UnifiedPOS Retail Peripheral Architecture

Version 1.16.1 RCSD

International Standard
For Implementation of Point Of Service Peripherals

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This proposal adds to and extends the UPOS 1.16 standard.

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https://www.omg.org/spec/UPOS/20200301/DeviceMonitorClassDiagram.xmi
https://www.omg.org/spec/UPOS/20200301/GestureControlClassDiagram.xmi
https://www.omg.org/spec/UPOS/20200301/GraphicDisplayClassDiagram.xmi
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Preface

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3 **Specialized CORBA**

IDL/Language Mapping Specifications

Modeling and Metadata Specifications

4 **UML, MOF, CWM, XMI**

5 **UML Profile**

Modernization Specifications

Platform Independent Model (PIM), Platform Specific Model (PSM), Interface Specifications

6 **CORBAServices**

7 **CORBAFacilities**

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CORBA Security Specifications

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Typographical Conventions

The type styles shown below are used in this document to distinguish programming statements from ordinary English. However, these conventions are not used in tables or section headings where no distinction is necessary.

Times/Times New Roman - 10 pt.: Standard body text

NOTE: Terms that appear in italics are defined in the glossary. Italic text also represents the name of a document, specification, or other publication.

Issues

The reader is encouraged to report any technical or editing issues/problems with this specification to http://www.omg.org/report_issue.htm.

UPOS 1.16.1 RCSD Specification Overview

Updated Items in Release 1.16.1

In the current UPOS 1.16, heavy technical review was done and found some area to be changed. Those changes are pointed out and all of changes are listed in the attached table. Please refer to the changes details in the table.

CHAPTER 21

Lights

This Chapter defines the Lights device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.12	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.12	open
CapPowerReporting:	*int32*	{read-only}	1.12	open
CapStatisticsReporting:	*boolean*	{read-only}	1.12	open
CapUpdateFirmware:	*boolean*	{read-only}	1.12	open
CapUpdateStatistics:	*boolean*	{read-only}	1.12	open
CheckHealthText:	*string*	{read-only}	1.12	open
Claimed:	*boolean*	{read-only}	1.12	open
DataCount:	*int32*	{read-only}	1.12	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.12	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.12	open & claim
FreezeEvents:	*boolean*	{read-write}	1.12	open
OutputID:	*int32*	{read-only}	1.12	***Not supported***
PowerNotify:	*int32*	{read-write}	1.12	open
PowerState:	*int32*	{read-only}	1.12	open
State:	*int32*	{read-only}	1.12	--
DeviceControlDescription:	*string*	{read-only}	1.12	--
DeviceControlVersion:	*int32*	{read-only}	1.12	--
DeviceServiceDescription:	*string*	{read-only}	1.12	open
DeviceServiceVersion:	*int32*	{read-only}	1.12	open
PhysicalDeviceDescription:	*string*	{read-only}	1.12	open
PhysicalDeviceName:	*string*	{read-only}	1.12	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAlarm:	*int32*	{read-only}	1.12	open
CapBlink:	*boolean*	{read-only}	1.12	open
CapColor:	*int32*	{read-only}	1.12	open
CapPattern:	*int32*	{read-only}	1.16	open
MaxLights:	*int32*	{read-only}	1.12	open

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.12
close ( ): **void {raises-exception, use after open}**	1.12
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.12
release ( ): **void {raises-exception, use after open, claim}**	1.12
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.12
clearInput ( ): **void { }**	***Not supported***
clearInputProperties ( ): **void { }**	***Not supported***
clearOutput ( ): **void { }**	***Not supported***
directIO (command: *int32*, **inout data:** *int32*, **inout obj:** *object***):** **void {raises-exception, use after open}**	1.12
compareFirmwareVersion (firmwareFileName: *string*, **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.12
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.12
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.12
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.12
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.12

