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INTERNATIONAL STANDARD

Information technology – UPnP Device Architecture – Part 5-10: Digital Security Camera Device Control Protocol – Digital Security Camera Motion Image Service



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INFORMATION TECHNOLOGY – UPNP DEVICE ARCHITECTURE –

Part 5-10: Digital Security Camera Device Control Protocol – Digital Security Camera Motion Image Service

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The list of all currently available parts of the ISO/IEC 29341 series, under the general title *Universal plug and play (UPnP) architecture*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

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UPnP Document Title	**ISO/IEC 29341 Part**
UPnP Device Architecture 1.0	ISO/IEC 29341-1
UPnP Basic:1 Device	ISO/IEC 29341-2
UPnP AV Architecture:1	ISO/IEC 29341-3-1
UPnP MediaRenderer:1 Device	ISO/IEC 29341-3-2
UPnP MediaServer:1 Device	ISO/IEC 29341-3-3
UPnP AVTransport:1 Service	ISO/IEC 29341-3-10
UPnP ConnectionManager:1 Service	ISO/IEC 29341-3-11
UPnP ContentDirectory:1 Service	ISO/IEC 29341-3-12
UPnP RenderingControl:1 Service	ISO/IEC 29341-3-13
UPnP MediaRenderer:2 Device	ISO/IEC 29341-4-2
UPnP MediaServer:2 Device	ISO/IEC 29341-4-3
UPnP AV Datastructure Template:1	ISO/IEC 29341-4-4
UPnP AVTransport:2 Service	ISO/IEC 29341-4-10
UPnP ConnectionManager:2 Service	ISO/IEC 29341-4-11
UPnP ContentDirectory:2 Service	ISO/IEC 29341-4-12
UPnP RenderingControl:2 Service	ISO/IEC 29341-4-13
UPnP ScheduledRecording:1	ISO/IEC 29341-4-14
UPnP DigitalSecurityCamera:1 Device	ISO/IEC 29341-5-1
UPnP DigitalSecurityCameraMotionImage:1 Service	ISO/IEC 29341-5-10
UPnP DigitalSecurityCameraSettings:1 Service	ISO/IEC 29341-5-11
UPnP DigitalSecurityCameraStillImage:1 Service	ISO/IEC 29341-5-12
UPnP HVAC_System:1 Device	ISO/IEC 29341-6-1
UPnP HVAC_ZoneThermostat:1 Device	ISO/IEC 29341-6-2
UPnP ControlValve:1 Service	ISO/IEC 29341-6-10
UPnP HVAC_FanOperatingMode:1 Service	ISO/IEC 29341-6-11
UPnP FanSpeed:1 Service	ISO/IEC 29341-6-12
UPnP HouseStatus:1 Service	ISO/IEC 29341-6-13
UPnP HVAC_SetpointSchedule:1 Service	ISO/IEC 29341-6-14
UPnP TemperatureSensor:1 Service	ISO/IEC 29341-6-15
UPnP TemperatureSetpoint:1 Service	ISO/IEC 29341-6-16
UPnP HVAC_UserOperatingMode:1 Service	ISO/IEC 29341-6-17
UPnP BinaryLight:1 Device	ISO/IEC 29341-7-1
UPnP DimmableLight:1 Device	ISO/IEC 29341-7-2
UPnP Dimming:1 Service	ISO/IEC 29341-7-10
UPnP SwitchPower:1 Service	ISO/IEC 29341-7-11
UPnP InternetGatewayDevice:1 Device	ISO/IEC 29341-8-1
UPnP LANDevice:1 Device	ISO/IEC 29341-8-2
UPnP WANDevice:1 Device	ISO/IEC 29341-8-3
UPnP WANConnectionDevice:1 Device	ISO/IEC 29341-8-4
UPnP WLANAccessPointDevice:1 Device	ISO/IEC 29341-8-5
UPnP LANHostConfigManagement:1 Service	ISO/IEC 29341-8-10
UPnP Layer3Forwarding:1 Service	ISO/IEC 29341-8-11
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UPnP RadiusClient:1 Service	ISO/IEC 29341-8-13
UPnP WANCableLinkConfig:1 Service	ISO/IEC 29341-8-14
UPnP WANCommonInterfaceConfig:1 Service	ISO/IEC 29341-8-15
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UPnP WANIPConnection:1 Service	ISO/IEC 29341-8-18
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UPnP Printer:1 Device	ISO/IEC 29341-9-1
UPnP Scanner:1.0 Device	ISO/IEC 29341-9-2
UPnP ExternalActivity:1 Service	ISO/IEC 29341-9-10
UPnP Feeder:1.0 Service	ISO/IEC 29341-9-11
UPnP PrintBasic:1 Service	ISO/IEC 29341-9-12
UPnP Scan:1 Service	ISO/IEC 29341-9-13
UPnP QoS Architecture:1.0	ISO/IEC 29341-10-1
UPnP QosDevice:1 Service	ISO/IEC 29341-10-10
UPnP QosManager:1 Service	ISO/IEC 29341-10-11
UPnP QosPolicyHolder:1 Service	ISO/IEC 29341-10-12
UPnP QoS Architecture:2	ISO/IEC 29341-11-1
UPnP QOS v2 Schema Files	ISO/IEC 29341-11-2

