ONVIF®

Profile T Specification

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REVISION HISTORY

Vers.	Date	Description	Contributors
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1 Scope

This document defines the mandatory and conditional features required by an ONVIF device and ONVIF client that support Profile T.

2 Normative references

This section defines the normative references applicable to this specification.

2.1 Normative references

- **IANA Media Type Reference**

  < http://www.iana.org/assignments/media-types/media-types.xhtml **>**

- **ONVIF Profile Policy**

  < http://www.onvif.org/profiles>

- **ONVIF Network Interface Specifications**

  < https://www.onvif.org/profiles/specifications/ >

3 Terms and definitions

This section provides common terms and definitions used in this specification.

3.1 Definitions

profile — See [ONVIF Profile Policy]

ONVIF device — Networked hardware appliance or software program that exposes one or multiple ONVIF Web Services

ONVIF client — Networked hardware appliance or software program that uses ONVIF Web Services.

tns1 — A prefix for the ONVIF topic namespace "http://www.onvif.org/ver10/topics". This prefix is not part of the standard and an implementation can use any prefix. See [ONVIF Network Interface Specifications] Core Specification description of Namespaces for details.

4 Technical specification version requirement

Implementation of ONVIF Network Interface Specifications, version 18.06 or later is required for conformance to Profile T.

5 Requirement levels

Each feature in this document has a requirement level for device and client that claim conformance to Profile T and contains a Function List that states the functions requirement level for device and client that implement that feature.

The requirement levels for features are:

- **Mandatory = Feature that shall be implemented by an ONVIF device or ONVIF client.**
- **Conditional = Feature that shall be implemented by an ONVIF device or ONVIF client if it supports that functionality in any way, including any proprietary way. Features that are conditional are marked with "if supported" in a profile specification.**

The requirement levels for functions are:

- **Mandatory = Function that shall be implemented by an ONVIF device or ONVIF client.**
- **Conditional = Function that shall be implemented by an ONVIF device or ONVIF client if it supports that functionality.**
- **Optional = Function that may be implemented by an ONVIF device or ONVIF client.**

Function Lists use the following abbreviations:

- **M = Mandatory**
- **C = Conditional**
- **O = Optional**

All functions shall be implemented as described in the corresponding [ONVIF Network Interface Specifications].

6 Overview

An ONVIF profile is described by a fixed set of functionalities through a number of services that are provided by the ONVIF standard. A number of services and functionalities are mandatory for each type of ONVIF profile. An ONVIF device and client may support any combination of profiles and other optional services and functionalities.

An ONVIF device conformant with Profile T is an ONVIF device that sends video data over an IP network to a client. Profile T also includes support for a number of features, including but not limited to: imaging, metadata streaming, onscreen display, and motion alarm events. Other features that may be supported on the device include PTZ, analytics, motion region configuration, bidirectional audio, digital inputs, and relay outputs. For example, a device conformant with Profile T may be an IP network camera or an encoder device.

An ONVIF client conformant with Profile T is an ONVIF client that can configure, request, and control streaming of video data over an IP network from an ONVIF device conformant with Profile T. Profile T also includes support for control of a number of features, including but not limited to imaging and motion alarm events. Other features that may be supported by the client include metadata streaming, onscreen display, PTZ, analytics, motion region configuration, bidirectional audio, digital inputs, and relay outputs.

7 Profile mandatory features (normative)

Devices and clients conformant to Profile T shall support the following features. The requirements represent the minimum functionality that must be implemented for conformance.

7.1 User authentication

This section describes the required method of user authentication.

7.1.1 Device requirements

- Device shall authenticate HTTP requests using Digest authentication as described by the **Core Specification**.
- Device shall authenticate RTSP requests using Digest authentication as described by the **Core Specification**.
- Device shall authenticate RTSP requests tunneled over HTTP using Digest authentication on the RTSP level as described by the **Core Specification**.

7.1.2 Client requirements

- Client shall support authenticating HTTP requests using Digest authentication as described by the **Core Specification**.
- Client shall support authenticating RTSP requests using Digest authentication as described by the **Core Specification**.
- Client shall support authenticating RTSP requests tunneled over HTTP using Digest authentication on the RTSP level as described by the **Core Specification**.

7.1.3 Function list for devices

User Authentication		**Device MANDATORY**
Function	**Service**	**Requirement**
Digest authentication	Core	M

7.1.4 Function list for clients

User Authentication		**Client MANDATORY**
Function	**Service**	**Requirement**
Digest authentication	Core	M

7.2 Capabilities

This section describes the operations related to obtaining the capabilities of a device.

7.2.1 Device requirements

- Device shall support **GetServices** and **GetServiceCapabilities** as detailed in the **Core Specification**.
- Device shall support **GetServiceCapabilities** as detailed in the **Media 2**, **Imaging**, and **Device IO Service Specifications**.
- If supported, device shall support **GetServiceCapabilities** as detailed in the **Analytics** and **PTZ Service Specifications**.
- Device shall provide the WSDL URL in response to the **GetWsdlUrl** operation.
- Device shall indicate support for at least two pull point subscriptions by returning **MaxPullPoints** set to no less than two in the response to **GetServiceCapabilities** in the event service.
- Device shall return its capabilities for the maximum number of profiles (**MaximumNumberOfProfiles**) in the **GetServiceCapabilities** response of the Media 2 service.

7.2.2 Client requirements

- Client shall determine the available **Services** using the **GetServices** operation.

7.2.3 Function list for devices

Capabilities		**Device MANDATORY**
Function	**Service**	**Requirement**
GetServices	Device Management	M
GetServiceCapabilities	Device Management	M
GetWsdlUrl	Device Management	M
GetServiceCapabilities	Event	M
GetServiceCapabilities	Media 2	M
GetServiceCapabilities	Imaging	M
GetServiceCapabilities	PTZ	C
GetServiceCapabilities	DeviceIO	M
GetServiceCapabilities	Analytics	C

7.2.4 Function list for clients

Capabilities		Client MANDATORY
Function	**Service**	**Requirement**
GetServices	Device Management	M
GetServiceCapabilities	Device Management	O
GetWsdlUrl	Device Management	O
GetServiceCapabilities	Event	O
GetServiceCapabilities	Media 2	O
GetServiceCapabilities	Imaging	O
GetServiceCapabilities	PTZ	O
GetServiceCapabilities	DeviceIO	O
GetServiceCapabilities	Analytics	O

7.3 Discovery

This section describes the operations related to device discovery.

7.3.1 Device requirements

- Device shall support **WS-Discovery** as specified in the **Core Specification**.
- Device shall support discovery mode using the operations **GetDiscoveryMode** and **SetDiscoveryMode**.
- Device shall support listing, adding, modifying and removing discovery scopes using the operations **GetScopes**, **AddScopes**, **SetScopes** and **RemoveScopes**
- Device shall support the Profile T-specific scope parameter presented in 7.3.5 **Scope Parameters**.

7.3.2 Client requirements

- Client shall be able to discover a device using **WS-Discovery** as specified in the **Core Specification**.

7.3.3 Function list for devices

Discovery		**Device MANDATORY**
Function	**Service**	**Requirement**
WS-Discovery	Core	M
GetDiscoveryMode	Device Management	M
SetDiscoveryMode	Device Management	M
GetScopes	Device Management	M
SetScopes	Device Management	M
AddScopes	Device Management	M
RemoveScopes	Device Management	M

7.3.4 Function list for clients

Discovery		Client MANDATORY
Function	**Service**	**Requirement**
WS-Discovery	Core	M
GetDiscoveryMode	Device Management	O
SetDiscoveryMode	Device Management	O
GetScopes	Device Management	O
SetScopes	Device Management	O
AddScopes	Device Management	O
RemoveScopes	Device Management	O

7.3.5 Scope parameters

Discovery		
Category	**Defined Values**	**Description**
Profile	T	The scope indicates if the device is conformant with Profile T. A device conformant with Profile T shall include a scope entry with this value in its scope list.