Specific

Name	
switchOff (lightNumber*:* *int32*): **void {raises-exception, use after open, claim, enable}**	1.12
switchOn (lightNumber: *int32,* **blinkOnCycle:** *int32,* **blinkOffCycle:** *int32,* **color:** *int32,* **alarm:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.12
switchOnMultiple (lightNumbers: string, blinkOnCycle: int32, **blinkOffCycle: int32, color: int32, alarm: int32):** **void {raises-exception, use after open, claim, enable}**	1.16
switchOnPattern (pattern: int32, alarm: int32): **void {raises-exception, use after open, claim, enable}**	1.16
switchOffPattern ( ): **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	
upos::events::DirectIOEvent			1.12
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent		***Not supported***	
upos::events::OutputCompleteEvent		***Not supported***	
upos::events::StatusUpdateEvent			1.12
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Lights programmatic name is “Lights”.

This device category was added to Version 1.12 of the specification.

Capabilities

- The Lights device control has the following capability:
  - Supports commands to “switch on” and “switch off” a light.
- The Lights device control may have the following additional capabilities:
  - Supports device-level blinking at adjustable blink cycles.
  - Support multiple lights.
  - Supports different colors of a light.
  - Supports different alarms

Device Sharing

Lights is an exclusive-use device. Its device sharing rules are:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some of the properties and methods, or receiving events.
- See the “Summary” table for precise usage prerequisites.

