuthorizationServer.ClientAuthenticationMethodsSupported capability.

Input: List of media profiles (*configuredProfilesList*). Uri for signaling server (*signalingServerUri*). Expected media stream encoding (*encoding*).

Returns: None

Procedure:

1. ONVIF Client performs registration at ONVIF Signaling Server:

    1.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.

    1.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:

    - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
    - id is skipped
    - name is skipped

    1.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:

    - id =: *clientId1*

2. The DUT perform registration at ONVIF signaling server:

    2.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

2.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

2.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities (if specified by the DUT)

2.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

2.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

3. For each Media Profile *profile1* from *configuredProfilesList* repeat the following steps:

3.1. The DUT and ONVIF Client performs connection exchange:

3.1.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*
- authorization := *clientAccessToken1*
- profile := *profile1*.@token

3.1.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1* (to be different for each connection)
- profile := *profile1*.@token
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped

3.1.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities (if specified by the DUT)

3.1.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped
- capabilities (if received from the DUT)

3.2. The DUT and ONVIF Client performs invitation procedure:

3.2.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

- session := *sessionId1*
- offer := *SDP for default profile*
- subprotocols (if specified by the DUT)

3.2.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

3.2.3. If *sdpOffer1* does not contain m=video with rtpmap value corresponding to *profile1*.Configurations.VideoEncoder.Encoding and session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

3.2.4. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for video)

3.2.5. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

3.3. ONVIF Client and ONVIF Device completes setup of WebRTC peer-to-peer connection to start video streaming using **trickle** request(s) with parameters:

- session := *sessionId1*
- candidate := ICE Candidate SDP update based on SDP

3.4. If DUT does not send *profile1*.Configurations.VideoEncoder.Encoding RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test and skip other steps.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **register** request.
- DUT did not send response for **connect** requests(s).
- DUT did not send **invite** request(s).
- At least one WebRTC peer-to-peer session is terminated by DUT during media streaming.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

Note: See Annex A.9 for invalid RTP header definition.

A.55 Media Streaming over WebRTC - RTCP Feedback

Name: HelperStreamingWebRTCRTCPFeedback

Procedure Purpose: Helper procedure to verify RTCP Feedback for media streaming over WebRTC.

Pre-requisite: None

Input: Uri for signaling server (*signalingServerUri*). Media type (*mediaType*).

Returns: None

Procedure:

1. ONVIF Client performs registration at ONVIF Signaling Server:
   1.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.
   1.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:
      - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
      - id is skipped
      - name is skipped
   1.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:
      - id =: *clientId1*
2. The DUT perform registration at ONVIF signaling server:
   2.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.
   2.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.
   2.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:
      - authorization := *accessToken1*
      - id (if specified by the DUT)
      - name (if specified by the DUT)
      - capabilities (if specified by the DUT)
   2.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

2.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

3. The DUT and ONVIF Client performs connection exchange:

3.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*
- authorization := *clientAccessToken1*
- profile is skipped

3.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1*
- profile is skipped
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped

3.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities (if specified by the DUT)

3.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped
- capabilities (if received from the DUT)

4. The DUT and ONVIF Client performs invitation procedure:

4.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

- session := *sessionId1*

- offer := *SDP for default profile*
- subprotocols (if specified by the DUT)

4.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

4.3. If *sdpOffer1* does not contain m=*mediaType* with rtpmap value corresponding to *encoding*, session attribute "sendonly" (a=sendonly).

4.4. If *sdpOffer1* does not contain RTCP Feedback Capability attribute (a=rtcp-fb) indicating PLI (a=rtcp-fb:{* or media type payload} nack pli) applicable for media type found at step 3, FAIL the test and skip other steps.

4.5. If *sdpOffer1* does not contain RTCP Feedback Capability attribute (a=rtcp-fb) indicating FIR (a=rtcp-fb:{* or media type payload} ccm fir) applicable for media type found at step 3, FAIL the test and skip other steps.

4.6. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for video)

4.7. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

5. ONVIF Client invokes **FIR** RTCP message over WebRTC peer-to-peer connection for video stream.
6. The DUT sends decoder refresh point.
7. ONVIF Client invokes **PLI** RTCP message over WebRTC peer-to-peer connection for video stream.
8. The DUT sends IDR frame.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send response for **connect** request.
- DUT did not send **invite** request.
- WebRTC peer-to-peer session is terminated by DUT during media streaming.
- DUT did not send decoder refresh point at step 6.
- DUT did not send IDR frame at step 8.

A.56 Device Configuration for Audio Streaming

Name: HelperDeviceConfigurationForAudioStreaming

Procedure Purpose: Helper procedure to configure Media profile, 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*), Audio encoding set in profile (*requiredAudioEncoding*).

Procedure:

1. ONVIF Client selects a Media Profile with required audio encoding support by following the procedure mentioned in Annex A.57 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. if *protocol* = RtspMulticast:
   2.1. ONVIF Client removes Video Encoder Configuration and Metadata Configuration from media profile by following the procedure mentioned in Annex A.58 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.Bitrate := the nearest value to *profile*.Configurations.AudioEncoder.Bitrate from *aecOptions*BitrateList.Items list
- 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.5 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.6 for Name and Token Parameters Length limitations.

