ONVIF™
PTZ Service Specification

Version 2.1.1
January, 2012

CONTENTS

1 Scope

This document defines the web service interface for configuration and operation of pan tilt zoom controllers.. Additionally the associated events are defined.

Web service usage is outside of the scope of this document. Please refer to the ONVIF core specification.

2 Normative references

ONVIF Core Specification

<http://www.onvif.org/specs/core/ONVIF-Core-Specification-v211.pdf>

ONVIF Media Service Specification

<http://www.onvif.org/specs/srv/media/ONVIF-Media-Service-Spec-v211.pdf>

3 Terms and Definitions

3.1 Definitions

Digital PTZ	Function that diminishes or crops an image to adjust the image position and ratio.
Optical zoom	Changes the focal length (angle of view) for the device by moving the zoom lens in the camera's optics.
PTZ node	Low-level PTZ entity that maps to the PTZ device and its capabilities.

3.2 Abbreviations

PTZ	Pan/Tilt/Zoom

4 Overview

The PTZ model groups the possible movements of the PTZ unit into a Pan/Tilt component and into a Zoom component. To steer the PTZ unit, the service provides absolute move, relative move and continuous move operations. Different coordinate systems and units are used to feed these operations.

The PTZ service provides an AbsoluteMove operation to move the PTZ device to an absolute position. The service expects the absolute position as an argument referencing an absolute coordinate system. The speed of the Pan/Tilt movement and the Zoom movement can be specified optionally. Speed values are positive scalars and do not contain any directional information. It is not possible to specify speeds for Pan and Tilt separately without knowledge about the current position. This approach to specifying a desired position generally produces a non-smooth and non-intuitive action.

A RelativeMove operation is introduced by the PTZ service in order to steer the dome relative to the current position, but without the need to know the current position. The operation expects a positional translation as an argument referencing a relative coordinate system. This specification distinguishes between relative and absolute coordinate systems, since there are cases where no absolute coordinate system exists for a well-defined relative coordinate system. An optional speed argument can be added to the RelativeMove operation with the same meaning as for the AbsoluteMove operation.

Finally, the PTZ device can be moved continuously via the ContinuousMove command in a certain direction with a certain speed. Thereby, a velocity vector represents both, the direction and the speed information. The latter is expressed by the length of the vector.

The Pan/Tilt and Zoom coordinates can be uniquely specified by augmenting the coordinates with appropriate space URIs. A space URI uniquely represents the underlying coordinate system. Section 5.7 defines a standard set of coordinate systems. A PTZ Node shall implement these coordinate systems if the corresponding type of movement is supported by the PTZ Node. In many cases, the Pan/Tilt position is represented by pan and tilt angles in a spherical coordinate system. A digital PTZ, operating on a fixed megapixel camera, may express the camera's viewing direction by a pixel position on a static projection plane. Therefore, different coordinate systems are needed in this case in order to capture the physical or virtual movements of the PTZ device. These and other additional coordinate systems are defined in a separate document, *ONVIF PTZ Coordinate Spaces* white paper. Optionally, the PTZ Node may define its own device specific coordinate systems to enable clients to take advantage of the specific properties of this PTZ Node.

The PTZ Node description retrieved via the GetNode or GetNodes operation contains all coordinate systems supported by a specific PTZ Node. Each coordinate system belongs to one of the following groups:

- AbsolutePanTiltPositionSpace

- RelativePanTiltTranslationSpace

- ContinuousPanTiltVelocitySpace

- PanTiltSpeedSpace

- AbsoluteZoomPositionSpace

- RelativeZoomTranslationSpace

- ContinuousZoomVelocitySpace

- ZoomSpeedSpace

If the PTZ node does not support the coordinate systems of a certain group, the corresponding move operation will not be available for this PTZ node. For instance, if the list does not contain an AbsolutePanTiltPositionSpace, the AbsoluteMove operation shall fail when an absolute Pan/Tilt position is specified. The corresponding command section describes those spaces that are required for a specific move command.

WSDL for this service is specified in http://www.onvif.org/onvif/ver20/ptz/wsdl/ptz.wsdl.

5 Service

5.1 PTZ Node

A PTZ-capable device can have multiple PTZ nodes. The PTZ nodes may represent mechanical PTZ drivers, uploaded PTZ drivers or digital PTZ drivers. PTZ nodes are the lowest level entities in the PTZ control API and reflect the supported PTZ capabilities. The PTZ node is referenced either by its name or by its reference token. The PTZ Service does not provide operations to create or manipulate PTZ nodes.

The following properties shall be provided for all PTZ nodes:

- Token – A unique identifier that is used to reference PTZ nodes.

- Name – A name given by the installer.

- SupportedPTZSpaces – A list of coordinate systems available for the PTZ node. For each Coordinate System, the PTZ node shall specify its allowed range.

- MaximumNumberOfPresets – All preset operations shall be available for this PTZ node if one preset is supported.

- HomeSupported – A boolean operator specifying the availability of a home position. If set to true, the Home Position Operations shall be available for this PTZ node.

- AuxiliaryCommands – A list of supported Auxiliary commands. If the list is not empty, the Auxiliary Operations shall be available for this PTZ node.

5.1.1 GetNodes

A PTZ-capable device shall implement this operation and return all PTZ nodes available on the device.

Table 1: GetNodes command

GetNodes	Access Class: READ_MEDIA
Message name	**Description**
GetNodesRequest	*This is an empty message.*
GetNodesResponse	*The response message contains a list of the existing PTZ Nodes on the device.* tt:PTZNode **PTZNode**[0][unbounded]
Fault codes	**Description**

env:Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported by the device.

5.1.2 GetNode

A PTZ-capable device shall implement the GetNode operation and return the properties of the requested PTZ node, if it exists. Otherwise, the device shall respond with an appropriate fault message.

Table 2: GetNode command

GetNode	Access Class: READ_MEDIA
Message name	**Description**
GetNodeRequest	*This message contains a reference to the requested PTZNode* tt:ReferenceToken **NodeToken**[1][1]

GetNodeResponse	*The PTZNode response message contains the requested PTZNode.* tt:PTZNode **PTZNode**[1][1]
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
    ter:NoEntity
	No such PTZNode on the device

env:Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.2 PTZ Configuration

The PTZConfiguration contains a reference to the PTZ node in which it belongs. This reference cannot be changed by a client.

The following elements are part of the PTZ Configuration:

- PTZNodeToken – A mandatory reference to the PTZ node that the PTZ Configuration belongs to.

- DefaultAbsolutePanTiltPositionSpace – If the PTZ node supports absolute Pan/Tilt movements, it shall specify one Absolute Pan/Tilt Position Space as default.