Lights Class Diagram

Updated in Release 1.16

The following diagram shows the relationships between the Lights classes

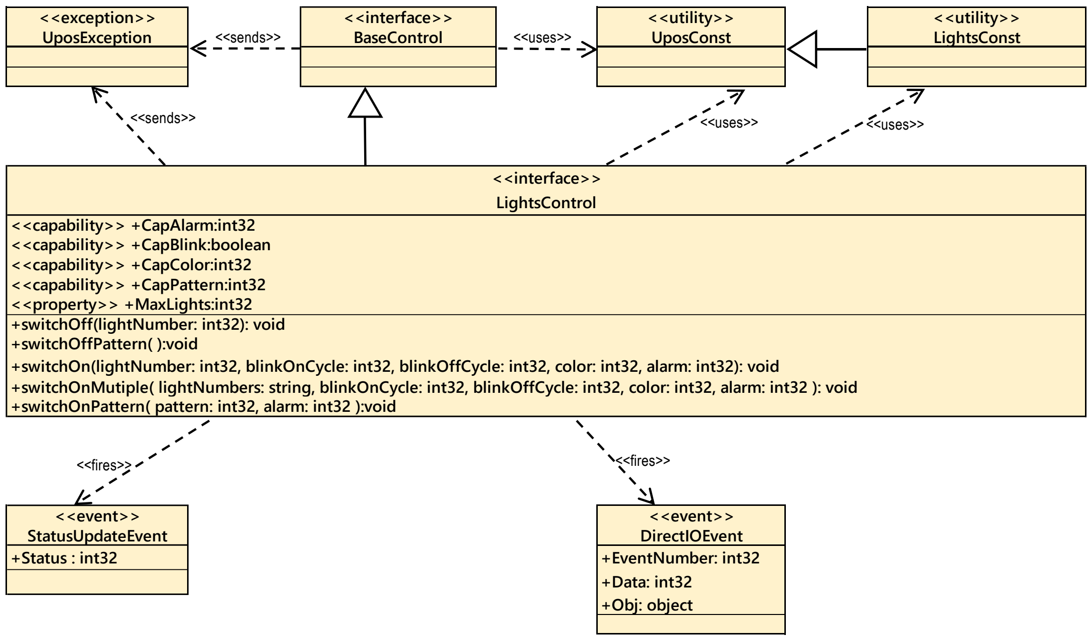

<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<utility>>
LightsConst
<<sends>>
<<uses>>
<<uses>>
<<interface>>
LightsControl
<<capability>> +CapAlarm:int32
<<capability>> +CapBlink:boolean
<<capability>> +CapColor:int32
<<capability>> +CapPattern:int32
<<property>> +MaxLights:int32
+switchOff(lightNumber: int32): void
+switchOffPattern( ):void
+switchOn(lightNumber: int32, blinkOnCycle: int32, blinkOffCycle: int32, color: int32, alarm: int32): void
+switchOnMutiple(lightNumbers: string, blinkOnCycle: int32, blinkOffCycle: int32, color: int32, alarm: int32): void
+switchOnPattern(pattern: int32, alarm: int32):void
<<fires>>
<<fires>>
<<event>>
StatusUpdateEvent
+Status : int32
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object

Fig. Chap. 21-1 Lights Class Diagram

Lights Sequence Diagram

The following sequence diagram show the typical usage of the Lights device illustrating the handling of the media entry indicator lights.