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UPnP Document Title	ISO/IEC 29341 Part
UPnP QosDevice:2 Service	ISO/IEC 29341-11-10
UPnP QosManager:2 Service	ISO/IEC 29341-11-11
UPnP QosPolicyHolder:2 Service	ISO/IEC 29341-11-12
UPnP RemoteUIClientDevice:1 Device	ISO/IEC 29341-12-1
UPnP RemoteUIServerDevice:1 Device	ISO/IEC 29341-12-2
UPnP RemoteUIClient:1 Service	ISO/IEC 29341-12-10
UPnP RemoteUIServer:1 Service	ISO/IEC 29341-12-11
UPnP DeviceSecurity:1 Service	ISO/IEC 29341-13-10
UPnP SecurityConsole:1 Service	ISO/IEC 29341-13-11

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1. Overview and Scope

This service definition is compliant with the UPnP Device Architecture version *1.0*.

The service enables delivery and control of live snapshot images from a digital security camera.

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2. Service Modeling Definitions

2.1. ServiceType

A service that is compliant with this template is identified with the following service type: **urn:schemas-upnp-org:service:** *DigitalSecurityCameraMotionImage:1*.

2.2. State Variables

Table 1: State Variables

Variable Name	Req. or Opt. [1]	Data Type	Allowed Value	Default Value	Eng. Units
AvailableEncodings	*R*	*string*			
DefaultEncoding	*R*	*string*			
AvailableCompressionLevels	*R*	*string*			
DefaultCompressionLevel	*R*	*string*			
AvailableResolutions	*R*	*string*			
DefaultResolutions	*R*	*string*			
VideoURL	*R*	*string*			
VideoPresentationURL	*R*	*string*			
MaxBandwidth	*R*	*ui4*	*0..*	*(Maximum)*	
TargetFrameRate	*R*	*ui4*	*0..*	*(Maximum)*	
Non-standard state variables implemented by an UPnP vendor go here.	X	*TBD*	*TBD*	*TBD*	*TBD*

[1] R = Required, O = Optional, X = Non-standard.

2.2.1. AvailableEncodings

The value of this string should be a list of all by the vendor specific service supported MIME-type still image types. The types in the list should be separated by a ",".

Example: image/jpeg, image/gif, image/bmp

This is a read only property.

2.2.2. DefaultEncoding

The value of this string must be a MIME-type still image type. Any MIME still image type listed in AvailableEncodings may be used as an allowed value.

2.2.3. AvailableCompressionLevels

Compression level describes how much an image should be compressed. Since a wide variety of compression methods and algorithms are available compression levels become subjective values that are hard to quantify. The value of this string should be a list of all supported compression levels separated by a ",". The list order should be the lowest compression level first.

Example1: 0, 1, 2, 3, 4, 5

Example2: Lowest, Highest

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This is a read only property.

2.2.4. DefaultCompressionLevel

The value of this string must be one of the supported compression levels specified in AvailableCompressionLevels.

AvailableEncodings may be used as an allowed value.

2.2.5. AvailableResolutions

Resolution is the actual number of horizontal and vertical pixels an image contains. It does not tell anything of the image quality apart from the size in pixels. There must be at least one resolution available. Presented in ascending order based on first the value of X multiplied by Y and as second order the value of X. Always formatted as "XxY". Where X is the horizontal number of pixels and Y the vertical number of pixels.