A.57 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.58 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.59 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.57 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.Name := *profile*.Configurations.AudioEncoder.Name
   - Configuration.UseCount := *profile*.Configurations.AudioEncoder.UseCount
   - Configuration.Encoding := *requiredAudioEncoding*
   - 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.Bitrate := the nearest value to *profile*.Configurations.AudioEncoder.Bitrate from *aecOptions*BitrateList.Items list
- 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.3 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.5 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.6 for Name and Token Parameters Length limitations.

A.60 Device Configuration for WebRTC Audio Streaming using Media Profile that contains only Audio Configurations

Name: HelperProfileConfigurationForWebRTCAudioOnlyStreaming

Procedure Purpose: Helper procedure to configure Media Profile with Audio Source Configuration and Audio Encoder Configuration only for WebRTC streaming.

Pre-requisite: Media2 Service is received from the DUT. Audio streaming is supported by the DUT. WebRTC streaming is supported by the DUT.

Input: Required audio encoding (*requiredAudioEncoding*).

Returns: Profile token (*profileToken*).

Procedure:

1. ONVIF Client selects a Media Profile with required audio encoding support by following the procedure mentioned in Annex A.57 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 sets audio encoder configuration by following the procedure mentioned in Annex A.61 with the following input and output parameters

- in *profile* - Media profile
- in *aecOptions* - audio encoder configuration options

3. Set *confTypeList* := (VideoSource, VideoEncoder, AudioOutput, AudioDecoder, Metadata, Analytics, PTZ)
4. ONVIF Client removes all configurations except AudioSource and AudioEncoder from the Media Profile by following the procedure mentioned in Annex A.3 with the following input and output parameters
   - in *confTypeList* - list of configuration type to remove from Media Profile
   - in *profile* - Media Profile to update
5. Set:
   - *profileToken* := *profile*.@token

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **SetAudioEncoderConfigurationResponse** message.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

A.61 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*) (optional parameter). IP version (*ipVersion*) (optional parameter).

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 or skipped:
  - 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.Bitrate := the nearest value to *profile*.Configurations.AudioEncoder.Bitrate from *aecOptions*BitrateList.Items list
- 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.62 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.

3.4. Set *audioOutputConfiguration* := *profile1*.Configuration.AudioOutput.

3.5. ONVIF Client invokes **GetAudioDecoderConfigurationOptions** request with parameters

- ConfigurationToken := *profile1*.Configuration.AudioDecoder.@token
- ProfileToken := *profile1*.@token

3.6. DUT responds with **GetAudioDecoderConfigurationOptionsResponse** message with parameters

- Options list =: *adcOptionsList*

3.7. If *requiredAudioDecoding* = AAC:

3.7.1. If *adcOptionsList* list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

3.7.1.1. Set *profile* := *profile1*.

3.7.1.2. Set *requiredAudioDecoding* := "MP4A-LATM" if *adcOptionsList* contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

3.7.1.3. Go to step 6.

3.8. If *requiredAudioDecoding* != AAC:

3.8.1. If *adcOptionsList* list contains item with Encoding = *requiredAudioDecoding*:

3.8.1.1. Set *profile* := *profile1*.

3.8.1.2. Go to step 6.

4. For each Media Profile *profile1* in *profileList* repeat the following steps:

4.1. ONVIF Client invokes **GetAudioOutputConfigurations** request with parameters

- ConfigurationToken skipped
- ProfileToken := *profile1*.@token

4.2. The DUT responds with **GetAudioOutputConfigurationsResponse** with parameters

- Configurations list =: *audioOutputConfList*

4.3. For each Audio Output Configuration *audioOutputConfiguration1* in *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.OutputToken := *audioOutputConfiguration*.OutputToken

- 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.5 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.63 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 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.8 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.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

A.64 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*
   - SDP information =: *sdp*
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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 3.

A.65 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.32 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.33 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 rtpmap 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.8 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 7.

A.66 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 (*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 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 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*
   - Response header =: *responseHeader*
   - SDP information =: *sdp*
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.8 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.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.67 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*
   - Response header =: *responseHeader*
   - SDP information =: *sdp*
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.8 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.10.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at step 5.

A.68 Media2 Service – Media Profile Configuration for Audio Backchannel WebRTC Streaming

Name: HelperConfigMediaProfileForBackchannelWebRTCStreaming

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 for WebRTC streaming.

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*).

Returns:

- Media profile token (*profileToken*) containing Audio Output Configuration and Audio Decoder Configuration with the required audio decoding.
- Audio decoding set in profile (*profileAudioDecoding*).