7.4 Network configuration

This section describes the operations related to the configuration of network settings on the device.

7.4.1 Device requirements

- Device shall support listing and configuring the device hostname using the **GetHostName** and **SetHostName** operations.
- Device shall support listing and configuring the DNS values using the **GetDNS** and **SetDNS** operations.
- Device shall support listing and configuring supported network interfaces on the device using the **GetNetworkInterfaces** and **SetNetworkInterfaces** operations.
- Device shall support listing and configuring supported network protocols on the device using the **GetNetworkProtocols** and **SetNetworkProtocols** operations.
- Device shall support listing and configuring the default gateway of the device using the **GetNetworkDefaultGateway** and **SetNetworkDefaultGateway** operations.

7.4.2 Client requirements

- Client shall be able to list and configure supported network interfaces on the device using the **GetNetworkInterfaces** and **SetNetworkInterfaces** operations.
- Client shall be able to list and set the default gateway of the device using the **GetNetworkDefaultGateway** and **SetNetworkDefaultGateway** operations.

7.4.3 Function list for devices

Network Configuration		**Device MANDATORY**
Function	**Service**	**Requirement**
GetHostName	Device Management	M
SetHostName	Device Management	M
GetDNS	Device Management	M
SetDNS	Device Management	M
GetNetworkInterfaces	Device Management	M
SetNetworkInterfaces	Device Management	M
GetNetworkProtocols	Device Management	M
SetNetworkProtocols	Device Management	M
GetNetworkDefaultGateway	Device Management	M
SetNetworkDefaultGateway	Device Management	M

7.4.4 Function list for clients

Network Configuration		Client MANDATORY
Function	**Service**	**Requirement**
GetHostName	Device Management	O
SetHostName	Device Management	O
GetDNS	Device Management	O
SetDNS	Device Management	O
GetNetworkInterfaces	Device Management	M
SetNetworkInterfaces	Device Management	M
GetNetworkProtocols	Device Management	O
SetNetworkProtocols	Device Management	O
GetNetworkDefaultGateway	Device Management	M
SetNetworkDefaultGateway	Device Management	M

7.5 System

This section describes the operations related to obtaining device information and the configuration of device settings.

7.5.1 Device requirements

- Device shall support the listing of device information such as manufacturer, model and firmware version using the **GetDeviceInformation** operation.
- Device shall support listing and configuring the date and time on the device using the **GetSystemDateAndTime** and **SetSystemDateAndTime** operations.
- Device shall support the ability to return to factory settings using the **SetSystemFactoryDefault** operation.
- Device shall support rebooting using the **SystemReboot** operation.

7.5.2 Client requirements (if supported)

- Client shall be able to get device information such as manufacturer, model and firmware version using the **GetDeviceInformation** operation.

7.5.3 Function list for devices

System		**Device MANDATORY**
Function	**Service**	**Requirement**
GetDeviceInformation	Device Management	M
GetSystemDateAndTime	Device Management	M
SetSystemDateAndTime	Device Management	M
SetSystemFactoryDefault	Device Management	M
SystemReboot	Device Management	M

7.5.4 Function list for clients

System		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetDeviceInformation	Device Management	M
GetSystemDateAndTime	Device Management	O
SetSystemDateAndTime	Device Management	O
SetSystemFactoryDefault	Device Management	O
SystemReboot	Device Management	O

7.6 User handling

This section describes the operations related to managing users on the device.

7.6.1 Device requirements

- Device shall support creating, listing, modifying and deleting users from the device using the **CreateUsers**, **GetUsers**, **SetUser** and **DeleteUsers** operations.

7.6.2 Client requirements (if supported)

- Client shall be able to create, list, modify and delete users from the device using the **CreateUsers**, **GetUsers**, **SetUser** and **DeleteUsers** operations.

7.6.3 Function list for devices

User Handling		**Device MANDATORY**
Function	**Service**	**Requirement**
GetUsers	Device Management	M
CreateUsers	Device Management	M
DeleteUsers	Device Management	M
SetUser	Device Management	M

7.6.4 Function list for clients

User Handling		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetUsers	Device Management	M
CreateUsers	Device Management	M
DeleteUsers	Device Management	M
SetUser	Device Management	M

7.7 Event handling

This section describes the operations related to retrieving and filtering events. The Real-time Pull-Point Notification Interface as covered by the **Core Specification** is Mandatory for Profile T conformance.

7.7.1 Device requirements

- Device shall support event handling with a pull point using the **SetSynchronizationPoint**, **CreatePullPointSubscription** and **PullMessage** operations.
- Device shall support retrieval of supported filter dialects and topics using the **GetEventProperties** operation.
- Device shall support event filtering using **Message Content Filter** and **Topic Filter** as described in the **Core Specification**.
- Device shall return the following **MessageContentFilterDialect** in response to **GetEventProperties**:
    - http://www.onvif.org/ver10/tev/messageContentFilter/ItemFilter
- Device shall support subscription management using the **Unsubscribe** operation.
- Device shall support at least two concurrent pull point subscriptions.

7.7.2 Client requirements

- Client shall implement event handling with a pull point using the **SetSynchronizationPoint**, **CreatePullPointSubscription** and **PullMessage** operations.

7.7.3 Function list for devices

Event Handling		**Device MANDATORY**
Function	**Service**	**Requirement**
SetSynchronizationPoint	Event	M
CreatePullPointSubscription	Event	M
PullMessages	Event	M
GetEventProperties	Event	M
Unsubscribe	Event	M
Filter parameter of CreatePullPointSubscriptionRequest	Event	M
MessageContentFilterDialect http://www.onvif.org/ver10/tev/messageContentFilter/ItemFilter	Event	M

7.7.4 Function list for clients

Event Handling		Client MANDATORY
Function	**Service**	**Requirement**
SetSynchronizationPoint	Event	M
CreatePullPointSubscription	Event	M
PullMessages	Event	M
GetEventProperties	Event	O
Unsubscribe	Event	O
Filter parameter of CreatePullPointSubscriptionRequest	Event	O
MessageContentFilterDialect http://www.onvif.org/ver10/tev/messageContentFilter/ItemFilter	Event	C*

*Client shall support this dialect if Message Content Filter is supported.

7.8 Media profile management

This section describes the operations related to the creation and deletion of **Media Profiles**.

7.8.1 Device requirements

- Device shall support creation of **Media Profiles** using the **CreateProfile** operation, containing at least one of the configuration types **Video Source Configuration**, **Audio Source Configuration** or **Audio Output Configuration**.
- Device shall support deletion of **Media Profiles** using the **DeleteProfile** operation.
- Device shall return its capabilities for the maximum number of concurrent streams in the **GetVideoEncoderInstances** response.
- For each **Video Source Configuration** returned by **GetVideoSourceConfigurations** the device shall support creation of a minimum of as many **Media Profiles** as instances returned by **GetVideoEncoderInstances** for that video source configuration token.
- Device shall deliver event notifications when a **Media Profile** is created or deleted.

7.8.2 Client requirements (if supported)

- Client shall be able to create **Media Profiles** using the **CreateProfile** operation, containing at least one of the configuration types **Video Source Configuration**, **Audio Source Configuration** or **Audio Output Configuration**.
- Client shall be able to query the maximum number of concurrent streams using the **GetVideoSourceConfigurations** and **GetVideoEncoderInstances** operations.