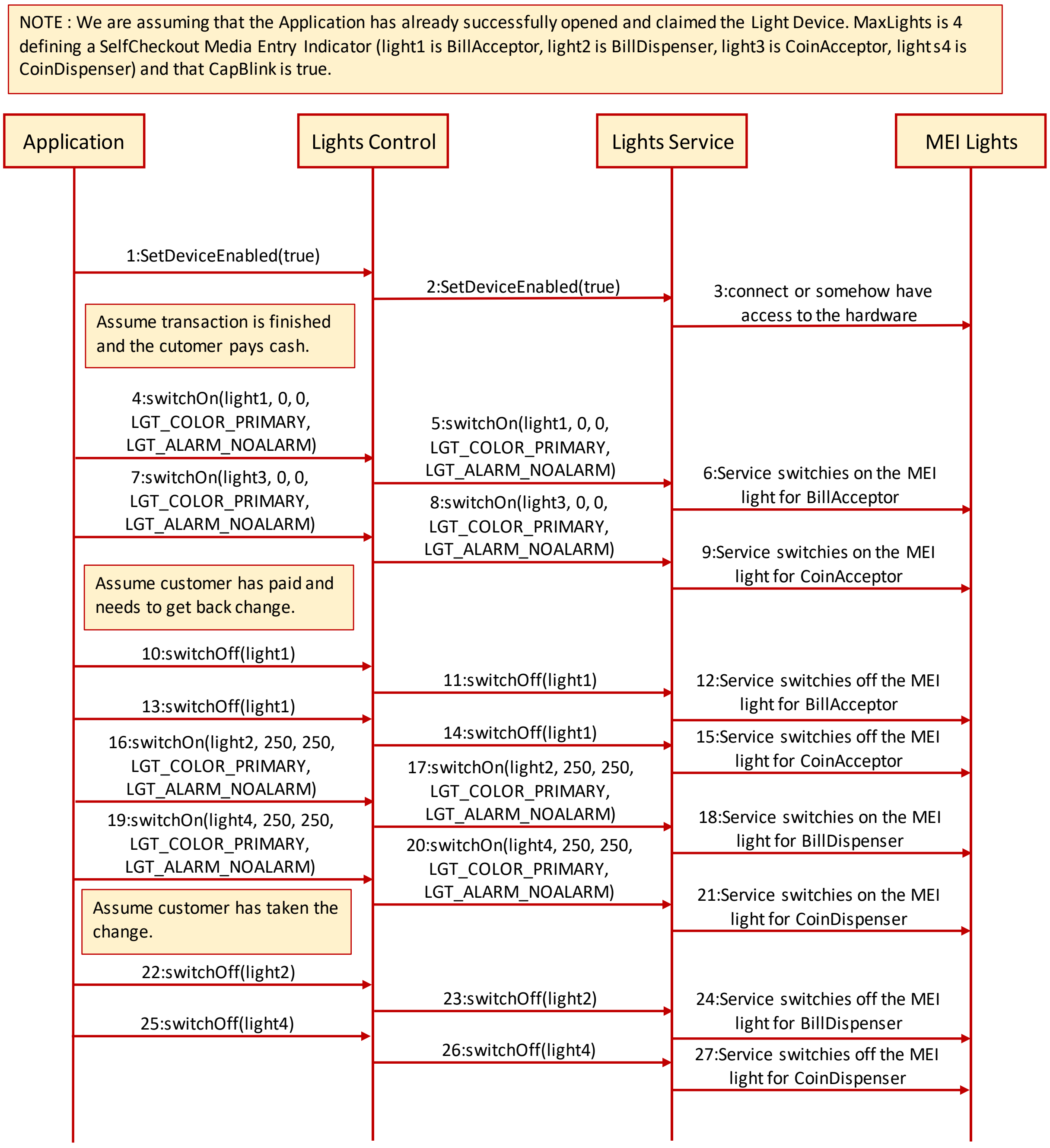

NOTE : We are assuming that the Application has already successfully opened and claimed the Light Device. MaxLights is 4 defining a SelfCheckout Media Entry Indicator (light1 is BillAcceptor, light2 is BillDispenser, light3 is CoinAcceptor, lights4 is CoinDispenser) and that CapBlink is true.
Application
Lights Control
Lights Service
MEI Lights
1:SetDeviceEnabled(true)
2:SetDeviceEnabled(true)
3:connect or somehow have access to the hardware
Assume transaction is finished and the cutomer pays cash.
4:switchOn(light1, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
5:switchOn(light1, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
6:Service switches on the MEI light for BillAcceptor
7:switchOn(light3, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
8:switchOn(light3, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
9:Service switches on the MEI light for CoinAcceptor
Assume customer has paid and needs to get back change.
10:switchOff(light1)
11:switchOff(light1)
12:Service switches off the MEI light for BillAcceptor
13:switchOff(light1)
14:switchOff(light1)
15:Service switches off the MEI light for CoinAcceptor
16:switchOn(light2, 250, 250, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
17:switchOn(light2, 250, 250, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
18:Service switches on the MEI light for BillDispenser
19:switchOn(light4, 250, 250, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
20:switchOn(light4, 250, 250, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
21:Service switches on the MEI light for CoinDispenser
Assume customer has taken the change.
22:switchOff(light2)
23:switchOff(light2)
24:Service switches off the MEI light for BillDispenser
25:switchOff(light4)
26:switchOff(light4)
27:Service switches off the MEI light for CoinDispenser

Fig. Chap. 21-2 Lights Sequence Diagram (handling of the media entry indicator lights)

The following sequence diagram show the typical usage of the Lights device illustrating the handling of the pole lights.