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. Set *profileAudioDecoding* := *requiredAudioDecoding*.
4. For each Media Profile *profile1* in *profileList* with both Configuration.AudioOutput and Configuration.AudioDecoder repeat the following steps:
   4.1. ONVIF Client invokes **GetAudioOutputConfigurationOptions** request with parameters

- ConfigurationToken := *profile1*.Configuration.AudioOutput.@token
- ProfileToken := *profile1*.@token

4.2. DUT responds with **GetAudioOutputConfigurationOptionsResponse** message with parameters

- Options =: *aocOptions*

4.3. 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.

4.4. Set *audioOutputConfiguration* := *profile1*.Configuration.AudioOutput.

4.5. ONVIF Client invokes **GetAudioDecoderConfigurationOptions** request with parameters

- ConfigurationToken := *profile1*.Configuration.AudioDecoder.@token
- ProfileToken := *profile1*.@token

4.6. DUT responds with **GetAudioDecoderConfigurationOptionsResponse** message with parameters

- Options list =: *adcOptionsList*

4.7. If *requiredAudioDecoding* = AAC:

4.7.1. If *adcOptionsList* list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

4.7.1.1. Set *profileToken* := *profile1*.@token.

4.7.1.2. Set *profileAudioDecoding* := "MP4A-LATM" if *adcOptionsList* contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

4.7.1.3. Go to step 7.

4.8. If *requiredAudioDecoding* != AAC:

4.8.1. If *adcOptionsList* list contains item with Encoding = *requiredAudioDecoding*:

4.8.1.1. Set *profileToken* := *profile1*.@token.

4.8.1.2. Go to step 7.

5. For each Media Profile *profile1* in *profileList* repeat the following steps:

5.1. ONVIF Client invokes **GetAudioOutputConfigurations** request with parameters

- ConfigurationToken skipped
- ProfileToken := *profile1*.@token

5.2. The DUT responds with **GetAudioOutputConfigurationsResponse** with parameters

- Configurations list =: *audioOutputConfList*

5.3. For each Audio Output Configuration *audioOutputConfiguration1* in *audioOutputConfList* repeat the following steps:

5.3.1. ONVIF Client invokes **GetAudioOutputConfigurationOptions** request with parameters

- ConfigurationToken := *audioOutputConfiguration1*.@token
- ProfileToken := *profile1*.@token

5.3.2. DUT responds with **GetAudioOutputConfigurationOptionsResponse** message with parameters

- Options =: *aocOptions*

5.3.3. 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.

5.3.4. Set *audioOutputConfiguration* := *audioOutputConfiguration1*.

5.3.5. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile1*.@token
- Name skipped
- Configuration[0].Type := AudioOutput
- Configuration[0].Token := *audioOutputConfiguration1*.@token

5.3.6. The DUT responds with **AddConfigurationResponse** message.

5.3.7. ONVIF Client invokes **GetAudioDecoderConfigurations** request with parameters

- ConfigurationToken skipped

- ProfileToken := *profile1*.@token

5.3.8. The DUT responds with **GetAudioDecoderConfigurationsResponse** with parameters

- Configurations list =: *audioDecoderConfList*

5.3.9. For each Audio Decoder Configuration *audioDecoderConfiguration1* in *audioDecoderConfList* repeat the following steps:

5.3.9.1. ONVIF Client invokes **GetAudioDecoderConfigurationOptions** request with parameters

- ConfigurationToken := *audioDecoderConfiguration1*.@token
- ProfileToken := *profile1*.@token

5.3.9.2. DUT responds with **GetAudioDecoderConfigurationOptionsResponse** message with parameters

- Options list =: *adcOptionsList*

5.3.9.3. If *requiredAudioDecoding* = AAC:

5.3.9.3.1. If *adcOptionsList* list contains item with Encoding = "MP4A-LATM" or "MPEG4-GENERIC":

5.3.9.3.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile1*.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := *audioDecoderConfiguration1*.@token

5.3.9.3.1.2. The DUT responds with **AddConfigurationResponse** message.

5.3.9.3.1.3. Set *profileToken* := *profile1*.@token.

5.3.9.3.1.4. Set *requiredAudioDecoding* := "MP4A-LATM" if *adcOptionsList* contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

5.3.9.3.1.5. Go to step 7.

5.3.9.4. If *requiredAudioDecoding* = !AAC:

5.3.9.4.1. If *adcOptionsList* list contains item with Encoding = *requiredAudioDecoding*:

5.3.9.4.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile1*.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := *audioDecoderConfiguration1*.@token

5.3.9.4.1.2. The DUT responds with **AddConfigurationResponse** message.

5.3.9.4.1.3. Set *profileToken* := *profile1*.@token.

5.3.9.4.1.4. Go to step 7.

6. FAIL the test and skip other steps.

7. If *audioOutputConfiguration*.SendPrimacy = www.onvif.org/ver20/HalfDuplex/Server:

7.1. ONVIF Client invokes **SetAudioOutputConfiguration** request with parameters

- Configuration.@token := *audioOutputConfiguration*.@token
- Configuration.Name := *audioOutputConfiguration*.Name
- Configuration.UseCount := *audioOutputConfiguration*.UseCount
- Configuration.OutputToken := *audioOutputConfiguration*.OutputToken

- 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

7.2. DUT responds with **SetAudioOutputConfigurationResponse** message.

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.69 Backchannel Audio Streaming over WebRTC with Default Profile

Name: HelperBackchannelStreamingWebRTCDefaultProfile

Procedure Purpose: Helper procedure to verify backchannel audio streaming over WebRTC with default media profile usage.