Example: 320x240, 640x480

This is a read only property.

Resolution is always based on Rotation = 0.

(See: Security Camera Settings Service for more information)

2.2.6. DefaultResolutions

The value of this string must be one of the supported resolutions specified in AvailableResolutions.

2.2.7. VideoURL

The VideoURL is the URL for the video stream itself.

This is a read only property.

2.2.8. VideoPresentationURL

This is the URL for an html presentation page of the current video stream. The typical implementation would be an html page that includes the VideoURL. This field must exist but may contain the empty string.

2.2.9. MaxBandwidth

This is the maximum bandwidth allowed for this service to use for *each* video connection. Unit used is Kbit/s. If set to 0 this service would be disabled. MaxBandwidth has priority over TargetFrameRate frame rate.

2.2.10.TargetFrameRate

Frame rate in frames/minute. Target frame rate should never be exceeded by the device. If an attempt to set outside scope of device the nearest supported legal value will be set.

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2.3. Eventing and Moderation

Table 2: Event Moderation

Variable Name	Evented	Moderated Event	Max Event Rate [1]	Logical Combination	Min Delta per Event [2]
AvailableEncodings	*No*	*No*	*N/A*		*N/A*
DefaultEncoding	*Yes*	*No*	*N/A*		*N/A*
AvailableCompressionLevels	*No*	*No*	*N/A*		*N/A*
DefaultCompression Level	*Yes*	*No*	*N/A*		*N/A*
AvailableResolutions	*No*	*No*	*N/A*		*N/A*
DefaultResolution	*Yes*	*No*	*N/A*		*N/A*
VideoURL	*No*	*No*	*N/A*		*N/A*
VideoPresentationURL	*No*	*No*	*N/A*		*N/A*
MaxBandwidth	*Yes*	*Yes*	*1*		*N/A*
TargetFrameRate	*Yes*	*Yes*	*1*		*N/A*
Non-standard state variables implemented by an UPnP vendor go here.	*TBD*	*TBD*	*TBD*	*TBD*	*TBD*

[1] Determined by N, where Rate = (Event)/(N secs).
[2] (N) * (allowedValueRange Step).

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2.4. Actions

Immediately following this table is detailed information about these actions, including short descriptions of the actions, the effects of the actions on state variables, and error codes defined by the actions.

Table 3: Actions

Name	Req. or Opt. [1]
GetAvailableEncodings	*R*
SetDefaultEncoding	*R*
GetDefaultEncoding	*R*
GetAvailableCompressionLevels	*R*
SetDefaultCompressionLevel	*R*
GetDefaultCompressionLevel	*R*
GetAvailableResolutions	*R*
SetDefaultResolution	*R*
GetDefaultResolution	*R*
GetVideoURL	*R*
GetDefaultVideoURL	*R*
GetVideoPresentationURL	*R*
GetDefaultVideoPresentationURL	*R*
SetMaxBandwidth	*R*
GetMaxBandwidth	*R*
SetTargetFrameRate	*R*
GetTargetFrameRate	*R*
Non-standard actions implemented by an UPnP vendor go here.	X

[1] R = Required, O = Optional, X = Non-standard.

2.4.1. GetAvailableEncodings

Get the list of supported MIME-type still image types.

2.4.1.1. Arguments

Table 4: Arguments for *GetAvailableEncodings*

Argument	Direction	relatedStateVariable
RetAvailableEncodings	*OUT*	*AvailableEncodings*

2.4.2. SetDefaultEncoding

Set the DefaultEncoding.

2.4.2.1. Arguments

Table 5: Arguments for *SetDefaultEncoding*

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Argument	Direction	relatedStateVariable
ReqEncoding	*IN*	*DefaultEncoding*

2.4.2.2. Effect on State

Changes the value of DefaultEncoding to ReqEncoding.

2.4.2.3. Errors

errorCode	errorDescription	Description
700	*ReqEncoding not supported*	ReqEncoding is not one of the supported encodings specified in AvailableEncodings.

2.4.3. GetDefaultEncoding

Get the DefaultEncoding.

2.4.3.1. Arguments

Table 6: Arguments for *GetDefaultEncoding*

Argument	Direction	relatedStateVariable
RetEncoding	*OUT*	*DefaultEncoding*

2.4.4. GetAvailableCompressionLevels

Get the list of supported compression levels.