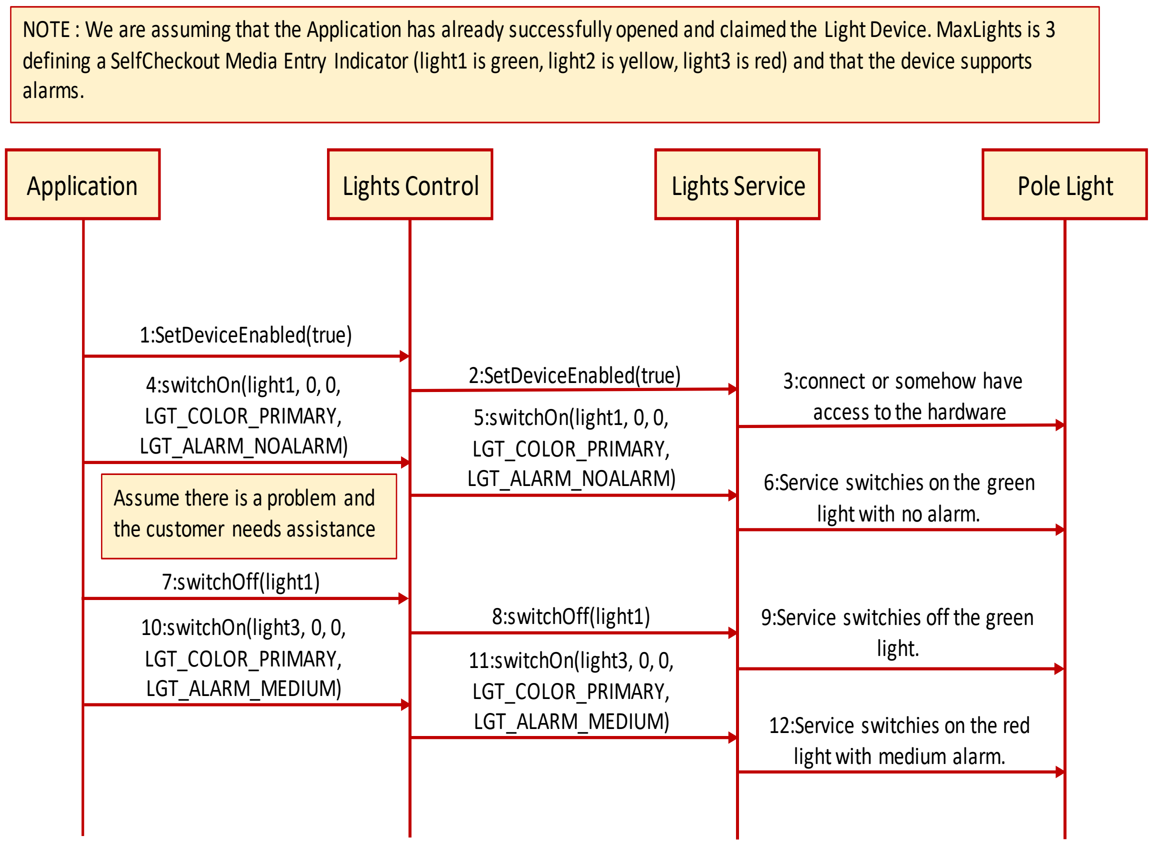

NOTE : We are assuming that the Application has already successfully opened and claimed the Light Device. MaxLights is 3 defining a SelfCheckout Media Entry Indicator (light1 is green, light2 is yellow, light3 is red) and that the device supports alarms.
Application
Lights Control
Lights Service
Pole Light
1:SetDeviceEnabled(true)
2:SetDeviceEnabled(true)
3:connect or somehow have access to the hardware
4:switchOn(light1, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
5:switchOn(light1, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_NOALARM)
6:Service switchies on the green light with no alarm.
Assume there is a problem and the customer needs assistance
7:switchOff(light1)
8:switchOff(light1)
9:Service switchies off the green light.
10:switchOn(light3, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_MEDIUM)
11:switchOn(light3, 0, 0, LGT_COLOR_PRIMARY, LGT_ALARM_MEDIUM)
12:Service switchies on the red light with medium alarm.

Fig. Chap. 21-3 Lights Sequence Diagram (handling of the pole lights)

Properties(UML attributes)

CapAlarm Property

Syntax **CapAlarm:** ***int32*** **{read-only, access after open}**

Remarks This capability indicates if the device supports different alarms.

CapAlarm is a logical OR combination of any of the following values:

Value	Meaning
LGT_ALARM_NOALARM	Alarms are not supported.
LGT_ALARM_SLOW	Supports a slow beep.
LGT_ALARM_MEDIUM	Supports a medium beep.
LGT_ALARM_FAST	Supports a fast beep.
LGT_ALARM_CUSTOM1	Supports 1st custom alarm.
LGT_ALARM_CUSTOM2	Supports 2nd custom alarm.

This property is initialized by the **open** method. If the device does not support alarms, it is initialized to LGT_ALARM_NOALARM.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

CapBlink Property

Syntax **CapBlink:** ***boolean*** **{read-only, access after open}**

Remarks If true, a blinking capability is supported. It may be either a physical capability of the device or emulated by the service.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

CapColor Property

Syntax **CapColor:** ***int32*** **{read-only, access after open}**

Remarks This capability indicates if the device supports different colors.