7.8.3 Function list for devices

Media Profile Management		**Device MANDATORY**
Function	**Service**	**Requirement**
CreateProfile	Media 2	M
DeleteProfile	Media 2	M
GetVideoSourceConfigurations	Media 2	M
GetVideoEncoderInstances	Media 2	M
tns1:Media/ProfileChanged	Event	M

7.8.4 Function list for clients

Media Profile Management		Client CONDITIONAL
Function	**Service**	**Requirement**
CreateProfile	Media 2	M
DeleteProfile	Media 2	O
GetVideoSourceConfigurations	Media 2	M
GetVideoEncoderInstances	Media 2	M
tns1:Media/ProfileChanged	Event	O

7.9 Video streaming

This section describes the operations related to the setup and control of video streaming.

7.9.1 Device requirements

- Device shall provide at least one ready-to-use **Media Profile** for streaming H.264 or H.265 video per video source.
- Device shall support listing of **Media Profiles** in response to the **GetProfiles** operation.
- Device shall return the stream URI in response to the **GetStreamUri** operation.
- Device shall support streaming of at least one of the H.264 and H.265 encoding formats**.**
- Device shall support initiation of streaming sessions using RTSP according to the **Streaming Service Specification**.
- Device shall be able to stream video over RTP/UDP using the selected **Media Profile**.
- Device shall be able to stream video over RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, device shall be able to stream video over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- Device shall be able to stream video over RTP/UDP multicast using the selected **Media Profile**.
- If supported, device shall be able to stream video over RTP/RTSP/TCP/WebSocket using the selected **Media Profile**.
- Device shall send a key frame on-demand upon reception of the **SetSynchronizationPoint** operation when streaming H.264 or H.265.

7.9.2 Client requirements

- Client shall be able to request the stream URI for the selected **Media Profile** using the **GetProfiles** and **GetStreamURI** operations.
- Client shall be able to initiate streaming sessions using RTSP according to the **Streaming Service Specification**.
- Client shall be able to receive a stream and decode H.264 video using the selected **Media Profile**.
- Client shall be able to receive a stream and decode H.265 video using the selected **Media Profile**.

- Client shall be able to receive a video stream over RTP/UDP or RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, client shall be able to receive a video stream over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- If supported, client shall be able to receive a video stream over RTP/UDP multicast using the selected **Media Profile**.

7.9.3 Function list for devices

Video Streaming		**Device MANDATORY**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Video Streaming using RTSP	Streaming	M
H.264 Encoding	Media 2	M*
H.265 Encoding	Media 2	
Streaming over RTP/UDP	Streaming	M
Streaming over RTP/RTSP/HTTP/TCP	Streaming	M
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/UDP Multicast	Streaming	M
Streaming over RTP/RTSP/TCP/WebSocket	Streaming	C
SetSynchronizationPoint	Media 2	M

* Device shall support at least one of the listed encoding formats. H.264 and H.265 are conditionally required.

7.9.4 Function list for clients

Video Streaming		Client MANDATORY
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Video Streaming using RTSP	Streaming	M
H.264 Decoding	Media 2	M
H.265 Decoding	Media 2	M
Streaming over RTP/UDP	Streaming	M*
Streaming over RTP/RTSP/HTTP/TCP	Streaming	
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/UDP Multicast	Streaming	C
Streaming over RTP/RTSP/TCP/WebSocket	Streaming	O
SetSynchronizationPoint	Media 2	O

* Client shall support at least one of the listed transport methods.

7.10 Configuration of video profile

This section describes the operations related to the configuration of **Media Profiles** for video streaming.

7.10.1 Device requirements

- Device shall support listing of **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support listing of video sources in response to the **GetVideoSources** operation.
- Device shall support adding a **Video Source Configuration** to a **Media Profile** using the **GetVideoSourceConfigurations** and **AddConfiguration** operations.
- Device shall support adding a **Video Encoder Configuration** to a **Media Profile** using the **GetVideoEncoderConfigurations** and **AddConfiguration** operations.
- Device shall support removing a **Video Source Configuration** or a **Video Encoder Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when a **Video Source Configuration** or **Video Encoder Configuration** is added or removed from a **Media Profile**.

7.10.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to add a **Video Encoder Configuration** to a **Media Profile** using the **GetVideoEncoderConfigurations** and **AddConfiguration** operations.

7.10.3 Function list for devices

Configuration of Video Profile		**Device MANDATORY**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetVideoSources	DeviceIO	M
GetVideoSourceConfigurations	Media 2	M
AddConfiguration	Media 2	M
GetVideoEncoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

7.10.4 Function list for clients

Configuration of Video Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetVideoSources	DeviceIO	O
GetVideoSourceConfigurations	Media 2	O
AddConfiguration	Media 2	M
GetVideoEncoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

7.11 Video source configuration

This section describes the operations related to the listing and modification of video source configurations on the device.

7.11.1 Device requirements

- Device shall support listing of **Video Source Configurations** using the **GetVideoSourceConfigurations** operation.
- For each **Video Source Configuration**, device shall return the list of options in response to the **GetVideoSourceConfigurationOptions** operation.
- Device shall support setting the current **Video Source Configuration** using the **SetVideoSourceConfiguration** operation.
- Device shall deliver event notifications when a **Video Source Configuration** is changed.

7.11.2 Client requirements (if supported)

- Client shall be able to retrieve the current **Video Source Configurations** using the **GetVideoSourceConfigurations** operation.
- Client shall be able to modify a **Video Source Configuration** using the **GetVideoSourceConfigurationOptions** and **SetVideoSourceConfiguration** operations.

7.11.3 Function list for devices

Video Source Configuration		**Device MANDATORY**
Function	**Service**	**Requirement**
GetVideoSourceConfigurations	Media 2	M
GetVideoSourceConfigurationOptions	Media 2	M
SetVideoSourceConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	M

7.11.4 Function list for clients

Video Source Configuration		Client CONDITIONAL
Function	**Service**	**Requirement**
GetVideoSourceConfigurations	Media 2	M
GetVideoSourceConfigurationOptions	Media 2	M
SetVideoSourceConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	O

7.12 Video encoder configuration

This section describes the operations related to the listing and modification of video encoder configurations on the device.

7.12.1 Device requirements

- Device shall support listing of **Video Encoder Configurations** using the **GetVideoEncoderConfigurations** operation.
- For each **Video Encoder Configuration**, device shall return the list of options in response to the **GetVideoEncoderConfigurationOptions** operation.
- Device shall support setting the current **Video Encoder Configuration** using the **SetVideoEncoderConfiguration** operation.
- Device shall deliver event notifications when a **Video Encoder Configuration** is changed.

7.12.2 Client requirements

- Client shall be able to modify a **Video Encoder Configuration** using the **GetVideoEncoderConfigurationOptions** and **SetVideoEncoderConfiguration** operations.

7.12.3 Function list for devices

Video Encoder Configuration		**Device MANDATORY**
Function	**Service**	**Requirement**
GetVideoEncoderConfigurations	Media 2	M
GetVideoEncoderConfigurationOptions	Media 2	M
SetVideoEncoderConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	M

7.12.4 Function list for clients

Video Encoder Configuration		**Client MANDATORY**
Function	**Service**	**Requirement**
GetVideoEncoderConfigurations	Media 2	O
GetVideoEncoderConfigurationOptions	Media 2	M
SetVideoEncoderConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	O

7.13 Metadata streaming

This section describes the operations related to metadata streaming.