Pre-requisite: None

Input:

- Uri for signaling server (*signalingServerUri*).
- Expected audio backchannel stream encoding (*encoding*).

Returns: None

Procedure:

1. ONVIF Client performs registration at ONVIF Signaling Server:

   1.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.

   1.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:

   - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
   - id is skipped
   - name is skipped

   1.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:

   - id =: *clientId1*

2. The DUT perform registration at ONVIF signaling server:

   2.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

   2.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

   2.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

   - authorization := *accessToken1*
   - id (if specified by the DUT)
   - name (if specified by the DUT)
   - capabilities (if specified by the DUT)

   2.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

   - id =: *endpointId1*

   2.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

3. The DUT and ONVIF Client performs connection exchange:

   3.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

   - peer := *peerId1*
   - authorization := *clientAccessToken1*
   - profile is skipped

   3.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

   - session := *sessionId1*
   - profile is skipped
   - iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
   - expiryTimeSeconds is skipped

   3.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

   - capabilities (if specified by the DUT)

   3.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

   - session =: *sessionId1*
   - iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
   - expiryTimeSeconds is skipped
   - capabilities (if received from the DUT)

4. The DUT and ONVIF Client performs invitation procedure:

   4.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

   - session := *sessionId1*
   - offer := *SDP for default profile*
   - subprotocols (if specified by the DUT)

   4.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

4.3. If *sdpOffer1* does not contain m=audio with rtpmap value corresponding to *encoding* and session attribute "recvonly" (a=recvonly) or "sendrecv" (a=sendrecv) or omitted, FAIL the test and skip other steps.

4.4. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for audio backchannel)

4.5. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

5. ONVIF Client and ONVIF Device completes setup of WebRTC peer-to-peer connection to start *mediaType* and *mediaType2* (if specified) streaming using **trickle** request(s) with parameters:
   - session := *sessionId1*
   - candidate := ICE Candidate SDP update based on SDP
6. ONVIF Client sends RTP Unicast audio stream with *encoding* to the DUT over WebRTC peer-to-peer connection.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **register** request.
- DUT did not send response for **connect** request.
- DUT did not send **invite** request.
- WebRTC peer-to-peer session is terminated by DUT during media streaming.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

Note: See Annex A.9 for invalid RTP header definition.

A.70 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

- ConfigurationToken := *metadataConf*.@token
- ProfileToken := *profile*.@token

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.71 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.72 with the following input and output parameters

   - in *profile* - Media Profile

8. ONVIF Client sets the following:

   - *metadataConfiguration*.@token := *profile*.Configurations.Metadata.@token
   - *metadataConfiguration*.Name := *profile*.Configurations.Metadata.Name
   - *metadataConfiguration*.UseCount := *profile*.Configurations.Metadata.UseCount
   - if *mcOptions*.Extention.CompressionType skipped:
     - *metadataConfiguration*.@CompressionType skipped
   - If *mcOptions*.Extention.CompressionType is not skipped:
     - *metadataConfiguration*.@CompressionType := None
   - If *mcOptions*.PTZStatusFilterOptions.PanTiltStatusSupported is equal to false and *mcOptions*.PTZStatusFilterOptions.ZoomStatusSupported is equal to false and *mcOptions*.PTZStatusFilterOptions.PanTiltPositionSupported is equal to false and *mcOptions*.PTZStatusFilterOptions.ZoomPositionSupported is equal to false:
     - *metadataConfiguration*.PTZStatus skipped
   - If at least on element value within *mcOptions*.PTZStatusFilterOptions is equal to true:
     - *metadataConfiguration*.PTZStatus.Status := true if *mcOptions*.PTZStatusFilterOptions.PanTiltStatusSupported or *mcOptions*.PTZStatusFilterOptions.ZoomStatusSupported is equal to true. Otherwice *metadataConfiguration*.PTZStatus.Status := false
     - *metadataConfiguration*.PTZStatus.Position := true if *mcOptions*.PTZStatusFilterOptions.PanTiltPositionSupported or *mcOptions*.PTZStatusFilterOptions.ZoomPositionSupported is equal to true. Otherwice *metadataConfiguration*.PTZStatus.Position := false
   - *metadataConfiguration*.Events
   - *metadataConfiguration*.Events.Filter skipped
   - *metadataConfiguration*.Events.SubscriptionPolicy skipped