CapColor is a logical OR combination of any of the following values:

Value	Meaning
LGT_COLOR_PRIMARY	Supports Primary Color (Usually Green).
LGT_COLOR_CUSTOM1	Supports 1st Custom Color (Usually Red).
LGT_COLOR_CUSTOM2	Supports 2nd Custom Color (Usually Yellow).
LGT_COLOR_CUSTOM3	Supports 3rd Custom Color.
LGT_COLOR_CUSTOM4	Supports 4th Custom Color.
LGT_COLOR_CUSTOM5	Supports 5th Custom Color.

This property is initialized by the **open** method. If the device supports only one color, it is initialized to LGT_COLOR_PRIMARY.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

CapPattern Property *Added in Release 1.16*

Syntax **CapPattern:** ***int32*** **{read-only, access after open}**

Remarks This capability indicates if the device supports different lighting patterns.

CapPattern is a logical OR combination of any of the following values:

Value	Meaning
LGT_PATTERN_NOPATTERN	Lighting patterns are not supported.
LGT_PATTERN_CUSTOM	1~32 Supports 1st to 32th Lighting Pattern.

This property is initialized by the **open** method. If the device does not support lighting pattern, it is initialized to LGT_PATTERN_NOPATTERN.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **switchOnPattern** Method.

MaxLights Property

Syntax **MaxLights:** ***int32*** **{read-only, access after open}**

Remarks **MaxLights** specifies the maximum number of lights that the device can support.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Methods (UML operations)

switchOff Method

Syntax **switchOff (lightNumber:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
lightNumber	Specifies the light number. Valid light numbers are 1 through **MaxLights**.

Remarks Switches off the light specified by *lightNumber*.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20**.**

A possible value of the exception’s *ErrorCode* property is:

Value	Meaning
E_ILLEGAL	The *lightNumber* parameter exceeds **MaxLights**.

See Also **MaxLights** Property**.**

switchOffPattern Method

Syntax **switchOff Pattern ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Switches off the pattern lighting.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20**.**

A possible value of the exception’s *ErrorCode* property is:

Value	Meaning
E_ILLEGAL	Pattern lighting is not executed.

See Also **switchOnPattern** Method.

switchOn Method *Updated in Release1.12*

Syntax **switchOn (lightNumber:** ***int32*****, blinkOnCycle:** ***int32*****,**
blinkOffCycle: ***int32*****, color:** ***int32*****, alarm:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
lightNumber	Specifies the light number. Valid light numbers are 1 through **MaxLights**.
blinkOnCycle	A zero (0) value indicates no blink cycle. A positive value indicates the blink on cycle time in milliseconds. Negative values are not allowed.
blinkOffCycle	A zero (0) value indicates no blink cycle. A positive value indicates the blink off cycle time in milliseconds. Negative values are not allowed.
color	Specifies the color of the light, must be one of the colors defined by **CapColor**.
alarm	Specifies the used alarm type, must be one of the alarms defined by **CapAlarm**.

Remarks Switches on the light specified by *lightNumber* or let it blink.

If *blinkOnCycle* and *blinkOffCycle* are zero (0) or **CapBlink** is false, then the parameters *blinkOnCycle* and *blinkOffCycle* will be ignored and the light will only be switched on.

If **CapBlink** is true and *blinkOnCycle* and *blinkOffCycle* are positive, then the light will blink.

If **CapColor** is LGT_COLOR_PRIMARY the light does not support different colors and *color* is ignored, otherwise **switchOn** will use the color specified by *color*.

If **CapAlarm** is LGT_ALARM_NOALARM the light does not support different alarms and *alarm* is ignored, otherwise **switchOn** will use the alarm specified by *alarm*.