- DefaultRelativePanTiltTranslationSpace – If the PTZ node supports relative Pan/Tilt movements, it shall specify one RelativePan/Tilt Translation Space as default.

- DefaultContinuousPanTiltVelocitySpace – If the PTZ node supports continuous Pan/Tilt movements, it shall specify one continuous Pan/Tilt velocity space as default.

- DefaultPanTiltSpeedSpace – If the PTZ node supports absolute or relative movements, it shall specify one Pan/Tilt speed space as default.

- DefaultAbsoluteZoomPositionSpace – If the PTZ node supports absolute zoom movements, it shall specify one absolute zoom position space as default.

- DefaultRelativeZoomTranslationSpace – If the PTZ node supports relative zoom movements, it shall specify one relative zoom translation space as default.

- DefaultContinuousZoomVelocitySpace – If the PTZ node supports continuous zoom movements, it shall specify one continuous zoom velocity space as default.

- DefaultPTZSpeed – If the PTZ node supports absolute or relative PTZ movements, it shall specify corresponding default Pan/Tilt and Zoom speeds.

- DefaultPTZTimeout – If the PTZ node supports continuous movements, it shall specify a default timeout, after which the movement stops.

- PanTiltLimits – The Pan/Tilt limits element should be present for a PTZ node that supports an absolute Pan/Tilt. If the element is present it signals the support for configurable Pan/Tilt limits. If limits are enabled, the Pan/Tilt movements shall

always stay within the specified range. The Pan/Tilt limits are disabled by setting the limits to –INF or +INF.

- ZoomLimits – The zoom limits element should be present for a PTZ node that supports absolute zoom. If the element is present it signals the supports for configurable zoom limits. If limits are enabled the zoom movements shall always stay within the specified range. The Zoom limits are disabled by settings the limits to –INF and +INF.

The default position/translation/velocity spaces are introduced to allow clients sending move requests without the need to specify a certain coordinate system. The default speeds are introduced to control the speed of move requests (absolute, relative, preset), where no explicit speed has been set.

The allowed pan and tilt range for Pan/Tilt limits is defined by a two-dimensional space range that is mapped to a specific absolute Pan/Tilt position space. At least one Pan/Tilt position space is required by the PTZNode to support Pan/Tilt limits. The limits apply to all supported absolute, relative and continuous Pan/Tilt movements. The limits shall be checked within the coordinate system for which the limits have been specified. That means that even if movements are specified in a different coordinate system, the requested movements shall be transformed to the coordinate system of the limits where the limits can be checked. When a relative or continuous movements is specified, which would leave the specified limits, the PTZ unit has to move along the specified limits. The Zoom Limits have to be interpreted accordingly.

5.2.1 GetConfigurations

A PTZ-capable device shall return all available PTZConfigurations through the GetConfigurations operation.

Table 3: GetConfigurations command

GetConfigurations	Access Class: READ_MEDIA
Message name	**Description**
GetConfigurations	*This is an empty message.*
GetConfigurationsResponse	*The response contains all existing PTZConfigurations on the device.* tt:PTZConfiguration **PTZConfiguration** [0][unbounded]
Fault codes	**Description**
env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*

5.2.2 GetConfiguration

A PTZ-capable device shall return the requested PTZ configuration, if it exists, through the GetConfiguration operation.

Table 4: GetConfiguration command

GetConfiguration	Access Class: READ_MEDIA
Message name	**Description**
GetConfigurationRequest	This message contains a reference to the requested PTZConfiguration. Tt:ReferenceToken **ConfigurationToken**[1][1]
GetConfigurationResponse	The response contains the requested PTZConfiguration tt:PTZConfiguration **PTZConfiguration** [1][1]
Fault codes	**Description**

env:Sender
  ter: InvalidArgVal
   ter:NoConfig
	The requested configuration does not exist.

Env:Receiver
  ter:ActionNotSupported
   ter:PTZNotSupported
	PTZ is not supported by the device.

5.2.3 GetConfigurationOptions

A PTZ-capable device shall implement the GetConfigurationOptions operation. It returns the list of supported coordinate systems including their range limitations. Therefore, the options MAY differ depending on whether the PTZ configuration is assigned to a profile(see ONVIF Media Service Specification) containing a VideoSourceConfiguration. In that case, the options may additionally contain coordinate systems referring to the image coordinate system described by the VideoSourceConfiguration. Each listed coordinate system belongs to one of the groups listed in Section 4. If the PTZ node supports continuous movements, it shall return a timeout range within which timeouts are accepted by the PTZ node.

Table 5: GetConfigurationOptions command

GetConfigurationOptions	Access Class: READ_MEDIA
Message name	**Description**
GetConfigurationOptions-Request	This message contains a token to a PTZ configuration. **ConfigurationToken** specifies an existing configuration that the options are intended for. tt:ReferenceToken **ConfigurationToken** [1][1]
GetConfigurationOptions-Response	This message contains the PTZ configuration options. tt:PTZConfigurationOptions **PTZConfigurationOptions**[1][1]
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
   ter:NoConfig
	The requested configuration does not exist.

Env: Receiver
  ter:ActionNotSupported
   ter:PTZNotSupported
	PTZ is not supported.

5.2.4 SetConfiguration

A PTZ-capable device shall implement the SetConfiguration operation. The ForcePersistence flag indicates if the changes remain after reboot of the device.

Table 6: SetConfiguration command

SetConfiguration	Access Class: ACTUATE
Message name	**Description**
SetConfigurationRequest	The **PTZConfiguration** element contains the modified PTZ configuration. The configuration shall exist in the device. The **ForcePersistence** element determines if the configuration changes shall be stored and remain after reboot. If true, changes shall be persistent. If false, changes MAY revert to previous values after reboot. tt:PTZConfiguration **PTZConfiguration**[1][1] xs:boolean **ForcePersistence**[1][1]
SetConfigurationResponse	*This is an empty message.*
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
    ter:NoConfig
	The configuration does not exist.

Env:Sender
  ter:InvalidArgVal
    ter:ConfigModify
	The configuration parameters are not possible to set.

Env:Receiver
  ter:Action
    ter:ConfigurationConflict
	The new settings conflict with other uses of the configuration.

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.3   Move Operations

This section describes three operations to move the PTZ unit absolutely, relatively or continuously. All operations require a *ProfileToken* referencing a Media Profile including a PTZConfiguration.

All move commands are non-blocking, meaning they do not wait until the requested move operation has finished. The last move operation can be overwritten by sending another move request.

5.3.1 AbsoluteMove

If a PTZ node supports absolute Pan/Tilt or absolute Zoom movements, it shall support the AbsoluteMove operation. The position argument of this command specifies the absolute position to which the PTZ unit moves. It splits into an optional Pan/Tilt element and an optional Zoom element. If the Pan/Tilt position is omitted, the current Pan/Tilt movement shall NOT be affected by this command. The same holds for the zoom position.