2.4.4.1. Arguments

Table 7: Arguments for *GetAvailableCompressionLevels*

Argument	Direction	relatedStateVariable
RetAvailableCompressionLevels	*OUT*	*AvailableCompressionLevels*

2.4.5. SetDefaultCompressionLevel

Set the DefaultCompressionLevel.

2.4.5.1. Arguments

Table 8: Arguments for *SetDefaultCompressionLevel*

Argument	Direction	relatedStateVariable
ReqCompressionLevel	*IN*	*DefaultCompressionLevel*

2.4.5.2. Effect on State

Changes the value of DefaultCompressionLevel to ReqCompressionLevel.

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2.4.5.3. Errors

errorCode	errorDescription	Description
701	*ReqCompressionLevel not supported*	ReqCompressionLevel is not one of the supported compression levels specified in AvailableCompressionLevels.

2.4.6. GetDefaultCompressionLevel

Get the DefaultCompressionLevel.

2.4.6.1. Arguments

Table 9: Arguments for *GetDefaultCompressionLevel*

Argument	Direction	relatedStateVariable
RetCompressionLevel	*OUT*	*DefaultCompressionLevel*

2.4.7. GetAvailableResolutions

Get the list of supported resolutions.

2.4.7.1. Arguments

Table 10: Arguments for *GetAvailableResolutions*

Argument	Direction	relatedStateVariable
RetAvailableResolutions	*OUT*	*AvailableResolutions*

2.4.8. SetDefaultResolution

Set the DefaultResolution.

2.4.8.1. Arguments

Table 11: Arguments for *SetDefaultResolution*

Argument	Direction	relatedStateVariable
ReqResolution	*IN*	*DefaultResolution*

2.4.8.2. Effect on State

Changes the value of DefaultResolution to ReqResolution.

2.4.8.3. Errors

errorCode	errorDescription	Description
702	*ReqResolution not supported*	ReqResolution is not one of the supported resolutions specified in AvailableResolutions.

2.4.9. GetDefaultResolution

Get the DefaultResolution.

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2.4.9.1. Arguments

Table 12: Arguments for *GetDefaultResolution*

Argument	Direction	relatedStateVariable
RetResolution	*OUT*	*DefaultResolution*

2.4.10.GetVideoURL

Get a URL to the video stream itself. The RetVideoURL is being built depending on how the different parameters has been set.

ReqEncoding should be one of the supported encodings.
ReqCompression should be one of the supported compressions.
ReqResolution should be one of the supported resolutions.
ReqMaxBandwidth should be the maximum bandwidth allowed.
ReqTargetFrameRate should be the maximum frame rate in frames/minute.

2.4.10.1.Arguments

Table 13: Arguments for *GetVideoURL*

Argument	Direction	relatedStateVariable
ReqEncoding	*IN*	*DefaultEncoding*
ReqCompression	*IN*	*DefaultCompression*
ReqResolution	*IN*	*DefaultResolution*
ReqMaxBandwidth	*IN*	*MaxBandwidth*
ReqTargetFrameRate	*IN*	*TargetFrameRate*
RetVideoURL	*OUT*	*VideoURL*

2.4.10.2.Errors

errorCode	errorDescription	Description
700	*ReqEncoding not supported*	ReqEncoding is not one of the supported encodings specified in AvailableEncodings.
701	*ReqCompressionLevel not supported*	ReqCompressionLevel is not one of the supported compression levels specified in AvailableCompressionLevels.
702	*ReqResolution not supported*	ReqResolution is not one of the supported resolutions specified in AvailableResolutions.

2.4.11.GetDefaultVideoURL

Get a URL to the video stream itself. The RetVideoURL is being built depending on how the different default parameters DefaultEncoding, DefaultCompressionLevel and DefaultResolution has been set.

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2.4.11.1.Arguments

Table 13: Arguments for *GetDefaultVideoURL*

Argument	Direction	relatedStateVariable
RetVideoURL	*OUT*	*VideoURL*

2.4.12.GetVideoPresentationURL

Get a URL to an html presentation page of the current video stream.
The ReqVideoPresentationURL is being built depending on how the different parameters has been set.