Subsequent calls to **switchOn** will change the blink cycles, the color or the alarm type of the light.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20**.**

A possible value of the exception's *ErrorCode* property is:

Value	Meaning
E_ILLEGAL	The *lightNumber* parameter exceeds **MaxLights**, an invalid *color* or *alarm* was specified.

See Also **CapAlarm** Property, **CapBlink** Property, **CapColor** Property, **MaxLights** Property**.**

switchOnMultiple Method *Added in Release 1.16*

Syntax **switchOnMultiple (lightNumbers: *string*, blinkOnCycle: *int32*, blinkOffCycle: *int32*, color: *int32*, alarm: *int32*): void {raises-exception, use after open-claim-enable}**

Parameter	**Description**
lightNumbers	Specifies the comma-delimited list of light number. Valid light numbers are 1 through **MaxLights**.
blinkOnCycle	A zero (0) value indicates no blink cycle. A positive value indicates the blink on cycle time in milliseconds. Negative values are not allowed.
blinkOffCycle	A zero (0) value indicates no blink cycle. A positive value indicates the blink off cycle time in milliseconds. Negative values are not allowed.
color	Specifies the color of the light, must be one of the colors defined by **CapColor**.
alarm	Specifies the used alarm type, must be one of the alarms defined by **CapAlarm**.

Remarks This method does the same as switchOn but in a synchronized way such that all lights are switched on / blinking synchronously. Switches on the multiple lights specified by *lightNumbers* or let it blink.

If *blinkOnCycle* and *blinkOffCycle* are zero (0) or **CapBlink** is false, then the parameters *blinkOnCycle* and *blinkOffCycle* will be ignored and the light will only be switched on.

If **CapBlink** is true and *blinkOnCycle* and *blinkOffCycle* are positive, then the light will blink.

If **CapColor** is LGT_COLOR_PRIMARY the light does not support different colors and *color* is ignored, otherwise **switchOnMultiple** will use the color specified by *color*.

If **CapAlarm** is LGT_ALARM_NOALARM the light does not support different alarms and *alarm* is ignored, otherwise **switchOnMultiple** will use the alarm specified by *alarm*.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20**.**

A possible value of the exception's *ErrorCode* property is:

Value	**Meaning**
E_ILLEGAL	The *lightNumbers* parameter exceeds **MaxLights**, an invalid value was specified.

See Also **CapAlarm** Property, **CapBlink** Property, **CapColor** Property, **MaxLights** Property**.**

switchOnPattern Method *Added in Release 1.16*

Syntax **switchOnPattern (pattern:** ***int32*****, alarm:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
pattern	Specifies the lighting pattern, must be one of the patterns defined by **CapPattern**.
alarm	Specifies the used alarm type, must be one of the alarms defined by **CapAlarm**.

Remarks Switches on the light specified by *pattern*.

If **CapAlarm** is LGT_ALARM_NOALARM the light does not support different alarms and *alarm* is ignored, otherwise **switchOn** and **switchOnPattern** will use the alarm specified by *alarm*.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20**.**

A possible value of the exception’s *ErrorCode* property is:

Value	Meaning
E_ILLEGAL	An invalid value was specified, or unsupported operation with the Device.

See Also **CapAlarm** Property, **CapPattern** Property**.**

Events (UML interfaces)

DirectIOEvent

<< event >> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*****{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Lights Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This property is settable.
Obj	*Object*	Additional data whose usage varies by the *EventNumber* and Service. This property is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described. Use of this event may restrict the application program from being used with other vendor's Lights devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** Method.

StatusUpdateEvent

<< event >> **upos::events::StatusUpdateEvent**

Status	**:** ***int32*** **{read-only}**

Description Notifies the application that there is a change in the power status of a light.

Attributes This event contains the following attribute:

Attribute	Type	Description
Status	*int32*	Reports a change in the power status of a light. ***Note that Release 1.3*** added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.* The Update Firmware capability, added in ***Release 1.9***, added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Remarks Enqueued when the light detects a power state change.