The spaces referenced within the position shall be absolute position spaces supported by the PTZ node. If the space information is omitted, the corresponding default spaces of the PTZ configuration, a part of the specified Media Profile, is used. A device may support absolute Pan/Tilt movements, absolute Zoom movements or no absolute movements by providing only absolute position spaces for the supported cases.

An existing Speed argument overrides the DefaultSpeed of the corresponding PTZ configuration during movement to the requested position. If spaces are referenced within the Speed argument, they shall be Speed Spaces supported by the PTZ Node.

The operation shall fail if the requested absolute position is not reachable.

Table 7: AbsoluteMove command

AbsoluteMove		Access Class: ACTUATE
Message name	**Description**	
AbsoluteMoveRequest	*This message contains a reference to the media profile, a **Position** vector specifying the absolute target position and an optional **Speed**.* tt:ReferenceToken **ProfileToken** [1][1] tt:PTZVector **Position** [1][1] tt:PTZSpeed **Speed** [0][1]	
AbsoluteMoveResponse	*This is an empty message*	
Fault codes	**Description**	
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*	
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*	
Env:Sender ter:InvalidArgVal ter:SpaceNotSupported	*A space is referenced in an argument which is not supported by the PTZ Node.*	
Env:Sender ter:InvalidArgVal ter:InvalidPosition	*The requested position is out of bounds.*	
Env:Sender ter:InvalidArgVal ter:InvalidSpeed	*The requested speed is out of bounds.*	
Env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*	

5.3.2 RelativeMove

If a PTZ node supports relative Pan/Tilt or relative Zoom movements, then it shall support the RelativeMove operation. The translation argument of this operation specifies the difference from the current position to the position to which the PTZ device is instructed to move. The operation is split into an optional Pan/Tilt element and an optional Zoom element. If the

Pan/Tilt element is omitted, the current Pan/Tilt movement shall NOT be affected by this command. The same holds for the zoom element.

The spaces referenced within the translation element shall be translation spaces supported by the PTZ node. If the space information is omitted for the translation argument, the corresponding default spaces of the PTZ configuration, which is part of the specified Media Profile, is used. A device may support relative Pan/Tilt movements, relative Zoom movements or no relative movements by providing only translation spaces for the supported cases.

An existing speed argument overrides the DefaultSpeed of the corresponding PTZ configuration during movement by the requested translation. If spaces are referenced within the speed argument, they shall be speed spaces supported by the PTZ node.

The command can be used to stop the PTZ unit at its current position by sending zero values for Pan/Tilt and Zoom. Stopping shall have the very same effect independent of the relative space referenced.

If the requested translation leads to an absolute position which cannot be reached, the PTZ Node shall move to a reachable position along the border of valid positions.

Table 8: RelativeMove command

RelativeMove	Access Class: ACTUATE
Message name	**Description**
RelativeMoveRequest	*This message contains a reference to the media profile, a positional **Translation** relative to the current position and an optional **Speed** parameter.* tt:ReferenceToken **ProfileToken** [1][1] tt:PTZVector **Translation** [1][1] tt:PTZSpeed **Speed** [0][1]
RelativeMoveResponse	*This is an empty message*
Fault codes	**Description**
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env:Sender ter:InvalidArgVal ter:SpaceNotSupported	*A space is referenced in an argument which is not supported by the PTZ Node.*
Env:Sender ter:InvalidArgVal ter:InvalidTranslation	*The requested translation is out of bounds.*
Env:Sender ter:InvalidArgVal ter:InvalidSpeed	*The requested speed is out of bounds.*
Env: Receiver ter:ActionNotSupported	*PTZ is not supported.*

ter:PTZNotSupported	

5.3.3 ContinuousMove

A PTZ-capable device shall support continuous movements. The velocity argument of this command specifies a signed speed value for the Pan, Tilt and Zoom. The combined Pan/Tilt element is optional and the Zoom element itself is optional. If the Pan/Tilt element is omitted, the current Pan/Tilt movement shall NOT be affected by this command. The same holds for the Zoom element. The spaces referenced within the velocity element shall be velocity spaces supported by the PTZ Node. If the space information is omitted for the velocity argument, the corresponding default spaces of the PTZ configuration belonging to the specified Media Profile is used. A device MAY support continuous Pan/Tilt movements and/or continuous Zoom movements by providing only velocity spaces for the supported cases.

An existing timeout argument overrides the DefaultPTZTimeout parameter of the corresponding PTZ configuration for this Move operation. The timeout parameter specifies how long the PTZ node continues to move.

The command can be used to stop the PTZ device at its current position by sending zero values for the Pan/Tilt and Zoom parameters. Stopping shall have the same effect independent of the velocity space referenced. This command has the same effect on a continuous move as the stop command specified in Section 5.3.4.

If the requested velocity leads to absolute positions which cannot be reached, the PTZ node shall move to a reachable position along the border of its range. A typical application of the continuous move operation is controlling PTZ via joystick.

Table 9: ContinuousMove command

ContinuousMove	Access Class: ACTUATE
Message name	**Description**
ContinuousMoveRequest	*This message contains a reference to the media profile, a **Velocity** vector specifying the velocity of pan, tilt and zoom, and an optional **Timeout** parameter.* tt:ReferenceToken **ProfileToken** [1][1] tt:PTZSpeed **Velocity** [1][1] xs:duration **Timeout** [0][1]
ContinuousMoveResponse	*This is an empty message.*
Fault codes	**Description**
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env:Sender ter:InvalidArgVal ter:SpaceNotSupported	*A space is referenced in an argument which is not supported by the PTZ node.*

Env:Sender
  ter:InvalidArgVal
    ter:TimeoutNotSupported
	The specified timeout argument is not within the supported timeout range.

Env:Sender
  ter:InvalidArgVal
    ter:InvalidVelocity
	The requested velocity is out of bounds.

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.3.4 Stop

A PTZ-capable device shall support the stop operation. If no stop filter arguments are present, this command stops all ongoing pan, tilt and zoom movements. The stop operation can be filtered to stop a specific movement by setting the corresponding stop argument.

Table 10: Stop (PTZ) command

Stop	Access Class: ACTUATE
Message name	**Description**
StopRequest	This message contains a reference to the MediaProfile and parameters that indicate what should be stopped. tt:ReferenceToken **ProfileToken**[1][1] xs:boolean **PanTilt** [0][1] xs:boolean **Zoom**0][1]
StopResponse	This is an empty message.
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
    ter:NoProfile
	The requested profile token **ProfileToken** does not exist.