ReqEncoding should be one of the supported encodings.
ReqCompression should be one of the supported compressions.
ReqResolution should be one of the supported resolutions.
ReqMaxBandwidth should be the maximum bandwidth allowed.
ReqTargetFrameRate should be the maximum frame rate in frames/minute.

2.4.12.1.Arguments

Table 14: Arguments for *GetVideoPresentationURL*

Argument	Direction	relatedStateVariable
ReqEncoding	*IN*	*DefaultEncoding*
ReqCompression	*IN*	*DefaultCompression*
ReqResolution	*IN*	*DefaultResolution*
ReqMaxBandwidth	*IN*	*MaxBandwidth*
ReqTargetFrameRate	*IN*	*TargetFrameRate*
RetVideoPresentationURL	*OUT*	*VideoPresentationURL*

2.4.12.2.Errors

errorCode	errorDescription	Description
700	*ReqEncoding not supported*	ReqEncoding is not one of the supported encodings specified in AvailableEncodings.
701	*ReqCompressionLevel not supported*	ReqCompressionLevel is not one of the supported compression levels specified in AvailableCompressionLevels.
702	*ReqResolution not supported*	ReqResolution is not one of the supported resolutions specified in AvailableResolutions.

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2.4.13.GetDefaultVideoPresentationURL

Get a URL to an html presentation page of the current video stream. The RetVideoPresentationURL is being built depending on how the different default parameters DefaultEncoding, DefaultCompressionLevel and DefaultResolution has been set.

2.4.13.1.Arguments

Table 15: Arguments for *GetDefaultVideoPresentationURL*

Argument	Direction	relatedStateVariable
RetVideoPresentationURL	*OUT*	*VideoPresentationURL*

2.4.14.SetMaxBandwidth

Change Maximum bandwidth allowed for each connection to this Motion Image service.
The response to an attempt to set an unsupported but legal value shall result in the nearest *supported* legal value.

2.4.14.1.Arguments

Table 16: Arguments for *SetMaxBandwidth*

Argument	Direction	relatedStateVariable
ReqMaxBandwidth	*IN*	*MaxBandwidth*

2.4.14.2.Effect on State

Changes the value of MaxBandwidth to ReqMaxBandwidth.

2.4.15.GetMaxBandwidth

Get the Maximum bandwidth allowed for each connection to this Motion Image service.

2.4.15.1.Arguments

Table 17: Arguments for *GetMaxBandwidth*

Argument	Direction	relatedStateVariable
RetMaxBandwidth	*OUT*	*MaxBandwidth*

2.4.16.SetTargetFrameRate

Change Target Frame rate. The response to an attempt to set an unsupported but legal value shall result in the nearest *supported* legal value.

2.4.16.1.Arguments

Table 18: Arguments for *SetTargetFrameRate*

Argument	Direction	relatedStateVariable
ReqTargetFrameRate	*IN*	*TargetFrameRate*

2.4.16.2.Effect on State

Changes the value of TargetFrameRate to ReqTargetFrameRate.

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2.4.17.GetTargetFrameRate

Get the Target Frame Rate allowed for each connection to this Motion Image service.

2.4.17.1.Arguments

Table 19: Arguments for *GetTargetFrameRate*

Argument	Direction	relatedStateVariable
ReqTargetFrameRate	*OUT*	*TargetFrameRate*

2.4.18.Non-Standard Actions Implemented by a UPnP Vendor

To facilitate certification, non-standard actions implemented by UPnP vendors should be included in this service template. The UPnP Device Architecture lists naming requirements for non-standard actions (see the section on Description).

2.4.19.Common Error Codes

The following table lists error codes common to actions for this service type. If an action results in multiple errors, the most specific error should be returned.

Table 20: Common Error Codes

errorCode	errorDescription	Description
401	Invalid Action	See UPnP Device Architecture section on Control.
402	Invalid Args	See UPnP Device Architecture section on Control.
404	Invalid Var	See UPnP Device Architecture section on Control.
501	Action Failed	See UPnP Device Architecture section on Control.
600-699	TBD	Common action errors. Defined by UPnP Forum Technical Committee.
700	*ReqEncoding not supported*	ReqEncoding is not one of the supported encodings specified in AvailableEncodings.
701	*ReqCompressionLevel not supported*	ReqCompressionLevel is not one of the supported compression levels specified in AvailableCompressionLevels.
702	*ReqResolution not supported*	ReqResolution is not one of the supported resolutions specified in AvailableResolutions.
800-899	*TBD*	*(Specified by UPnP vendor.)*

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2.5. Theory of Operation

An instance of Digital Security Camera Motion Image Service may be embedded into a Digital Security Camera Device or other devices requiring this service.