7.13.1 Device requirements

- Device shall support listing of **Media Profiles** in response to the **GetProfiles** operation.
- Device shall return the stream URI in response to the **GetStreamUri** operation.
- Device shall support initiation of streaming sessions using RTSP according to the **Streaming Service Specification**.
- Device shall be able to stream metadata over RTP/UDP using the selected **Media Profile**.
- Device shall be able to stream metadata over RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, device shall be able to stream metadata over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- If supported, device shall be able to stream metadata over RTP/RTSP/TCP/WebSocket using the selected **Media Profile**.
- Device shall be able to stream metadata over RTP/UDP multicast using the selected **Media Profile**.
- Device shall send a key frame on-demand upon reception of the **SetSynchronizationPoint** operation when streaming metadata. The content of the key frame for the metadata stream depends on the filters configured/enabled in MetadataConfiguration such as PTZ Status and Property Events.

7.13.2 Client requirements (if supported)

- Client shall be able to get the stream URI for the selected profile using the **GetProfiles** and **GetStreamURI** operations.
- Client shall initiate streaming sessions using RTSP according to the **Streaming Service Specification**.
- Client shall be able to receive a metadata stream over RTP/UDP or RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, client shall be able to receive a metadata stream over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- If supported, client shall be able to receive a metadata stream over RTP/UDP multicast using the selected **Media Profile**.

7.13.3 Function list for devices

Metadata Streaming		Device MANDATORY
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Metadata Streaming using RTSP	Streaming	M
Streaming over RTP/UDP	Streaming	M
Streaming over RTP/RTSP/HTTP/TCP	Streaming	M
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/Websocket	Streaming	C
Streaming over RTP/UDP Multicast	Streaming	M
SetSynchronizationPoint	Media 2	M

7.13.4 Function list for clients

Metadata Streaming		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Metadata Streaming using RTSP	Streaming	M
Streaming over RTP/UDP	Streaming	M*
Streaming over RTP/RTSP/HTTP/TCP	Streaming	
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/Websocket	Streaming	O
Streaming over RTP/UDP Multicast	Streaming	C
SetSynchronizationPoint	Media 2	O

* Client shall support at least one of the listed transport methods.

7.14 Configuration of metadata profile

This section describes the operations related to the configuration of **Media Profiles** for metadata streaming.

7.14.1 Device requirements

- Device shall return available **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support adding a **Metadata Configuration** to a **Media Profile** using the **GetMetadataConfigurations** and **AddConfiguration** operations.
- Device shall support removing a **Metadata Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when a **Metadata Configuration** is added or removed from a **Media Profile**.

7.14.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to add a **Metadata Configuration** to a **Media Profile** using the **GetMetadataConfigurations** and **AddConfiguration** operations.

7.14.3 Function list for devices

Configuration of Metadata Profile		**Device MANDATORY**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetMetadataConfigurations	Media 2	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

7.14.4 Function list for clients

Configuration of Metadata Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetMetadataConfigurations	Media 2	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

7.15 Metadata configuration

This section describes the operations related to metadata configuration.

7.15.1 Device requirements

- Device shall provide the current **Metadata Configurations** in response to the **GetMetadataConfigurations** operation.
- Device shall support modifying a **Metadata Configuration** using the **GetMetadataConfigurationOptions** and **SetMetadataConfiguration** operations.
- Device shall deliver event notifications when a **Metadata Configuration** is changed.

7.15.2 Client requirements (if supported)

- Client shall be able to retrieve the current **Metadata Configurations** using the **GetMetadataConfigurations** operation.
- Client shall be able to modify a **Metadata Configuration** using the **SetMetadataConfiguration** operations**.**

7.15.3 Function list for devices

Metadata Configuration		**Device MANDATORY**
Function	**Service**	**Requirement**
GetMetadataConfigurations	Media 2	M
GetMetadataConfigurationOptions	Media 2	M
SetMetadataConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	M

7.15.4 Function list for clients

Metadata Configuration		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetMetadataConfigurations	Media 2	M
GetMetadataConfigurationOptions	Media 2	O
SetMetadataConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	O

7.16 Imaging settings

This section describes the operations related to the manipulation of imaging settings.

7.16.1 Device requirements

- Device shall return available video sources in response to the **GetVideoSources** operation.
- Device shall support listing of imaging settings using the **GetImagingSettings** operation.
- Device shall be able to modify imaging settings using the **GetOptions** and **SetImagingSettings** operations.

7.16.2 Client requirements

- Client shall be able to retrieve current imaging settings using the **GetImagingSettings** operation.
- Client shall be able to modify imaging settings using the **GetOptions** and **SetImagingSettings** operations.

7.16.3 Function list for devices

Imaging Settings		**Device MANDATORY**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	M
GetImagingSettings	Imaging	M
GetOptions	Imaging	M
SetImagingSettings	Imaging	M

7.16.4 Function list for clients

Imaging Settings		**Client MANDATORY**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	O
GetImagingSettings	Imaging	M
GetOptions	Imaging	M
SetImagingSettings	Imaging	M

7.17 Tampering

This section describes the operations related to tampering.

7.17.1 Device requirements

- Device shall generate at least one type of Tampering event according to the **Imaging Service Specification**.

7.17.2 Client requirements (if supported)

- Client shall be able to receive all types of Tampering events according to the **Imaging Service Specification**.

7.17.3 Function list for devices

Tampering		**Device MANDATORY**
Function	**Service**	**Requirement**
tns1:VideoSource/ImageTooBlurry/ImagingService	Event	M*
tns1:VideoSource/ImageTooBlurry/AnalyticsService	Event	
tns1:VideoSource/ImageTooDark/ImagingService	Event	
tns1:VideoSource/ImageTooDark/AnalyticsService	Event	
tns1:VideoSource/ImageTooBright/ImagingService	Event	
tns1:VideoSource/ImageTooBright/AnalyticsService	Event	
tns1:VideoSource/GlobalSceneChange/ImagingService	Event	
tns1:VideoSource/GlobalSceneChange/AnalyticsService	Event	

* Device shall support at least one of the listed event topics.

7.17.4 Function list for clients

Tampering		**Client CONDITIONAL**
Function	**Service**	**Requirement**
tns1:VideoSource/ImageTooBlurry/ImagingService	Event	M
tns1:VideoSource/ImageTooBlurry/AnalyticsService	Event	M
tns1:VideoSource/ImageTooDark/ImagingService	Event	M
tns1:VideoSource/ImageTooDark/AnalyticsService	Event	M
tns1:VideoSource/ImageTooBright/ImagingService	Event	M
tns1:VideoSource/ImageTooBright/AnalyticsService	Event	M
tns1:VideoSource/GlobalSceneChange/ImagingService	Event	M
tns1:VideoSource/GlobalSceneChange/AnalyticsService	Event	M

7.18 Configuration of On-Screen Display (OSD)

This section describes the operations related to the configuration of the On-Screen Display (OSD). It also covers adding and removing OSDs in **Media Profiles**.

7.18.1 Device requirements

- Device shall support listing of **Video Source Configurations** using the **GetVideoSourceConfigurations** operation.
- Device shall be able to create OSD text configurations using the **CreateOSD** operation.
- If supported, device shall be able to create OSD image configurations using the **CreateOSD** operation.
- Device shall support deletion of OSDs using the **DeleteOSD** operation.
- Device shall support listing of OSDs using the **GetOSDs** operation.
- Device shall support modification of an OSD using the **GetOSDOptions** and **SetOSD** operations.

7.18.2 Client requirements (if supported)

- Client shall be able to create OSD text configurations using the **CreateOSD** operation.
- If supported, client shall be able to create OSD image configurations using the **CreateOSD** operation.
- Client shall be able to retrieve OSDs using the **GetVideoSourceConfigurations**, **GetOSDs** operation.
- Client shall be able to modify an OSD using the **GetOSDOptions** and **SetOSD** operations.