- If *profile*.Configurations contains Analytics:
  - *metadataConfiguration*.Analytics := true
- If *profile*.Configurations does not contain Analytics:
  - *metadataConfiguration*.Analytics skipped
- If *transportProtocol* is not equal to RtspMulticast:
  - *metadataConfiguration*.Multicast := *profile*.Configurations.Metadata.Multicast
- If *transportProtocol* is equal to RtspMulticast:
  - If *ipType* is equal to IPv4:
    - *metadataConfiguration*.Multicast.Address.Type := IPv4
    - *metadataConfiguration*.Multicast.Address.IPv4Address := multicast IPv4 address
    - *metadataConfiguration*.Multicast.Address.IPv6Address skipped
  - If *ipType* is equal to IPv6:
    - *metadataConfiguration*.Multicast.Address.Type := IPv6
    - *metadataConfiguration*.Multicast.Address.IPv4Address skipped
    - *metadataConfiguration*.Multicast.Address.IPv6Address := multicast IPv6 address
  - *metadataConfiguration*.Multicast.Port := port for multicast streaming
  - *metadataConfiguration*.Multicast.TTL := 1
  - *metadataConfiguration*.Multicast.AutoStart := 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.3 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.5 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.71 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.72 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.73 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.8 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

- 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
   - Configuration.Name := *metadataConfiguration*.Name
   - Configuration.UseCount := *metadataConfiguration*.UseCount
   - Configuration.@CompressionType := *metadataConfiguration*.CompressionType
   - Configuration.PTZStatus := *metadataConfiguration*.PTZStatus
   - Configuration.PTZStatus.Status := *metadataConfiguration*.PTZStatus.Status
   - Configuration.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
   - Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"
   - 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart

- 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.74 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.8 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.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
    - Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"
    - 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart
    - Configuration.SessionTimeout := *metadataConfiguration*.SessionTimeout
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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.75 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.8 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
   - Configuration.Name := *metadataConfiguration*.Name
   - Configuration.UseCount := *metadataConfiguration*.UseCount

- Configuration.@CompressionType := *metadataConfiguration*.CompressionType
- Configuration.PTZStatus := *metadataConfiguration*.PTZStatus
- Configuration.PTZStatus.Status := *metadataConfiguration*.PTZStatus.Status
- Configuration.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
- Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"
- 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart
- 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 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
    - 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.76 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.8 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.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
- Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"
- 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart
- Configuration.SessionTimeout := *metadataConfiguration*.SessionTimeout

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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.77 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.32 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.33 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.8 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.PTZStatus.Status := *metadataConfiguration*.PTZStatus.Status
- Configuration.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
- Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"
- 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart
- 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.78 Media2 Service – Media Profile Configuration for Metadata & Audio Streaming

Name: HelperConfigureMediaProfileForMetadataAndAudioStreaming

Procedure Purpose: Helper procedure to configure Media Profile to contain Audio 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 Audio 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.AudioSource 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 **GetAudioSourceConfigurations** request with parameters
      - ConfigurationToken skipped
      - ProfileToken := *profile*.@token

   4.2. The DUT responds with **GetAudioSourceConfigurationsResponse** with parameters
      - Configurations list =: *audioSourceConfList*

   4.3. For each Audio Source Configuration *audioSourceConfiguration* in *audioSourceConfList* repeat the following steps:
      4.3.1. ONVIF Client invokes **AddConfiguration** request with parameters
         - ProfileToken := *profile*.@token
         - Name skipped
         - Configuration[0].Type := AudioSource
         - Configuration[0].Token := *audioSourceConfiguration*.@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

- ConfigurationToken := *metadataConf*.@token
- ProfileToken := *profile*.@token

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. Set *confTypeList* := (PTZ, Analytics, VideoSource, VideoEncoder, AudioEncoder)

7. ONVIF Client removes PTZ and Analytics services, Video Source Configuration, Video Encoder Configuration and Audio Encoder Configuration from the Media Profile by following the procedure mentioned in Annex A.3 with the following input and output parameters
   - in *confTypeList* - list of configuration type to remove from Media Profile
   - in *profile* - Media Profile to update

8. ONVIF Client invokes **GetMetadataConfigurationOptions** request with parameters
   - ConfigurationToken := *profile*.Configuration.Metadata.@token
   - ProfileToken := *profile*.@token

9. DUT responds with **GetMetadataConfigurationOptionsResponse** message with parameters
   - Options =: *metadataOptions*

10. ONVIF Client sets the following:
    - *metadataConfiguration*.@token := *profile*.Configurations.Metadata.@token
    - *metadataConfiguration*.Name := *profile*.Configurations.Metadata.Name
    - *metadataConfiguration*.UseCount := *profile*.Configurations.Metadata.UseCount
    - if *metadataOptions*.Extention.CompressionType skipped:
      - *metadataConfiguration*.@CompressionType skipped
    - If *metadataOptions*.Extention.CompressionType is not skipped:
      - *metadataConfiguration*.@CompressionType := None
    - *metadataConfiguration*.Events
    - *metadataConfiguration*.Events.Filter skipped
    - *metadataConfiguration*.Events.SubscriptionPolicy skipped
    - If *transportProtocol* is not equal to RtspMulticast:

- *metadataConfiguration*.Multicast := *profile*.Configurations.Metadata.Multicast