Env:Sender
  ter:InvalidArgVal
    ter:NoPTZProfile
	The requested profile token does not reference a PTZ configuration.

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.3.5 GetStatus

A PTZ-capable device shall be able to report its PTZ status through the GetStatus command. The PTZ status contains the following information:

- Position (optional) – Specifies the absolute position of the PTZ unit together with the space references. The default absolute spaces of the corresponding PTZ configuration shall be referenced within the position element.

- MoveStatus (optional) – Indicates if the Pan/Tilt/Zoom device unit is currently moving, idle or in an unknown state.

- Error (optional) – States a current PTZ error.

• UTC Time – Specifies the UTC time when this status was generated.

Table 11: GetStatus (PTZ) command

GetStatus	Access Class: READ_MEDIA
Message name	**Description**
GetStatusRequest	*This message contains a reference to the media profile where the PTZStatus should be requested.* tt:ReferenceToken **ProfileToken**[1][1]
GetStatusResponse	*This message contains the PTZStatus for the requested MediaProfile.* tt:PTZStatus **PTZStatus**[1][1]
Fault codes	**Description**
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env:Receiver ter:Action ter:NoStatus	*No PTZ status is available in the requested Media Profile.*
Env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*

5.4 Preset operations

This section describes operations that manage the presets of a PTZ node. These operations shall be implemented for PTZ nodes supporting presets. All operations require a *ProfileToken* referencing a Media Profile including a PTZConfiguration.

5.4.1 SetPreset

The SetPreset command saves the *current* device position parameters so that the device can move to the saved preset position through the GotoPreset operation.

In order to create a new preset, the SetPresetRequest contains no PresetToken. If creation is successful, the response contains the PresetToken which uniquely identifies the preset. An existing preset can be overwritten by specifying the PresetToken of the corresponding preset. In both cases (overwriting or creation) an optional PresetName can be specified. The operation fails if the PTZ device is moving during the SetPreset operation.

The device MAY internally save additional states such as imaging properties in the PTZ preset which then should be recalled in the GotoPreset operation.

Table 12: SetPreset command

SetPreset	Access Class: ACTUATE
Message name	**Description**

SetPresetRequest	*This message contains a reference to the MediaProfile and the requested name or token for the preset.* ttReferenceToken **ProfileToken**[1][1] tt:ReferenceToken **PresetToken**[0][1] xs:string **PresetName**[0][1]
SetPresetResponse	*This message contains a reference to the Preset which has been set.* tt:ReferenceToken **PresetToken**[1][1]

Fault codes	Description
env:Sender ter:InvalidArgVal ter:PresetExist	*The requested name already exist for another preset.*
Env:Sender ter:InvalidArgVal ter:InvalidPresetName	*The PresetName is either too long or contains invalid characters.*
Env:Receiver ter:Action ter:MovingPTZ	*Preset cannot be set while PTZ unit is moving.*
Env:Receiver ter:Action ter:TooManyPresets	*Maximum number of Presets reached.*
Env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Sender ter:InvalidArgVal ter:NoToken	*The requested preset token does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*

5.4.2 GetPresets

The GetPresets operation returns the saved presets consisting of the following elements:

- Token – A unique identifier to reference the preset.

- Name – An optional mnemonic name.

- PTZ Position – An optional absolute position. If the PTZ node supports absolute Pan/Tilt position spaces, the Pan/Tilt position shall be specified. If the PTZ node supports absolute zoom position spaces, the zoom position shall be specified.

Table 13: GetPresets command

GetPresets	Access Class: READ_MEDIA
Message name	**Description**
GetPresetsRequest	*This message contains a reference to the MediaProfile where the operation should take place.* tt:ReferenceToken **ProfileToken**[1][1]
GetPresetsResponse	*This message contains a list of presets which are available for the requested MediaProfile.* tt:PTZPreset **Preset**[0][unbounded]
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
    ter:NoProfile
	*The requested profile token **ProfileToken** does not exist.*

Env:Sender
  ter:InvalidArgVal
    ter:NoPTZProfile
	The requested profile token does not reference a PTZ configuration.

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.4.3 GotoPreset

The GotoPreset operation recalls a previously set preset. If the speed parameter is omitted, the default speed of the corresponding PTZ configuration shall be used. The speed parameter can only be specified when speed spaces are available for the PTZ node. The GotoPreset command is a non-blocking operation and can be interrupted by other move commands.

Table 14: GotoPreset command

GotoPreset	Access Class: ACTUATE
Message name	**Description**
GotoPresetRequest	*This message contains a reference to the MediaProfile where the move to the preset identified by its token should take place.* tt:ReferenceToken **ProfileToken**[1][1] tt:ReferenceToken **PresetToken**[1][1] tt:PTZSpeed **Speed**[0][1]
GotoPresetResponse	*This is an empty message.*
Fault codes	**Description**

env:Sender
  ter:InvalidArgVal
    ter:NoProfile
	*The requested profile token **ProfileToken** does not exist.*

Env:Sender
  ter:InvalidArgVal
    ter:NoToken
	The requested preset token does not exist.

Env:Sender
  ter:InvalidArgVal
    ter:SpaceNotSupported
	A space is referenced in an argument which is not supported by the PTZ node.

Env:Sender
  ter:InvalidArgVal
    ter:NoPTZProfile
	The requested profile token does not reference a PTZ configuration.

Env:Sender
  ter:InvalidArgs
    ter:InvalidSpeed
	The requested speed is out of bounds.

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.4.4 RemovePreset

The RemovePreset operation removes a previously set preset.

Table 15: RemovePreset command

RemovePreset		Access Class: ACTUATE
Message name	**Description**	
RemovePresetRequest	*This message contains a reference to the MediaProfile where the preset identified by the token should be removed.* tt:ReferenceToken **ProfileToken**[1][1] tt:ReferenceToken **PresetToken**[1][1]	
RemovePresetResponse	*This is an empty message.*	
Fault codes	**Description**	

env:Sender
  ter:InvalidArgVal
    ter:NoProfile
	*The requested profile token **ProfileToken** does not exist.*	

Env:Sender
  ter:InvalidArgVal
    ter:NoToken
	The requested preset token does not exist.	

Env:Sender
  ter:InvalidArgVal
    ter:NoPTZProfile
	The requested profile token does not reference a PTZ configuration.	

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.	

5.5 Home Position operations

This section describes operations used to manage the home position of a PTZ node. These operations shall be implemented for PTZ nodes supporting home positions. All operations require a *ProfileToken* referencing a Media Profile including a PTZConfiguration.

The "home" position MAY be set by the SetHome operation or is a fix position of the PTZ unit.