7.18.3 Function list for devices

Configuration of On-Screen Display		**Device MANDATORY**
Function	**Service**	**Requirement**
CreateOSD, text	Media 2	M
CreateOSD, image	Media 2	C
DeleteOSD	Media 2	M
GetVideoSourceConfigurations	Media 2	M
GetOSDs	Media 2	M
GetOSDOptions	Media 2	M
SetOSD	Media 2	M

7.18.4 Function list for clients

Configuration of On-Screen Display		Client CONDITIONAL
Function	**Service**	**Requirement**
CreateOSD, text	Media 2	M
CreateOSD, image	Media 2	C
DeleteOSD	Media 2	O
GetVideoSourceConfigurations	Media 2	M
GetOSDs	Media 2	M
GetOSDOptions	Media 2	M
SetOSD	Media 2	M

7.19 JPEG snapshot

This section describes the operations related to the providing of a JPEG image snapshot by a device.

7.19.1 Device requirements

- Device shall provide a JPEG snapshot URI in response to the **GetSnapshotUri** operation.

7.19.2 Function list for devices

JPEG Snapshot		**Device MANDATORY**
Function	**Service**	**Requirement**
GetSnapshotUri	Media 2	M

7.19.3 Function list for clients

JPEG Snapshot		**Client OPTIONAL**
Function	**Service**	**Requirement**
GetSnapshotUri	Media 2	O

7.20 Motion alarm events

This section describes the operations related to the **Motion Alarm** event.

7.20.1 Device requirements

- Device shall generate **Motion Alarm** events according to the **Imaging Service Specification**.

7.20.2 Client requirements

- Clients shall receive notifications of **Motion Alarm** events according to the **Imaging Service Specification**.

7.20.3 Function list for devices

Motion Alarm Events		**Device MANDATORY**
Function	**Service**	**Requirement**
tns1:VideoSource/MotionAlarm	Event	M

7.20.4 Function list for clients

Motion Alarm Events		**Client MANDATORY**
Function	**Service**	**Requirement**
tns1:VideoSource/MotionAlarm	Event	M

7.21 Absolute PTZ move

This section describes the requirements for moving a PTZ device to an absolute position. This section covers devices with motors (mechanical PTZ), devices without motors (digital PTZ), and clients that communicate with each category of device.

Some devices only support Pan/Tilt and not Zoom (or vice versa). For this reason, Pan/Tilt operations are listed separately from Zoom operations. To accommodate non-zoom devices, device zoom operations are listed as Conditional.

7.21.1 Device requirements (if supported)

- Device shall provide at least one ready-to-use **Media Profile** for PTZ control per PTZ node.
- Device shall return true for the capability **MoveStatus** and **StatusPosition** in the response to the **GetServiceCapabilities** operation.
- Device shall support providing PTZ status through the **GetStatus** operation.
- Device shall support the **AbsoluteMove** operation.
- A device that supports motorized pan/tilt shall have a PTZ node that lists the following pan/tilt PTZ spaces in the **SupportedPTZSpaces** capability:
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/SphericalPositionSpaceDegrees
- A device that supports pan/tilt shall have a PTZ node that lists the following pan/tilt PTZ spaces in the **SupportedPTZSpaces** capability:
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace
- A device that supports zoom shall have a PTZ node that lists the following zoom PTZ spaces in the **SupportedPTZSpaces** capability:
    - http://www.onvif.org/ver10/tptz/ZoomSpaces/PositionGenericSpace

7.21.2 Client requirements

- Client shall be able to move a PTZ device using the **AbsoluteMove** operation using the following PTZ spaces:
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/SphericalPositionSpaceDegrees
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace
    - http://www.onvif.org/ver10/tptz/ZoomSpaces/PositionGenericSpace

7.21.3 Function list for devices

Absolute PTZ Move		Device CONDITIONAL
Function	**Service**	**Requirement**
AbsoluteMove	PTZ	M
GetStatus	PTZ	M
http://www.onvif.org/ver10/tptz/PanTiltSpaces/SphericalPositionSpaceDegrees	PTZ	C
http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace	PTZ	C
http://www.onvif.org/ver10/tptz/ZoomSpaces/PositionGenericSpace	PTZ	C

7.21.4 Function list for clients

Absolute PTZ Move		Client MANDATORY
Function	**Service**	**Requirement**
AbsoluteMove	PTZ	M
GetStatus	PTZ	O
http://www.onvif.org/ver10/tptz/PanTiltSpaces/SphericalPositionSpaceDegrees	PTZ	M
http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace	PTZ	M
http://www.onvif.org/ver10/tptz/ZoomSpaces/PositionGenericSpace	PTZ	M

7.22 Continuous PTZ move

This section details the requirements for performing a continuous move operation on a PTZ device, and stopping that move operation. Unlike the Absolute Move section, this section does not distinguish between devices with and without motors since the namespaces and functions are the same for both categories.

Some devices only support Pan/Tilt and not Zoom (or vice versa). For this reason, Pan/Tilt operations are listed separately from Zoom operations. To accommodate non-zoom devices, device zoom operations are listed as Conditional.

7.22.1 Device requirements (if supported)

- Device shall provide at least one ready-to-use **Media Profile** for PTZ control per PTZ node.
- Device shall return true for the capability **MoveStatus** in the response to the **GetServiceCapabilities** operation.
- Device shall support providing PTZ status through the **GetStatus** operation.
- Device shall support the **ContinuousMove** and **Stop** operations.
- A device that supports pan/tilt shall have a PTZ node that lists the following pan/tilt PTZ space in the **SupportedPTZSpaces** capability:
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace
- A device that supports zoom shall have a PTZ node that lists the following zoom PTZ space in the **SupportedPTZSpaces** capability:
    - http://www.onvif.org/ver10/tptz/ZoomSpaces/VelocityGenericSpace

7.22.2 Client requirements

- Client shall be able to move a PTZ device using the **ContinuousMove** operation using the following PTZ spaces
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace
    - http://www.onvif.org/ver10/tptz/ZoomSpaces/VelocityGenericSpace
- Client shall be able to stop a continuous move using the **Stop** operation.

7.22.3 Function list for devices

Continuous PTZ Move		Device CONDITIONAL
Function	**Service**	**Requirement**
ContinuousMove	PTZ	M
Stop	PTZ	M
GetStatus	PTZ	M
http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace	PTZ	C
http://www.onvif.org/ver10/tptz/ZoomSpaces/VelocityGenericSpace	PTZ	C

7.22.4 Function list for clients

Continuous PTZ Move		Client MANDATORY
Function	**Service**	**Requirement**
ContinuousMove	PTZ	M
Stop	PTZ	M
GetStatus	PTZ	O
http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace	PTZ	M
http://www.onvif.org/ver10/tptz/ZoomSpaces/VelocityGenericSpace	PTZ	M

8 Profile conditional features (normative)

The Profile Conditional Features section lists the features that shall be implemented if the device or client supports the feature. The requirements represent the minimum functionality that must be implemented for conformance.

8.1 Configuration of PTZ profile

This section describes the operations related to the configuration of **Media Profiles** for PTZ operations.

The reader should be familiar with the PTZ spaces defined in the **PTZ Service Specification**, and the functions defined in each PTZ namespace. For example, when using the PositionGenericSpace, some calculation may be required using the range of values for each axis, as returned by the GetConfigurationOptions command response from the PTZ service.

8.1.1 Device requirements (if supported)

- Device shall return the set of available **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support adding a **PTZ Configuration** to a **Media Profile** using the **GetCompatibleConfigurations** (from the PTZ Service) and **AddConfiguration** operations.
- Device shall support removing a **PTZ Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when a **PTZ Configuration** is added or removed from a **Media Profile**.

8.1.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to add a **PTZ Configuration** to a **Media Profile** using the **GetCompatibleConfigurations** (from the PTZ Service) and **AddConfiguration** operations.