- If *transportProtocol* is equal to RtspMulticast:
  - If *ipType* is equal to IPv4:
    - *metadataConfiguration*.Multicast.Address.Type := IPv4
    - *metadataConfiguration*.Multicast.Address.IPv4Address := multicast IPv4 address
    - *metadataConfiguration*.Multicast.Address.IPv6Address skipped
  - If *ipType* is equal to IPv6:
    - *metadataConfiguration*.Multicast.Address.Type := IPv6
    - *metadataConfiguration*.Multicast.Address.IPv4Address skipped
    - *metadataConfiguration*.Multicast.Address.IPv6Address := multicast IPv6 address
  - *metadataConfiguration*.Multicast.Port := port for multicast streaming
  - *metadataConfiguration*.Multicast.TTL := 1
  - *metadataConfiguration*.Multicast.AutoStart := false
- *metadataConfiguration*.SessionTimeout := *profile*.Configurations.Metadata.SessionTimeout

11. ONVIF Client invokes **SetMetadataConfiguration** request with parameters
    - Configuration := *metadataConfiguration*
    - Configuration.SessionTimeout := *profile*.Configurations.Metadata.SessionTimeout
12. The DUT responds with **SetMetadataConfigurationResponse** message.
13. ONVIF Client retrieves a stream uri for Media Profile for required transport protocol by following the procedure mentioned in Annex A.5 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 **GetAudioSourceConfigurationsResponse** message.
- DUT did not send **AddConfigurationResponse** message.
- DUT did not send **GetMetadataConfigurationsResponse** message.
- DUT did not send **SetMetadataConfigurationResponse** message.

A.79 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*
   - 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.8 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;multicast;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
   - 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
   - Configuration.Name := *metadataConfiguration*.Name
   - Configuration.UseCount := *metadataConfiguration*.UseCount
   - Configuration.@CompressionType := *metadataConfiguration*.CompressionType
   - Configuration.PTZStatus := *metadataConfiguration*.PTZStatus
   - Configuration.PTZStatus.Status := *metadataConfiguration*.PTZStatus.Status
   - Configuration.PTZStatus.Position := *metadataConfiguration*.PTZStatus.Position
   - Configuration.Events.Filter.TopicExpression.Dialect := "http://www.onvif.org/ver10/tev/topicExpression/ConcreteSet"

- 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.Multicast.AutoStart := *metadataConfiguration*.Multicast.AutoStart
- 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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

A.80 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.61 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

- ConfigurationToken := *profile*.Configuration.VideoEncoder.@token
- ProfileToken := *profile*.@token

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.81 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.3 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, otherwivce item with Encoding = H265.

9.5.3.4. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.81 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.82 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.61 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

9.5.3.6.2 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.3 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.5 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.6 for Name and Token Parameters Length limitations.

A.81 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*) (optional parameter). IP version (*ipVersion*) (optional parameter).

Returns: None.

Procedure:

1. 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 := *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)
  - Configuration.RateControl.BitrateLimit := min {max {*profile*.Configurations.VideoEncoder.RateControl.BitrateLimit, *vecOptions*.BitrateRange.Min}, *vecOptions*.BitrateRange.Max}
- if *protocol* is not equal to RtspMulticast or skipped:
  - 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.82 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
   - ProfileToken := *profile*.@token

- Name skipped
- Configuration[0].Type := AudioSource
- Configuration[0].Token := *audioSourceConfiguration*.@token

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 = "MP4A-LATM" 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.83 Device Configuration for Video and Audio WebRTC Streaming

Name: HelperProfileConfigurationForWebRTCVideoAndAudioStreaming

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.
- Video streaming is supported by the DUT.
- H.264 encoding OR H.265 encoding is supported by the DUT.
- Audio streaming is supported by the DUT.
- WebRTC streaming is supported by the DUT.

Input: Required audio encoding (*requiredAudioEncoding*).

Returns: Media profile token (*profileToken*).

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.61 with the following input and output parameters

- in *profile* - Media profile
- in *aecOptions* - audio encoder configuration options

3.1.5.2. ONVIF Client invokes **GetVideoEncoderConfigurationOptions** request with parameters

- ConfigurationToken := *profile*.Configuration.VideoEncoder.@token
- ProfileToken := *profile*.@token

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.81 with the following input and output parameters

- in *profile* - Media profile
- in *vecOptions* - video encoder configuration options

3.1.5.6. Go to step 11.

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.3 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, otherwivce item with Encoding = H265.

9.5.3.4. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.81 with the following input and output parameters

- in *profile* - Media profile
- in *vecOptions* - video encoder configuration options

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.82 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.61 with the following input and output parameters

- in *profile* - Media profile
- in *aecOptions* - audio encoder configuration options

9.5.3.6.2 Go to step 11.

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. Set:

- *profileToken* := *profile*.@token

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **GetProfilesResponse** message.
- DUT did not send **GetAudioEncoderConfigurationOptionsResponse** message.
- DUT did not send **GetVideoEncoderConfigurationOptionsResponse** message.
- DUT did not send **GetVideoSourceConfigurationsResponse** message.
- DUT did not send **GetVideoEncoderConfigurationsResponse** message.
- DUT did not send **AddConfigurationResponse** message.
- DUT did not send **RemoveConfigurationResponse** message.