5.5.1 GotoHomePosition

This operation moves the PTZ unit to its home position. If the speed parameter is omitted, the default speed of the corresponding PTZ configuration shall be used. The speed parameter can only be specified when speed spaces are available for the PTZ node.The command is non-blocking and can be interrupted by other move commands.

Table 16: GotoHomePosition command

GotoHomePosition	Access Class: ACTUATE
Message name	**Description**
GotoHomePositionRequest	*This message contains a reference to the MediaProfile where the operation should take place.* tt:ReferenceToken **ProfileToken**[1][1] tt:PTZSpeed **Speed**[0][1]
GotoHomePositionResponse	*This is an empty message.*
Fault codes	**Description**
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Receiver ter:Action ter:NoHomePosition	*No home position has been defined for this Profile.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*

5.5.2 SetHomePosition

The SetHome operation saves the *current* position parameters as the home position, so that the GotoHome operation can request that the device move to the home position.

The SetHomePosition command shall return with a failure if the "home" position is fixed and cannot be overwritten. If the SetHomePosition is successful, it shall be possible to recall the home position with the GotoHomePosition command.

Table 17: SetHomePosition command

SetHomePosition	Access Class: ACTUATE
Message name	**Description**
SetHomePositionRequest	*This message contains a reference to the MediaProfile where the home position should be set.* tt:ReferenceToken **ProfileToken**[1][1]
SetHomePositionResponse	*This message is empty.*

Fault codes	Description
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*
Env:Receiver ter:Action ter:CannotOverwriteHome	*The home position is fixed and cannot be overwritten.*
Env: Receiver ter:ActionNotSupported ter:PTZNotSupported	*PTZ is not supported.*

5.6 Auxiliary operations

This section describes operations to manage auxiliary commands of a PTZ node, such as an infrared (IR) lamp, a heater or a wiper.

These operations shall be implemented for PTZ nodes indicating auxiliary commands in the node properties. All operations require a *ProfileToken* referencing a Media Profile including a PTZConfiguration.

5.6.1 SendAuxiliaryCommand

This operation is used to call an auxiliary operation on the device. The supported commands can be retrieved via the PTZ node properties. The AuxiliaryCommand should match the supported command listed in the PTZ node; no other syntax is supported. If the PTZ node lists the *irlampon* command, then the AuxiliaryCommand argument would be *irlampon.* The SendAuxiliaryCommand shall be implemented when the PTZ node supports auxiliary commands.

Table 18: Send Auxiliary command

SendAuxiliaryCommand	Access Class: ACTUATE
Message name	**Description**
SendAuxiliaryCommandRequest	*This message contains a reference to the MediaProfile where the Auxiliary request should be done and the Auxiliary request data.* tt:ReferenceToken **ProfileToken**[1][1] tt:AuxiliaryData **AuxiliaryData**[1][1]
SendAuxiliaryCommandResponse	*The response contains the auxiliary response.* tt:AuxiliaryData **AuxiliaryResponse**[1][1]
Fault codes	**Description**
env:Sender ter:InvalidArgVal ter:NoProfile	*The requested profile token **ProfileToken** does not exist.*
Env:Sender ter:InvalidArgVal ter:NoPTZProfile	*The requested profile token does not reference a PTZ configuration.*

Env: Receiver
  ter:ActionNotSupported
    ter:PTZNotSupported
	PTZ is not supported.

5.7 Predefined PTZ spaces

Spaces are used to specify absolute, relative and continuous movements. Whereas absolute movements require an absolute position, relative movements are specified by a position translation. Continuous movements require the specification of a velocity (relative movement over time). For these three cases, different coordinate systems are used describing the desired movement. The generic spaces do not absolutely specify the underlying PTZ model, so that it can be applied to any PTZ hardware. Additional spaces are defined in the document *ONVIF PTZ Coordinate Spaces* white paper.

5.7.1 Absolute Position Spaces

5.7.1.1 Generic Pan/Tilt Position Space

The Generic Pan/Tilt Position space shall be provided by every PTZ node that supports absolute Pan/Tilt, since it does not relate to a specific physical range. Instead, the range should be defined as the full range of the PTZ unit normalized to the range -1 to 1 resulting in the following space description:

```
<tt:AbsolutePanTiltPositionSpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
  <tt:Yrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Yrange>
</tt:AbsolutePanTiltPositionSpace>
```

5.7.1.2 Generic Zoom Position Space

The Generic Zoom Position Space shall be provided by every PTZ node that supports absolute Zoom, since it does not relate to a specific physical range. Instead, the range should be defined as the full range of the Zoom normalized to the range 0 (wide) to 1 (tele). There is no assumption about how the generic zoom range is mapped to magnification, FOV or other physical zoom dimension. This results in the following space description:

```
<tt:AbsoluteZoomPositionSpace>
  <tt:SpaceURI>
  http://www.onvif.org/ver10/tptz/ZoomSpaces/PositionGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>0.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
</tt:AbsoluteZoomPositionSpace>
```

5.7.2 Relative Translation Spaces

A Relative Pan/Tilt Translation Space moves the PTZ unit a certain translation in a certain direction without knowing the camera's current Pan/Tilt position.

5.7.2.1 Generic Pan/Tilt Translation Space

The Generic Pan/Tilt translation space shall be provided by every PTZ node that supports relative Pan/Tilt, since it does not relate to a specific physical range. Instead, the range should be defined as the full positive and negative translation range of the PTZ unit normalized to the range -1 to 1, where positive translation would mean clockwise rotation or movement in right/up direction resulting in the following space description:

```
<tt:RelativePanTiltTranslationSpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/PanTiltSpaces/TranslationGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
  <tt:Yrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Yrange>
</tt:RelativePanTiltTranslationSpace>
```

5.7.2.2 Generic Zoom Translation Space

The Generic Zoom Translation Space shall be provided by every PTZ node that supports relative Zoom, since it does not relate to a specific physical range. Instead, the corresponding absolute range should be defined as the full positive and negative translation range of the Zoom normalized to the range -1 to1, where a positive translation maps to a movement in TELE direction. The translation is signed to indicate direction (negative is to wide, positive is to tele). There is no assumption about how the generic zoom range is mapped to magnification, FOV or other physical zoom dimension. This results in the following space description:

```
<tt:RelativeZoomTranslationSpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/ZoomSpaces/TranslationGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
</tt:RelativeZoomTranslationSpace>
```

5.7.3 Continuous Velocity Spaces

The continuous velocity spaces are used to continuously move the PTZ unit in a certain direction.