8.1.3 Function list for devices

Configuration of PTZ Profile		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetCompatibleConfigurations	PTZ	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

8.1.4 Function list for clients

Configuration of PTZ Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetCompatibleConfigurations	PTZ	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

8.2 PTZ configuration

This section describes the operations related to PTZ configuration.

8.2.1 Device requirements (if supported)

- Device shall return its PTZ nodes in response to the **GetNode** and **GetNodes** operations.
- Device shall return available PTZ configuration options in response to the **GetConfigurationOptions** operation.
- Device shall support modifying a PTZ configuration in response to the **SetConfiguration** operation.
- Device shall deliver event notifications when a PTZ Configuration is changed.

8.2.2 Client requirements (if supported)

- Client shall be able to retrieve PTZ nodes using at least one of the operations **GetNode** and **GetNodes**.
- Client shall be able to modify a PTZ configuration using the **SetConfiguration** operation.

8.2.3 Function list for devices

PTZ Configuration		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetNodes	PTZ	M
GetNode	PTZ	M
GetConfigurationOptions	PTZ	M
SetConfiguration	PTZ	M
tns1:Media/ConfigurationChanged	Event	M

8.2.4 Function list for clients

PTZ Configuration		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetNodes	PTZ	M*
GetNode	PTZ	
GetConfigurationOptions	PTZ	O
SetConfiguration	PTZ	M
tns1:Media/ConfigurationChanged	Event	O

* Client shall support at least one of the listed operations.

8.3 PTZ presets

This section describes the operations related to moving a device to a PTZ preset, and listing, configuring and removing PTZ presets.

8.3.1 Device requirements (if supported)

- Device shall provide a PTZ node with the **MaximumNumberOfPresets** capability set to at least 1.
- Device shall return available presets in response to the **GetPresets** operation.
- Device shall move to a specific preset in response to the **GotoPreset** operation.
- Device shall support storing the current position to a preset in response to the **SetPreset** operation.
- Device shall support removing a stored preset in response to the **RemovePreset** operation.

8.3.2 Client requirements (if supported)

- Client shall be able to retrieve available presets using the **GetPresets** operation.
- Client shall be able to move a PTZ device to a specific preset using the **GotoPreset** operation.
- Client shall be able to store a preset using the **SetPreset** operation**.**

8.3.3 Function list for devices

PTZ Presets		Device CONDITIONAL
Function	**Service**	**Requirement**
GetPresets	PTZ	M
SetPreset	PTZ	M
GotoPreset	PTZ	M
RemovePreset	PTZ	M

8.3.4 Function list for clients

PTZ Presets		Client CONDITIONAL
Function	**Service**	**Requirement**
GetPresets	PTZ	M
SetPreset	PTZ	M
GotoPreset	PTZ	M
RemovePreset	PTZ	O

8.4 PTZ home position

This section describes the operations related to PTZ home position.

8.4.1 Device requirements (if supported)

- Device shall provide a PTZ node with the **HomeSupported** capability set to true.
- Device shall set its home position in response to the **SetHomePosition** operation.
- Device shall support moving to its home position in response to the **GotoHomePosition** operation.

8.4.2 Client requirements (if supported)

- Client shall be able to move a PTZ device to its home position using the **GotoHomePosition** operation.

8.4.3 Function list for devices

PTZ Home Position		**Device CONDITIONAL**
Function	**Service**	**Requirement**
SetHomePosition	PTZ	M
GotoHomePosition	PTZ	M

8.4.4 Function list for clients

PTZ Home Position		**Client CONDITIONAL**
Function	**Service**	**Requirement**
SetHomePosition	PTZ	O
GotoHomePosition	PTZ	M

8.5 Configuration of analytics profile

This section describes the operations related to the configuration of **Media Profiles** for streaming analytics metadata.

8.5.1 Device requirements (if supported)

- Device shall return the set of available **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support adding an **Analytics Configuration** to a **Media Profile** using the **GetAnalyticsConfigurations** and **AddConfiguration** operations.
- Device shall support removing an **Analytics Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when an **Analytics Configuration** is added or removed from a **Media Profile**.

8.5.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to add an **Analytics Configuration** to a **Media Profile** using the **GetAnalyticsConfigurations** and **AddConfiguration** operations.

8.5.3 Function list for devices

Configuration of Analytics Profile		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAnalyticsConfigurations	Media 2	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

8.5.4 Function list for clients

Configuration of Analytics Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAnalyticsConfigurations	Media 2	M
AddConfiguration	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

8.6 Motion region detector configuration

This section describes the operations related to Motion Region Detector rule configuration and event notification.

8.6.1 Device requirements (if supported)

- Device shall include **tt:MotionRegionDetector** in response to the **GetSupportedRules** operation.
- Device shall return available **Rules** in response to the **GetRules** operation.
- Device shall support creation of **Rules** in response to the **GetRuleOptions** and **CreateRules** operation.
- Device shall support modification of **Rules** in response to the **GetRuleOptions** and **ModifyRules** operation.
- Device shall support deletion of **Rules** in response to the **DeleteRules** operation.
- Device shall generate **Motion Region Detector** events according to the **Analytics Service Specification**.

8.6.2 Client requirements (if supported)

- Client shall be able to retrieve available **Rules** using the **GetSupportedRules** and **GetRules** operations.
- Client shall be able to create **Rules** of type **tt:MotionRegionDetector** using the **GetRuleOptions** and **CreateRules** operation.
- Client shall be able to delete **Rules** using the **DeleteRules** operation.
- Clients shall receive notifications of **Motion Region Detector** events according to the **Analytics Service Specification**.

8.6.3 Function list for devices

Motion Region Detector Configuration	Device CONDITIONAL	
Function	**Service**	**Requirement**
GetSupportedRules	Analytics	M
GetRules	Analytics	M
GetRuleOptions	Analytics	M
CreateRules	Analytics	M
ModifyRules	Analytics	M
DeleteRules	Analytics	M
tns1:RuleEngine/MotionRegionDetector/Motion	Event	M

8.6.4 Function list for clients

Motion Region Detector Configuration	Client CONDITIONAL	
Function	**Service**	**Requirement**
GetSuportedRules	Analytics	M
GetRules	Analytics	M
GetRuleOptions	Analytics	M
CreateRules	Analytics	M
ModifyRules	Analytics	O
DeleteRules	Analytics	M
tns1:RuleEngine/MotionRegionDetector/Motion	Event	M

8.7 Video source mode

This section describes the operations related to video source mode.

8.7.1 Device requirements (if supported)

- Device shall return available video sources in response to the **GetVideoSources** operation.
- Device shall return the information for current video source mode and settable video source modes of specified video source in response to the **GetVideoSourceModes** operation.
- Device shall change its current video source mode in response to the **SetVideoSourceMode** operation.

8.7.2 Client requirements (if supported)

- Client shall request the information for current video source mode and settable video source modes of specified video source using the **GetVideoSourceModes** operation.
- Client shall be able to change current video source mode using the **SetVideoSourceMode** operation.

8.7.3 Function list for devices

Video Source Mode		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	M
GetVideoSourceModes	Media 2	M
SetVideoSourceMode	Media 2	M

8.7.4 Function list for clients

Video Source Mode		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	O
GetVideoSourceModes	Media 2	M
SetVideoSourceMode	Media 2	M

8.8 NTP

This section describes the operations related to synchronization of time on a Device using NTP servers.

8.8.1 Device requirements (if supported)

- Device shall support configuring **NTP** servers in response to the **GetNTP** and **SetNTP** operations.

8.8.2 Client requirements (if supported)

- Client shall be able to configure **NTP** servers on a device using the **GetNTP** and **SetNTP** operations.