This service will enable access to live motion images (video) by providing the retrieval address of the desired video stream. The retrieval address will be in the form of a complete URL.

Method of video data transfer is in no way restricted by this specification, implementers are free to use any available transport protocols that can be described in the form of a URL.

The operation of this service is “stateless”. The action of fetching a VideoURL or VideoPresentationURL does not affect the properties of previous, simultaneous or later fetched video streams and VideoPresentation URLs. This allows for multiple User Control Points to receive images with different properties without potential interference.

The properties AvailableResolutions, AvailableCompressionLevels and AvailableEncodings are vendor specific descriptions of the complete set of available options of the matching property.

The VideoURL property is the URL where the video stream itself can be fetched.

The VideoPresentationURL is a container document needed for *display* of the video by a user control point. This does for instance allow for display of video that require special viewers such as ActiveX components or Java applets.

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3. XML Service Description

```
<?xml version="1.0"?>
<scpd xmlns="urn:schemas-upnp-org:service-1-0">
  <specVersion>
    <major>1</major>
    <minor>0</minor>
  </specVersion>
  <actionList>
    <action>
    <name>GetAvailableEncodings</name>
      <argumentList>
        <argument>
          <name>RetAvailableEncodings</name>
          <relatedStateVariable>AvailableEncodings
          </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetDefaultEncoding</name>
      <argumentList>
        <argument>
          <name>RetEncoding</name>
         <relatedStateVariable>DefaultEncoding</relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>SetDefaultEncoding</name>
      <argumentList>
        <argument>
          <name>ReqEncoding</name>
         <relatedStateVariable>DefaultEncoding</relatedStateVariable>
          <direction>in</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetAvailableCompressionLevels</name>
      <argumentList>
        <argument>
          <name>RetAvailableCompressionLevels</name>
         <relatedStateVariable>AvailableCompressionLevels
         </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetDefaultCompressionLevel</name>
      <argumentList>
        <argument>
          <name>RetCompressionLevel</name>
         <relatedStateVariable>DefaultCompressionLevel
         </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
```

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```
<name>SetDefaultCompressionLevel</name>
  <argumentList>
    <argument>
      <name>ReqCompressionLevel</name>
      <relatedStateVariable>DefaultCompressionLevel
      </relatedStateVariable>
      <direction>in</direction>
    </argument>
  </argumentList>
</action>
<action>
<name>GetAvailableResolutions</name>
  <argumentList>
    <argument>
      <name>RetAvailableResolutions</name>
      <relatedStateVariable>AvailableResolutions
      </relatedStateVariable>
      <direction>out</direction>
    </argument>
  </argumentList>
</action>
<action>
<name>GetDefaultResolution</name>
  <argumentList>
    <argument>
      <name>RetResolution</name>
      <relatedStateVariable>DefaultResolution
      </relatedStateVariable>
      <direction>out</direction>
    </argument>
  </argumentList>
</action>
<action>
<name>SetDefaultResolution</name>
  <argumentList>
    <argument>
      <name>ReqResolution</name>
      <relatedStateVariable>DefaultResolution
      </relatedStateVariable>
      <direction>in</direction>
    </argument>
  </argumentList>
</action>
<action>
<name>GetVideoURL</name>
  <argumentList>
    <argument>
      <name>ReqEncoding</name>
      <relatedStateVariable>DefaultEncoding</relatedStateVariable>
      <direction>in</direction>
    </argument>
    <argument>
      <name>ReqCompression</name>
      <relatedStateVariable>DefaultCompressionLevel
      </relatedStateVariable>
      <direction>in</direction>
    </argument>
    <argument>
      <name>ReqResolution</name>
      <relatedStateVariable>DefaultResolution
      </relatedStateVariable>
      <direction>in</direction>
    </argument>
    <argument>
```

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```
        <name>ReqMaxBandwidth</name>
        <relatedStateVariable>MaxBandwidth</relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>ReqTargetFrameRate</name>
        <relatedStateVariable>TargetFrameRate</relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>RetVideoURL</name>
        <relatedStateVariable>VideoURL
        </relatedStateVariable>
        <direction>out</direction>
      </argument>
    </argumentList>
  </action>
  <action>
  <name>GetDefaultVideoURL</name>
    <argumentList>
      <argument>
        <name>RetVideoURL</name>
        <relatedStateVariable>VideoURL
        </relatedStateVariable>
        <direction>out</direction>
      </argument>
    </argumentList>
  </action>
  <action>
  <name>GetVideoPresentationURL</name>
    <argumentList>
      <argument>
        <name>ReqEncoding</name>
        <relatedStateVariable>DefaultEncoding</relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>ReqCompression</name>
        <relatedStateVariable>DefaultCompressionLevel
        </relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>ReqResolution</name>
        <relatedStateVariable>DefaultResolution
        </relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>ReqMaxBandwidth</name>
        <relatedStateVariable>MaxBandwidth</relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>ReqTargetFrameRate</name>
        <relatedStateVariable>TargetFrameRate</relatedStateVariable>
        <direction>in</direction>
      </argument>
      <argument>
        <name>RetVideoPresentationURL</name>
        <relatedStateVariable>VideoPresentationURL
        </relatedStateVariable>
        <direction>out</direction>
      </argument>
```