5.7.3.1 Generic Pan/Tilt Velocity Space

The generic Pan/Tilt velocity space shall be provided by every PTZ node, since it does not relate to a specific physical range. Instead, the range should be defined as a range of the PTZ unit's speed normalized to the range -1 to 1, where a positive velocity would map to clockwise rotation or movement in the right/up direction. A signed speed can be independently specified for the pan and tilt component resulting in the following space description:

```
<tt:ContinuousPanTiltVelocitySpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
```

```
    <tt:Yrange>
      <tt:Min>-1.0</tt:Min>
      <tt:Max>1.0</tt:Max>
    </tt:Yrange>
</tt:ContinuousPanTiltVelocitySpace>
```

5.7.3.2 Generic Zoom Velocity Space

The generic zoom velocity space specifies a zoom factor velocity without knowing the underlying physical model. The range should be normalized from -1 to 1, where a positive velocity would map to TELE direction. A generic zoom velocity space description resembles the following:

```
<tt:ContinuousZoomVelocitySpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/ZoomSpaces/VelocityGenericSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>-1.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
</tt:ContinuousZoomVelocitySpace>
```

5.7.4 Speed Spaces

The speed spaces specify the speed for a Pan/Tilt and Zoom movement when moving to an absolute position or to a relative translation. In contrast to the velocity spaces, speed spaces do not contain any directional information. The speed of a combined Pan/Tilt movement is represented by a single non-negative scalar value.

5.7.4.1   Generic Pan/Tilt Speed Space

The generic Pan/Tilt speed space shall be provided by every PTZ node that supports configurable speed for Pan/Tilt, since it does not relate to a specific physical range. Instead, the range should be defined as the full range of the speed range normalized to the range 0 (stopped) to 1 (full speed). This results in the following space description:

```
<tt:PanTiltSpeedSpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/PanTiltSpaces/GenericSpeedSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>0.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
</tt:PanTiltSpeedSpace>
```

5.7.4.2 Generic Zoom Speed Space

The generic zoom speed space shall be provided by every PTZ node that supports configurable speed for Zoom, since it does not relate to a specific physical range. Instead, the range should be defined as the full range of the speed range normalized to the range 0 (stopped) to 1 (full speed). This results in the following space description:

```
<tt:ZoomSpeedSpace>
  <tt:SpaceURI>
http://www.onvif.org/ver10/tptz/ZoomSpaces/ZoomGenericSpeedSpace
  </tt:SpaceURI>
  <tt:Xrange>
    <tt:Min>0.0</tt:Min>
    <tt:Max>1.0</tt:Max>
  </tt:Xrange>
</tt:ZoomSpeedSpace>
```

5.8   Capabilities

The capabilities reflect optional functions and functionality of a service. The information is static and does not change during device operation. Currently the PTZ capabilites set is empty.

Table 19: GetServiceCapabilities command

GetServiceCapabilities		Access Class: PRE_AUTH
Message name	**Description**	
GetServiceCapabilitiesRequest	*This is an empty message.*	
GetServiceCapabilitiesResponse	*The capability response message contains the requested service capabilities using a hierarchical XML capability structure.* tptz:Capabilities **Capabilities** [1][1]	
Fault codes	**Description**	
	No command specific faults!	

5.9   Service specific data types

5.9.1 PTZNode

```
<xs:complexType name="PTZNode">
   <xs:complexContent>
     <xs:extension base="tt:DeviceEntity">
           <xs:sequence>
           <xs:element name="Name" type="tt:Name" minOccurs="0"/>
           <xs:element name="SupportedPTZSpaces" type="tt:PTZSpaces"/>
           <xs:element name="MaximumNumberOfPresets" type="xs:int"/>
           <xs:element name="HomeSupported" type="xs: oolean"/>
           <xs:element name="AuxiliaryCommands" type="tt:AuxiliaryData"
           minOccurs="0" maxOccurs="unbounded"/>
           </xs:sequence>
        <xs:attribute name="FixedHomePosition" type="xs:boolean">
     </xs:extension>
   </xs:complexContent>
</xs:complexType>
```

- **Name**
  A unique identifier that is used to reference PTZ nodes.

- **SupportedPTZSpaces**
  A list of coordinate systems available for the PTZ node. For each coordinate system, the PTZ node MUST specify its allowed range.

- **MaximumNumberOfPresets**
  All preset operations MUST be available for this PTZ node if one preset is supported.

- **HomeSupported**
  A boolean operator specifying the availability of a home position. If set to true, the home position operations MUST be available for this PTZ node.

- **AuxiliaryCommands**
  A list of supported auxiliary commands. If the list is not empty, the auxiliary operations MUST be available for this PTZ node.

- **FixedHomePosition**   Indication whether the HomePosition of a Node is fixed or it can be changed via the SetHomePosition command.

5.9.2 PTZConfiguration

```
<xs:complexType name="PTZConfiguration">
   <xs:complexContent>
     <xs:extension base="tt:ConfigurationEntity">
            <xs:sequence>
            <xs:element name="NodeToken" type="tt:ReferenceToken"/>
            <xs:element name="DefaultAbsolutePantTiltPositionSpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultAbsoluteZoomPositionSpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultRelativePanTiltTranslationSpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultRelativeZoomTranslationSpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultContinuousPanTiltVelocitySpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultContinuousZoomVelocitySpace"
            type="xs:anyURI" minOccurs="0"/>
            <xs:element name="DefaultPTZSpeed" type="tt:PTZSpeed"
            minOccurs="0"/>
            <xs:element name="DefaultPTZTimeout" type="xs:duration"
            minOccurs="0"/>
            <xs:element name="PanTiltLimits" type="tt:PanTiltLimits"
            minOccurs="0"/>
            <xs:element name="ZoomLimits" type="tt:ZoomLimits"
            minOccurs="0"/>
            </xs:sequence>
     </xs:extension>
   </xs:complexContent>
</xs:complexType>
```

- **NodeToken**
  A mandatory reference to the PTZ node that the PTZ configuration belongs to.

- **DefaultAbsolutePantTiltPositionSpace**
  If the PTZ node supports absolute Pan/Tilt movements, it shall specify one absolute Pan/Tilt position space as default.

- **DefaultAbsoluteZoomPositionSpace**
  If the PTZ node supports absolute zoom movements, it shall specify one absolute zoom position space as default.

- **DefaultRelativePanTiltTranslationSpace**
  If the PTZ node supports relative Pan/Tilt movements, it shall specify one relative Pan/Tilt translation space as default.

- **DefaultRelativeZoomTranslationSpace**
  If the PTZ node supports relative zoom movements, it shall specify one relative zoom translation space as default.

- **DefaultContinuousPanTiltVelocitySpace**
  If the PTZ node supports continuous Pan/Tilt movements, it shall specify one continuous Pan/Tilt velocity space as default.