8.8.3 Function list for devices

NTP		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetNTP	Device Management	M
SetNTP	Device Management	M

8.8.4 Function list for clients

NTP		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetNTP	Device Management	M
SetNTP	Device Management	M

8.9 Audio streaming

This section describes the operations related to the setup and control of audio streaming.

8.9.1 Device requirements (if supported)

- Device shall support providing the stream URI for the selected **Media Profile** using the **GetProfiles** and **GetStreamURI** operations.
- Device shall support streaming of at least one of the G.711 µ-law and AAC encoding formats.
- Device shall support initiation of streaming sessions using RTSP according to the **Streaming Service Specification**.
- Device shall be able to stream audio over RTP/UDP using the selected **Media Profile**.
- Device shall be able to stream audio over RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, device shall be able to stream audio over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- If supported, device shall be able to stream audio over RTP/RTSP/TCP/WebSocket**,** using the selected **Media Profile.**
- Device shall be able to stream audio over RTP/UDP multicast using the selected **Media Profile**.

8.9.2 Client requirements (if supported)

- Client shall be able to get the stream URI for the selected **Media Profile** using the **GetProfiles** and **GetStreamURI** operations.
- Client shall initiate streaming sessions using RTSP according to the **Streaming Service Specification**.
- Client shall be able to receive a stream and decode G.711 µ-law audio using the selected **Media Profile**.
- Client shall be able to receive a stream and decode AAC audio using the selected **Media Profile**.
- Client shall be able to receive an audio stream over RTP/UDP or RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, client shall be able to receive an audio stream over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.

- If supported, client shall be able to receive an audio stream over RTP/UDP multicast using the selected **Media Profile**.

8.9.3 Function list for devices

Audio Streaming		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Audio Streaming using RTSP	Streaming	M
G.711 µ-law Encoding	Media 2	M*
AAC Encoding	Media 2	
Streaming over RTP/UDP	Streaming	M
Streaming over RTP/RTSP/HTTP/TCP	Streaming	M
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/Websocket	Streaming	C
Streaming over RTP/UDP Multicast	Streaming	M

* Device shall support at least one of the listed encoding formats.

8.9.4 Function list for clients

Audio Streaming		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
Audio Streaming using RTSP	Streaming	M
G.711 µ-law Decoding	Media 2	M
AAC Decoding	Media 2	M
Streaming over RTP/UDP	Streaming	M*
Streaming over RTP/RTSP/HTTP/TCP	Streaming	
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/Websocket	Streaming	O
Streaming over RTP/UDP Multicast	Streaming	C

* Client shall support at least one of the listed transport methods.

8.10 Configuration of audio profile

This section describes the operations related to configuring **Media Profiles** for audio streaming.

8.10.1 Device requirements (if supported)

- Device shall support listing of **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support listing of audio sources in response to the **GetAudioSources** operation.
- Device shall support adding an **Audio Source Configuration** to a **Media Profile** using the **GetAudioSourceConfigurations** and **AddConfiguration** operations.
- Device shall support adding an **Audio Encoder Configuration** to a **Media Profile** using the **GetAudioEncoderConfigurations** and **AddConfiguration** operations.
- Device shall support removing an **Audio Source Configuration** or an **Audio Encoder Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when an **Audio Source Configuration** or **Audio Encoder Configuration** is added or removed from a **Media Profile**.

8.10.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to either:
    - Add an **Audio Source Configuration** to a **Media Profile** using the **GetAudioSourceConfigurations** and **AddConfiguration** operations, or
    - Create a media profile with an **Audio Source Configuration** according to **7.8.2**.
- Client shall be able to add an **Audio Encoder Configuration** to a **Media Profile** using the **GetAudioEncoderConfigurations** and **AddConfiguration** operations.

8.10.3 Function list for devices

Configuration of Audio Profile		Device CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAudioSources	DeviceIO	M
GetAudioSourceConfigurations	Media 2	M
AddConfiguration	Media 2	M
GetAudioEncoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

8.10.4 Function list for clients

Configuration of Audio Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAudioSources	DeviceIO	O
GetAudioSourceConfigurations	Media 2	M
AddConfiguration	Media 2	M
GetAudioEncoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

8.11 Audio encoder configuration

This section describes the operations related to modifying audio encoder configurations.

8.11.1 Device requirements (if supported)

- Device shall support listing of **Audio Encoder Configurations** in response to the **GetAudioEncoderConfigurations** operation.
- Device shall support modifying an **Audio Encoder Configuration** using the **GetAudioEncoderConfigurationOptions** and **SetAudioEncoderConfiguration** operations.
- Device shall deliver event notifications when an **Audio Encoder Configuration** is changed.

8.11.2 Client requirements (if supported)

- Client shall be able to retrieve the current **Audio Encoder Configurations** using the **GetAudioEncoderConfigurations** operation.
- Client shall be able to modify an **Audio Encoder Configuration** using the **GetAudioEncoderConfigurationOptions** and **SetAudioEncoderConfiguration** operations**.**

8.11.3 Function list for devices

Audio Encoder Configuration		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetAudioEncoderConfigurations	Media 2	M
GetAudioEncoderConfigurationOptions	Media 2	M
SetAudioEncoderConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	M

8.11.4 Function list for clients

Audio Encoder Configuration		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetAudioEncoderConfigurations	Media 2	M
GetAudioEncoderConfigurationOptions	Media 2	M
SetAudioEncoderConfiguration	Media 2	M
tns1:Media/ConfigurationChanged	Event	O

8.12 Audio output streaming

This section describes the operations related to audio output streaming. It is also known as audio backchannel.

8.12.1 Device requirements (if supported)

- Device shall support getting the stream URI for the selected **Media Profile** using the **GetProfiles** and **GetStreamURI** operations.
- Device shall return the list of decoder options in response to the **GetAudioDecoderConfigurationOptions** operation.
- Device shall support initiation of streaming sessions using RTSP according to the **Streaming Service Specification**, Back Channel Connection.
- Device shall be able to decode G.711 µ-law.
- If supported, device shall be able to decode AAC.
- Device shall be able to receive an audio stream over RTP/UDP and RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, device shall be able to receive an audio stream over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.
- If supported, device shall be able receive an audio stream over RTP/RTSP/TCP/WebSocket using the selected **Media Profile**.

8.12.2 Client requirements (if supported)

- Client shall be able to get the stream URI for the selected **Media Profile** using the **GetProfiles** and **GetStreamURI** operations.
- Client shall be able to initiate streaming sessions using RTSP according to the **Streaming Service Specification**, Back Channel Connection.
- Client shall be able to send a stream of G.711 µ-law encoded audio**.**
- If supported, client shall be able to send a stream of AAC encoded audio**.**
- Client shall be able to stream audio over RTP/UDP or RTP/RTSP/HTTP/TCP using the selected **Media Profile**.
- If supported, client shall be able to stream audio over RTP/RTSP/HTTPS/TCP using the selected **Media Profile**.

8.12.3 Function list for devices

Audio Output Streaming		Device CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
GetAudioDecoderConfigurationOptions	Media 2	M
Streaming using RTSP – Back Channel	Streaming	M
G.711 µ-law Decoding	Media 2	M
AAC Decoding	Media 2	C
Streaming over RTP/UDP	Streaming	M
Streaming over RTP/RTSP/HTTP/TCP	Streaming	M
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/WebSocket	Streaming	C

8.12.4 Function list for clients

Audio Output Streaming		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetStreamUri	Media 2	M
GetAudioDecoderConfigurationOptions	Media 2	O
Streaming using RTSP – Back Channel	Streaming	M
G.711 µ-law Encoding	Media 2	M
AAC Encoding	Media 2	C
Streaming over RTP/UDP	Streaming	M*
Streaming over RTP/RTSP/HTTP/TCP	Streaming	
Streaming over RTP/RTSP/HTTPS/TCP	Streaming	C
Streaming over RTP/RTSP/TCP/WebSocket	Streaming	O

* Client shall support at least one of the listed transport methods.