Note: See Annex A.6 for Name and Token Parameters Length limitations.

A.84 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.3 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 *requiredAudioDecoder* := "MP4A-LATM" if *adcOptionsList* contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

8.5.4. If *requiredAudioDecoder* = !AAC:

8.5.4.1. If *adcOptionsList* list contains item with Encoding = *requiredAudioDecoding*:

8.5.4.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile*.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := *audioDecoderConfiguration*.@token

8.5.4.1.2. 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.85 with the following input and output parameters

- in *profile* - Media profile
- out (optional) *vecOptions* - Video Encoder Configuration Options for the Media Profile
- out (optional) *aecOptions* - Audio Encoder Configuration Options for the Media Profile

8.5.5.2. If *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.OutputToken := *profile*.Configurations.AudioOutput.OutputToken
    - 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.5 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.6 for Name and Token Parameters Length limitations.

A.85 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

- Options list =: *optionsList*

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, otherwivce item with Encoding = H265.

3.5.3.4. ONVIF Client sets video encoder configuration by following the procedure mentioned in Annex A.81 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.86 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.61 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.86 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.82 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.82 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 –

- None.

A.87 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.8 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
    - RTP-Info
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.9 for invalid RTP header definition.

Note: ONVIF Client checks authentication type for all RTSP requests by following the procedure mentioned in Annex A.10.

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.

A.88 Device Configuration for Audio Backchannel and Video and Audio Streaming

Name: HelperDeviceConfigurationForAllStreamingWebRTC

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 over WebRTC.

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*).

Returns:

- Media profile token (*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.3 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 *requiredAudioDecoder* := "MP4A-LATM" if *adcOptionsList* contains item with Encoding = "MP4A-LATM", otherwise "MPEG4-GENERIC".

8.5.4. If *requiredAudioDecoder* = !AAC:

8.5.4.1. If *adcOptionsList* list contains item with Encoding = *requiredAudioDecoding*:

8.5.4.1.1. ONVIF Client invokes **AddConfiguration** request with parameters

- ProfileToken := *profile*.@token
- Name skipped
- Configuration[0].Type := AudioDecoder
- Configuration[0].Token := *audioDecoderConfiguration*.@token

8.5.4.1.2. 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.85 with the following input and output parameters

- in *profile* - Media profile
- out (optional) *vecOptions* - Video Encoder Configuration Options for the Media Profile
- out (optional) *aecOptions* - Audio Encoder Configuration Options for the Media Profile

8.5.5.2. If *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.OutputToken := *profile*.Configurations.AudioOutput.OutputToken
    - Configuration.SendPrimacy skipped
    - Configuration.OutputLevel := *profile*.Configurations.AudioOutput.OutputLevel
11. DUT responds with **SetAudioOutputConfigurationResponse** message.
12. Set:
    - *profileToken* := *profile*.@token

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.6 for Name and Token Parameters Length limitations.

A.89 Backchannel Audio, Audio, and Video Streaming over WebRTC with Default Profile

Name: HelperAllStreamingWebRTCDefaultProfile

Procedure Purpose: Helper procedure to verify simultaneous backchannel audio, audio, and video streaming over WebRTC with default media profile usage.

Pre-requisite: None

Input:

- Uri for signaling server (*signalingServerUri*).
- Expected audio backchannel stream encoding (*audioBackchannelEncoding*).
- Expected audio stream encoding (*audioEncoding*).
- Expected video stream encoding (*videoEncoding*).

Returns: None

Procedure:

1. ONVIF Client performs registration at ONVIF Signaling Server:
   1.1. ONVIF Client opens connection to *signalingServerUri1* with *clientAccessToken1* and verifies certificate provided by ONVIF Signaling Server.
   1.2. ONVIF Client invokes **register** request to ONVIF Signaling Server over established connection with parameters:
      - authorization := ONVIF Client access token valid for the signaling server (*clientAccessToken1*)
      - id is skipped
      - name is skipped

1.3. ONVIF Signaling Server responds to ONVIF Client on **register** request with the following parameters:

- id =: *clientId1*

2. The DUT perform registration at ONVIF signaling server:

2.1. The DUT receives access token *accessToken1* from authorization server defined at WebRTC Configuration.

2.2. The DUT opens connection to *signalingServerUri1* with *accessToken1* and verifies certificate provided by ONVIF Signaling Server at WebSoket connection establishment based on certification path validation policy defined at WebRTC Configuration.

2.3. The DUT invokes **register** request to ONVIF Signaling Server over established connection with parameters:

- authorization := *accessToken1*
- id (if specified by the DUT)
- name (if specified by the DUT)
- capabilities (if specified by the DUT)

2.4. ONVIF Signaling Server responds to the DUT on **register** request with the following parameters:

- id =: *endpointId1*

2.5. ONVIF Signaling Server provides peer id *peerId1* for registered DUT to ONVIF Client using proprietary protocol between ONVIF Signaling Server and ONVIF Client.