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```
      </argumentList>
    </action>
    <action>
    <name>GetDefaultVideoPresentationURL</name>
      <argumentList>
        <argument>
          <name>RetVideoPresentationURL</name>
         <relatedStateVariable>VideoPresentationURL
         </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>SetMaxBandwidth</name>
      <argumentList>
        <argument>
          <name>ReqMaxBandwidth</name>
         <relatedStateVariable>MaxBandwidth
         </relatedStateVariable>
          <direction>in</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetMaxBandwidth</name>
      <argumentList>
        <argument>
          <name>RetMaxBandwidth</name>
         <relatedStateVariable>MaxBandwidth
         </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>SetTargetFrameRate</name>
      <argumentList>
        <argument>
          <name>ReqTargetFrameRate</name>
         <relatedStateVariable>TargetFrameRate
         </relatedStateVariable>
          <direction>in</direction>
        </argument>
      </argumentList>
    </action>
    <action>
    <name>GetTargetFrameRate</name>
      <argumentList>
        <argument>
          <name>RetTargetFrameRate</name>
         <relatedStateVariable>TargetFrameRate
         </relatedStateVariable>
          <direction>out</direction>
        </argument>
      </argumentList>
    </action>
  </actionList>
  <serviceStateTable>
    <stateVariable sendEvents="no">
      <name>AvailableEncodings</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="yes">
```

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```
      <name>DefaultEncoding</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>AvailableCompressionLevels</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>DefaultCompressionLevel</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>AvailableResolutions</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>DefaultResolution</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>VideoURL</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="no">
      <name>VideoPresentationURL</name>
      <dataType>string</dataType>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>MaxBandwidth</name>
      <dataType>ui4</dataType>
      <defaultValue>maximum</defaultValue>
      <allowedValueRange>
        <minimum>0</minimum>
        <maximum>maximum</maximum>
      </allowedValueRange>
    </stateVariable>
    <stateVariable sendEvents="yes">
      <name>TargetFrameRate</name>
      <dataType>ui4</dataType>
      <defaultValue>maximum</defaultValue>
      <allowedValueRange>
        <minimum>0</minimum>
        <maximum>maximum</maximum>
      </allowedValueRange>
    </stateVariable>
  </serviceStateTable>
</scpd>
```

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4. Test

Testing of the UPnP functions Addressing, Discovery, Description, Control (Syntax) and Eventing are performed by the UPnP Test Tool v1.1 based on the following documents:

- UPnP Device Architecture v1.0
- The Service Definitions in chapter 2 of this document
- The XML Service Description in chapter 3 of this document
- The UPnP Test Tool service template test file: ***DigitalSecurityCameraMotionImage1.xml***
- The UPnP Test Tool service template test file: ***DigitalSecurityCameraMotionImage1.SyntaxTests.xml***

The test suite does not include tests for Control Semantics, since it is felt that such tests would not provide a higher level of interoperability.

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