- **DefaultContinuousZoomVelocitySpace**
  If the PTZ node supports continuous zoom movements, it shall specify one continuous zoom velocity space as default.

- **DefaultPTZSpeed**
  If the PTZ node supports absolute or relative PTZ movements, it shall specify corresponding default Pan/Tilt and Zoom speeds.

- **DefaultPTZTimeout**
  If the PTZ node supports continuous movements, it shall specify a default timeout, after which the movement stops.

- **PanTiltLimits**
  The Pan/Tilt limits element should be present for a PTZ node that supports an absolute Pan/Tilt. If the element is present it signals the support for configurable Pan/Tilt limits. If limits are enabled, the Pan/Tilt movements shall always stay within the specified range. The Pan/Tilt limits are disabled by setting the limits to –INF or +INF.

- **ZoomLimits**
  The Zoom limits element should be present for a PTZ node that supports absolute zoom. If the element is present it signals the supports for configurable zoom limits. If limits are enabled the zoom movements shall always stay within the specified range. The zoom limits are disabled by settings the limits to –INF and +INF.

5.9.3 PTZConfigurationOptions

```
<xs:complexType name="PTZConfigurationOptions">
   <xs:sequence>
     <xs:element name="Spaces" type="tt:PTZSpaces"/>
     <xs:element name="PTZTimeout" type="tt:DurationRange"/>
   </xs:sequence>
</xs:complexType>
```

- **Spaces**
  A list of supported coordinate systems including their range limitations.

- **PTZTimeout**
  A timeout range within which timeouts are accepted by the PTZ node.

5.9.4 PanTiltLimits

```
<xs:complexType name="PanTiltLimits">
  <xs:sequence>
    <xs:element name="Range" type="tt:Space2Ddescription"/>
  </xs:sequence>
```

```
</xs:complexType>
```

- **Range**
  A range of pan tilt limits..

5.9.5 ZoomLimits

```
<xs:complexType name="ZoomLimits">
   <xs:sequence>
     <xs:element name="Range" type="tt:Space1Ddescription"/>
   </xs:sequence>
</xs:complexType>
```

- **Range**
  A range of zoom limits..

5.9.6 PTZSpaces

```
<xs:complexType name="PTZSpaces">
   <xs:sequence>
     <xs:element name="AbsolutePanTiltPositionSpace"
            type="tt:Space2Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="AbsoluteZoomPositionSpace"
            type="tt:Space1Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="RelativePanTiltTranslationSpace"
            type="tt:Space2Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="RelativeZoomTranslationSpace"
            type="tt:Space1Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="ContinuousPanTiltVelocitySpace"
            type="tt:Space2Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="ContinuousZoomVelocitySpace"
            type="tt:Space1Ddescription" minOccurs="0"
            maxOccurs="unbounded"/>
     <xs:element name="PanTiltSpeedSpace" type="tt:Space1Ddescription"
            minOccurs="0" maxOccurs="unbounded"/>
     <xs:element name="ZoomSpeedSpace" type="tt:Space1Ddescription"
            minOccurs="0" maxOccurs="unbounded"/>
   </xs:sequence>
</xs:complexType>
```

- **AbsolutePanTiltPositionSpace**
  A coordinate systems of absolute pan tilt position.

- **AbsoluteZoomPositionSpace**
  A coordinate systems of absolute zoom position.

- **RelativePanTiltTranslationSpace**
  A coordinate systems of relative pan tilt position.

- **RelativeZoomTranslationSpace**
  A coordinate systems of relative zoom position.

- **ContinuousPanTiltVelocitySpace**
  A coordinate systems of continuous pan tilt velocity.

- **ContinuousZoomVelocitySpace**
  A coordinate systems of continuous zoom velocity.

- **PanTiltSpeedSpace**
  A coordinate systems of continuous pan tilt speed.

- **ZoomSpeedSpace**
  A coordinate systems of continuous zoom speed.

5.9.7 Space2Ddescription

```
<xs:complexType name="Space2Ddescription">
   <xs:sequence>
     <xs:element name="URI" type="xs:anyURI"/>
     <xs:element name="Xrange" type="tt:FloatRange"/>
     <xs:element name="Yrange" type="tt:FloatRange"/>
   </xs:sequence>
</xs:complexType>
```

- **URI**
  A URI of coordinate systems.

- **Xrange**
  A range of x-axis.

- **Yrange**
  A range of y-axis.

5.9.8 Space1Ddescription

```
<xs:complexType name="Space1Ddescription">
   <xs:sequence>
     <xs:element name="URI" type="xs:anyURI"/>
     <xs:element name="Xrange" type="tt:FloatRange"/>
   </xs:sequence>
</xs:complexType>
```

- **URI**
  A URI of coordinate systems.

- **Xrange**
  A range of x-axis.

5.9.9 Vector2D

```
<xs:complexType name="Vector2D">
   <xs:attribute name="x" type="xs:float" use="required"/>
   <xs:attribute name="y" type="xs:float" use="required"/>
   <xs:attribute name="space" type="xs:anyURI" use="optional"/>
</xs:complexType>
```

- **x**
  The x component corresponds to pan.

- **y**
  The y component corresponds to tilt.

- **space**
  Pan/tilt coordinate space selector. The following options are defined:

    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/TranslationGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/GenericSpeedSpace

5.9.10 Vector1D

```
<xs:complexType name="Vector1D">
  <xs:attribute name="x" type="xs:float" use="required"/>
  <xs:attribute name="space" type="xs:anyURI" use="optional"/>
</xs:complexType>
```

- **x**
  The x component corresponds to pan.

- **space**
  Pan/tilt coordinate space selector. The following options are defined:

    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/PositionGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/TranslationGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/VelocityGenericSpace
    - http://www.onvif.org/ver10/tptz/PanTiltSpaces/GenericSpeedSpace

5.9.11 PTZVector

```
<xs:complexType name="PTZVector">
  <xs:sequence>
    <xs:element name="PanTilt" type="tt:Vector2D" minOccurs="0"/>
    <xs:element name="Zoom" type="tt:Vector1D" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
```

- **PanTilt**
  Pan and tilt position. The x component corresponds to pan and the y component to tilt.

- **Zoom**
  A zoom position.

5.9.12 PTZSpeed

```
<xs:complexType name="PTZSpeed">
  <xs:sequence>
    <xs:element name="PanTilt" type="tt:Vector2D" minOccurs="0"/>
    <xs:element name="Zoom" type="tt:Vector1D" minOccurs="0"/>
```

```
   </xs:sequence>
</xs:complexType>
```

- **PanTilt**
  Pan and tilt speed. The x component corresponds to pan and the y component to tilt.

- **Zoom**
  A zoom speed.