3. The DUT and ONVIF Client performs connection exchange:

3.1. ONVIF Client invokes **connect** request to ONVIF Signaling Server over established connection with parameters:

- peer := *peerId1*
- authorization := *clientAccessToken1*
- profile is skipped

3.2. ONVIF Signaling Server invokes **connect** request to the DUT with parameters

- session := *sessionId1*

- profile is skipped
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped

3.3. The DUT responds to ONVIF Signaling Server on **connect** request with parameters:

- capabilities (if specified by the DUT)

3.4. ONVIF Signaling Server responds to ONVIF Client on **connect** request with the following parameters:

- session =: *sessionId1*
- iceServers := [{"urls":["stun:*stunServerAddress1*"]}]
- expiryTimeSeconds is skipped
- capabilities (if received from the DUT)

4. The DUT and ONVIF Client performs invitation procedure:

4.1. The DUT invokes **invite** request to ONVIF Signaling Server over established connection with parameters:

- session := *sessionId1*
- offer := *SDP for default profile*
- subprotocols (if specified by the DUT)

4.2. ONVIF Signaling Server invokes **invite** request to the ONVIF Client with parameters:

- session := *sessionId1*
- offer := *sdpOffer1*
- subprotocols (if specified by the DUT)

4.3. If *sdpOffer1* does not contain m=audio with rtpmap value corresponding to *audioBackchannelEncoding* and session attribute "recvonly" (a=recvonly) or "sendrecv" (a=sendrecv) or omitted , FAIL the test and skip other steps.

4.4. If *sdpOffer1* does not contain m=audio with rtpmap value corresponding to *audioEncoding* and session attribute "sendonly" (a=sendonly) or "sendrecv" (a=sendrecv) or omitted, FAIL the test and skip other steps.

4.5. If *sdpOffer1* does not contain m=video with rtpmap value corresponding to *videoEncoding* and session attribute "sendonly" (a=sendonly), FAIL the test and skip other steps.

4.6. ONVIF Client responds to ONVIF Signaling Server on **invite** request with parameters:

- answer := *sdpAnswer* (ONVIF Client forms SDP-answer based on *sdpOffer1* to initiate streaming for video, audio, and audio backchannel)

4.7. ONVIF Signaling Server responds to the DUT on **invite** request with the following parameters:

- answer := *sdpAnswer*

5. ONVIF Client and ONVIF Device completes setup of WebRTC peer-to-peer connection to start video, audio, and audio backchannel streaming using **trickle** request(s) with parameters:

- session := *sessionId1*
- candidate := ICE Candidate SDP update based on SDP

6. ONVIF Client sends RTP Unicast audio stream with *audioBackchannelEncoding* to the DUT over WebRTC peer-to-peer connection.

7. If DUT does not send *videoEncoding* RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test and skip other steps.

8. If DUT does not send *audioEncoding* RTP media stream to ONVIF Client over WebRTC peer-to-peer connection, FAIL the test and skip other steps.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **register** request.
- DUT did not send response for **connect** request.
- DUT did not send **invite** request.
- WebRTC peer-to-peer session is terminated by DUT during media streaming.

Note: Requests exchange between ONVIF Client and ONVIF Signaling Server is out of testing scope and provided for information proposes.

Note: See Annex A.9 for invalid RTP header definition.

Note: If *encoding* = MP4A-LATM, then rtpmap value may be equal either MP4A-LATM or MPEG4-GENERIC at steps 4.5.

A.90 Find Media Profile for Streaming

Name: HelperFindMediaProfileForStreaming

Notes: Annex is used at:

- ONVIF Real Time Streaming using Media2 Device Test Specification

Procedure Purpose: Helper procedure to find existing Media Profile to contain Video Source Configuration and Video Encoder Configuration or Audio Source Configuration and Audio Encoder Configuration.

Pre-requisite: Media2 Service is received from the DUT. Video Streaming or Audio Streaming is supported by the DUT.

Input: None.

Returns: Media Profile (*profile1*) containing Video Source Configuration and Video Encoder Configuration or Audio Source Configuration and Audio Encoder Configuration.

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 *profilesListWithVideo1* := all items from *profileList* which item with Configurations contains both Video Source Configuration and Video Encoder Configuration
4. If *profilesListWithVideo1* is not empty:

   4.1. Set *profile1* := *profilesListWithVideo1*[0]

4.2. Skip other steps of the annex.

5. Set *profilesListWithAudio1* := all items from *profileList* which item with Configurations contains both Audio Source Configuration and Audio Encoder Configuration

6. If *profilesListWithAudio1* is not empty:

   6.1. Set *profile1* := *profilesListWithAudio1*[0]

   6.2. Skip other steps of the annex.

7. FAIL the test and skip other steps.

Procedure Result:

PASS –

- DUT passes all assertions.

FAIL –

- DUT did not send **GetProfilesResponse** message.