8.13 Configuration of audio output profile

This section describes the operations related to the configuration of **Media Profiles** for audio output streaming (audio backchannel).

8.13.1 Device requirements (if supported)

- Device shall support listing of **Media Profiles** in response to the **GetProfiles** operation.
- Device shall support listing of audio outputs in response to the **GetAudioOutputs** operation.
- Device shall support adding an **Audio Output Configuration** to a **Media Profile** using the **GetAudioOutputConfigurations** and **AddConfiguration** operations.
- Device shall support adding an **Audio Decoder Configuration** to a **Media Profile** using the **GetAudioDecoderConfigurations** and **AddConfiguration** operations.
- Device shall support removing an **Audio Output Configuration** or an **Audio Decoder Configuration** from a profile using the **RemoveConfiguration** operation.
- Device shall deliver event notifications when an **Audio Output Configuration** or **Audio Decoder Configuration** is added or removed from a profile.

8.13.2 Client requirements (if supported)

- Client shall be able to retrieve available **Media Profiles** using the **GetProfiles** operation.
- Client shall be able to either:
    - Add an **Audio Output Configuration** to a **Media Profile** using the **GetAudioOutputConfigurations** and **AddConfiguration** operations, or
    - Create a media profile with an **Audio Output Configuration** according to **7.8.2**.
- Client shall be able to add an **Audio Decoder Configuration** to a **Media Profile** using the **GetAudioDecoderConfigurations** and **AddConfiguration** operations.

8.13.3 Function list for devices

Configuration of Audio Output Profile		Device CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAudioOutputs	DeviceIO	M
GetAudioOutputConfigurations	Media 2	M
AddConfiguration	Media 2	M
GetAudioDecoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	M
tns1:Media/ProfileChanged	Event	M

8.13.4 Function list for clients

Configuration of Audio Output Profile		Client CONDITIONAL
Function	**Service**	**Requirement**
GetProfiles	Media 2	M
GetAudioOutputs	DeviceIO	O
GetAudioOutputConfigurations	Media 2	M
AddConfiguration	Media 2	M
GetAudioDecoderConfigurations	Media 2	M
RemoveConfiguration	Media 2	O
tns1:Media/ProfileChanged	Event	O

8.14 Focus control

This section describes the operations related to focus control.

8.14.1 Device requirements (if supported)

- Device shall return available video sources in response to the **GetVideoSources** operation.
- Device shall list available focus move options using the **GetMoveOptions** operation.
- Device shall support focus movement using the **Move** and **Stop** operations.
- Device shall report its current status using the **GetStatus** operation.

8.14.2 Client requirements (if supported)

- Client shall be able to control focus using the **GetMoveOptions**, **Move** and **Stop.**

8.14.3 Function list for devices

Focus Control		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	M
GetMoveOptions	Imaging	M
Move	Imaging	M
Stop	Imaging	M
GetStatus	Imaging	M

8.14.4 Function list for clients

Focus Control		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetVideoSources	DeviceIO	O
GetMoveOptions	Imaging	M
Move	Imaging	M
Stop	Imaging	M
GetStatus	Imaging	O

8.15 Relay outputs

This section describes the operations related to the control of Relay Outputs.

8.15.1 Device requirements (if supported)

- Device shall return available **Relay Outputs** in response to the **GetRelayOutputs** operation.
- Device shall support modifying **Relay Output** settings in response to the **GetRelayOutputOptions** and **SetRelayOutputSettings** operations.
- Device shall support control of the **Relay Output** state in response to the **SetRelayOutputState** operation.
- Device shall generate **Relay Output** events according to the **Device IO Service Specification**.

8.15.2 Client requirements (if supported)

- Client shall be able to retrieve available **Relay Outputs** using the **GetRelayOutputs** operation.
- Client shall be able to control **Relay Output** state using the **SetRelayOutputState** operation.

8.15.3 Function list for devices

Relay Outputs		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetRelayOutputs	DeviceIO	M
GetRelayOutputOptions	DeviceIO	M
SetRelayOutputSettings	DeviceIO	M
SetRelayOutputState	DeviceIO	M
tns1:Device/Trigger/Relay	Event	M

8.15.4 Function list for clients

Relay Outputs		Client CONDITIONAL
Function	**Service**	**Requirement**
GetRelayOutputs	DeviceIO	M
GetRelayOutputOptions	DeviceIO	O
SetRelayOutputSettings	DeviceIO	O
SetRelayOutputState	DeviceIO	M
tns1:Device/Trigger/Relay	Event	O

8.16 Digital inputs

This section describes the operations related to the control of Digital Inputs connected to a device.

8.16.1 Device requirements (if supported)

- Device shall provide available **Digital Inputs** in response to the **GetDigitalInputs** operation.
- Device shall support modifying **Digital Input** configurations in response to the **GetDigitalInputConfigurationOptions** and **SetDigitalInputConfigurations** operations.
- Device shall generate **Digital Input** events according to the **Device IO Service Specification**.

8.16.2 Client requirements (if supported)

- Client shall be able to retrieve available **Digital Inputs** using the **GetDigitalInputs** operation.
- Client shall monitor the state of the input pins with event topic **tns1:Device/Trigger/DigitalInput.**

8.16.3 Function list for devices

Digital Inputs		**Device CONDITIONAL**
Function	**Service**	**Requirement**
GetDigitalInputs	DeviceIO	M
GetDigitalInputConfigurationOptions	DeviceIO	M
SetDigitalInputConfigurations	DeviceIO	M
tns1:Device/Trigger/DigitalInput	Event	M

8.16.4 Function list for clients

Digital Inputs		**Client CONDITIONAL**
Function	**Service**	**Requirement**
GetDigitalInputs	DeviceIO	M
GetDigitalInputConfigurationOptions	DeviceIO	O
SetDigitalInputConfigurations	DeviceIO	O
tns1:Device/Trigger/DigitalInput	Event	M

8.17 Auxiliary commands

This section describes the operations related to auxiliary commands on a device.

8.17.1 Device requirements (if supported)

- Device shall support the **SendAuxiliaryCommand** operation as covered by the **Device Management** service.
- Device shall return a list of supported auxiliary commands in the **Misc.AuxiliaryCommands** field in the response of the **GetServiceCapabilities** operation.

8.17.2 Client requirements (if supported)

- Client shall be able to execute auxiliary commands using the **SendAuxiliaryCommand** operation as covered by the **Device Management** service.

8.17.3 Function list for devices

Auxiliary Commands		**Device CONDITIONAL**
Function	**Service**	**Requirement**
SendAuxiliaryCommand	Device Management	M
tt:Wiper|On	Device Management	C
tt:Wiper|Off	Device Management	C
tt:Washer|On	Device Management	C
tt:Washer|Off	Device Management	C
tt:WashingProcedure|On	Device Management	C
tt:WashingProcedure|Off	Device Management	C
tt:IRLamp|On	Device Management	C
tt:IRLamp|Off	Device Management	C
tt:IRLamp|Auto	Device Management	C

8.17.4 Function list for clients

Auxiliary Commands		Client CONDITIONAL
Function	**Service**	**Requirement**
SendAuxiliaryCommand	Device Management	M
tt:Wiper|On	Device Management	M*
tt:Wiper|Off	Device Management	
tt:Washer|On	Device Management	
tt:Washer|Off	Device Management	
tt:WashingProcedure|On	Device Management	
tt:WashingProcedure|Off	Device Management	
tt:IRLamp|On	Device Management	
tt:IRLamp|Off	Device Management	
tt:IRLamp|Auto	Device Management	

*Client shall support at least one of the listed commands.