5.9.13 PTZStatus

```
<xs:complexType name="PTZStatus">
   <xs:sequence>
     <xs:element name="Position" type="tt:PTZVector" minOccurs="0"/>
     <xs:element name="MoveStatus" type="tt:PTZMoveStatus" minOccurs="0"/>
     <xs:element name="Error" type="xs:string" minOccurs="0"/>
     <xs:element name="UtcTime" type="xs:dateTime"/>
   </xs:sequence>
</xs:complexType>
```

- **Position**
  Specifies the absolute position of the PTZ unit together with the space references. The default absolute spaces of the corresponding PTZ configuration MUST be referenced within the Position element.

- **MoveStatus**
  Indicates if the Pan/Tilt/Zoom device unit is currently moving, idle or in an unknown state.

- **Error**
  States a current PTZ error.

- **UtcTime**
  Specifies the UTC time when this status was generated.

5.9.14 PTZPreset

```
<xs:complexType name="PTZPreset">
   <xs:sequence>
     <xs:element name="Name" type="tt:Name" minOccurs="0"/>
     <xs:element name="PTZPosition" type="tt:PTZVector" minOccurs="0"/>
   </xs:sequence>
   <xs:attribute name="token" type="tt:ReferenceToken"/>
</xs:complexType>
```

- **token**
  A unique identifier to reference the preset.

- **Name**
  A list of preset position name.

- **PTZPosition**
  A list of preset position.

5.9.15 PTZMoveStatus

```
<xs:complexType name="PTZMoveStatus">
   <xs:sequence>
     <xs:element name="PanTilt" type="tt:MoveStatus" minOccurs="0"/>
     <xs:element name="Zoom" type="tt:MoveStatus" minOccurs="0"/>
   </xs:sequence>
</xs:complexType>
```

- **PanTilt**
  Defined values are IDLE, MOVING and UNKNOWN.

- **Zoom**
  Defined values are IDLE, MOVING and UNKNOWN.

5.10 Service specific fault codes

Table 20 below lists the PTZ service specific fault codes. Each command can generate a generic fault.

The specific faults are defined as subcode of a generic fault, as defined in the ONVIF Core Specification. The parent generic sub code is the *subcode* at the top of each row below and the specific fault *subcode* is at the bottom of the cell.

Table 20: PTZspecific fault codes

Fault Code	Parent Subcode	Fault Reason	Description
	Subcode		
env:Receiver	ter:Action	Preset cannot be set	Preset cannot be set while the PTZ unit is moving.
	Ter:MovingPTZ		
env:Receiver	ter:Action	Number of presets limit reached	Maximum number of Presets reached.
	Ter:TooManyPresets		
env:Receiver	ter:ActionNotSupported	PTZ not supported	PTZ is not supported by the device.
	Ter:PTZNotSupported		
env:Sender	ter:InvalidArgVal	Token already exist	The requested name or token already exist for another preset.
	ter:PresetExist		
env:Receiver	ter:Action	No PTZ status available	No PTZ status is available in the requested Media Profile.
	ter:NoStatus		
env:Receiver	ter:Action	Conflict when using new settings	The new settings result in an inconsistent configuration.
	ter:ConfigurationConflict		
env:Receiver	ter:Action	Home position cannot be overwritten	The home position is fixed and cannot be overwritten.
	ter:CannotOverwriteHome		
env:Sender	ter:InvalidArgVal	No such PTZ node	No such PTZ Node on the device
	ter:NoEntity		
env:Sender	ter:InvalidArgVal	No such configuration	No such configuration exist.
	ter:NoConfig		

env:Sender	ter:InvalidArgVal	The paramters could not be set	The configuration parameters are not possible to set.
	ter:ConfigModify		
env:Sender	ter:InvalidArgVal	Destination out of bounds	The requested destination is out of bounds.
	ter:InvalidPosition		
env:Sender	ter:InvalidArgVal	Translation out of bounds	The requested translation is out of bounds.
	ter:InvalidTranslation		
env:Sender	ter:InvalidArgVal	Reqested speed out of bounds	The requested speed is out of bounds.
	ter:InvalidSpeed		
env:Sender	ter:InvalidArgVal	Velocity out of bounds	The requested velocity is out of bounds.
	ter:InvalidVelocity		
env:Sender	ter:InvalidArgVal	PresetName too long	The PresetName is either too long or contains invalid characters.
	ter:InvalidPresetName		
env:Sender	ter:InvalidArgVal	Profile miss PTZ configuration	The requested profile token does not reference a PTZ configuration.
	ter:NoPTZProfile		
env:Sender	ter:InvalidArgVal	Profile token does not exist	The requested profile token **ProfileToken** does not exist.
	ter:NoProfile		
env:Sender	ter:InvalidArgVal	Timeout not supported	The specified timeout argument is not within the supported timeout range.
	ter:TimeoutNotSupported		
env:Sender	ter:InvalidArgVal	Token does not exist.	The requested preset token does not exist
	ter:NoToken		
env:Receiver	ter:Action	No HomePosition	No home position has been defined for this Profile.
	ter:NoHomePosition		
env:Sender	ter:InvalidArgVal	No such space	A space is referenced in an argument which is not supported by the PTZ Node.
	ter:SpaceNotSupported		

Annex A. Notification topics
(informative)

A.1   PTZ Controller Topics

The PTZ service specifies handling of PTZ presets. Since the move operations are non-blocking, a client is not informed when the PTZ preset has been reached. Therefore, the following events are introduced which inform subscribers about the status of preset movements.

```
tns1:PTZController/PTZPresets/Invoked
tns1:PTZController/PTZPresets/Reached
tns1:PTZController/PTZPresets/Aborted
tns1:PTZController/PTZPresets/Left
```

The typical sequence of events is that first a client requests a certain preset. When the device accepts this request, it will send out an invoked event. The invoked event has to follow either a reached event or an aborted event. The former is used when the PTZ unit was able to reach the invoked preset position, the latter in any other case. A reached event has to follow a left event, as soon as the PTZ unit moves away from the preset position.

The message structure of these events is given by the following message description:

```
<tt:MessageDescription>
  <tt:Source>
    <tt:SimpleItemDescription Name="PTZConfigurationToken"
                    Type="tt:ReferenceToken"/>
  </tt:Source>
  <tt:Data>
    <tt:SimpleItemDescription Name="PresetToken" Type="tt:ReferenceToken"/>
    <tt:SimpleItemDescription Name="PresetName"  Type="tt:Name"/>
  </tt:Data>
</tt:MessageDescription>
```

Annex B. Revision History

Rev.	Date	Editor	Changes
2.1	Jul-2011	Hans Busch	Split from Core 2.0 without change of content.
2.1.1	Jan-2012	Hans Busch	Change Requests 262, 434, 535, 554