See Also **"Events"** on page Intro-19.

C H A P T E R 2 9

POS Power

This Chapter defines the POS Power device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.5	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.9	open
CapPowerReporting:	*int32*	{read-only}	1.3	open
CapStatisticsReporting:	*boolean*	{read-only}	1.8	open
CapUpdateFirmware:	*boolean*	{read-only}	1.9	open
CapUpdateStatistics:	*boolean*	{read-only}	1.8	open
CheckHealthText:	*string*	{read-only}	1.5	open
Claimed:	*boolean*	{read-only	1.5	open
DataCount:	*int32*	{read-only}	1.5	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.5	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.5	open & claim
FreezeEvents:	*boolean*	{read-write}	1.5	open
OutputID:	*int32*	{read-only}	1.5	***Not supported***
PowerNotify:	*int32*	{read-write}	1.5	open
PowerState:	*int32*	{read-only}	1.5	open
State:	*int32*	{read-only}	1.5	--
DeviceControlDescription:	*string*	{read-only}	1.5	--
DeviceControlVersion:	*int32*	{read-only}	1.5	--
DeviceServiceDescription:	*string*	{read-only}	1.5	open
DeviceServiceVersion:	*int32*	{read-only}	1.5	open
PhysicalDeviceDescription:	*string*	{read-only}	1.5	open
PhysicalDeviceName:	*string*	{read-only}	1.5	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapBatteryCapacityRemaining:	*boolean*	{read-only}	1.9	open
CapBatteryCapacityRemainingInSeconds:	*boolean*	{read-only}	1.16	open
CapChargeTime:	*boolean*	{read-only}	1.16	open
CapFanAlarm:	*boolean*	{read-only}	1.5	open
CapHeatAlarm:	*boolean*	{read-only}	1.5	open
CapQuickCharge:	*boolean*	{read-only}	1.5	open
CapRestartPOS:	*boolean*	{read-only}	1.9	open
CapShutdownPOS:	*boolean*	{read-only}	1.5	open
CapStandbyPOS:	*boolean*	{read-only}	1.9	open
CapSuspendPOS:	*boolean*	{read-only}	1.9	open
CapUPSChargeState:	*int32*	{read-only}	1.5	open
CapVariableBatteryCriticallyLowThreshold:	*boolean*	{read-only}	1.9	open
CapVariableBatteryCriticallyLowThresholdInSeconds:	*boolean*	{read-only}	1.16	open
CapVariableBatteryLowThreshold:	*boolean*	{read-only}	1.9	open
CapVariableBatteryLowThresholdInSeconds:	*boolean*	{read-only}	1.16	open
BatteryCapacityRemaining:	*int32*	{read-only}	1.9	open
BatteryCapacityRemainingInSeconds:	*int32*	{read-only}	1.16	open
BatteryCriticallyLowThreshold:	*int32*	{read-write}	1.9	open
BatteryCriticallyLowThresholdInSeconds:	*int32*	{read-write}	1.16	open
BatteryLowThreshold:	*int32*	{read-write}	1.9	open
BatteryLowThresholdInSeconds:	*int32*	{read-write}	1.16	open
ChargeTime:	*int32*	{read-only}	1.16	open
EnforcedShutdownDelayTime:	*int32*	{read-write}	1.5	open
PowerFailDelayTime:	*int32*	{read-only}	1.5	open
PowerSource:	*int32*	{read-only}	1.9	open
QuickChargeMode:	*boolean*	{read-only}	1.5	open
QuickChargeTime:	*int32*	{read-only}	1.5	open
UPSChargeState:	*int32*	{read-only}	1.5	open & enable

Methods (UML operations)

Common

Name	*Version*

open (logicalDeviceName: *string***):**
void {raises-exception}
	1.5

close ( ): **void {raises-exception, use after open}**	1.5
claim (timeout: *int32* **):** **void {raises-exception, use after open}**	1.5
release ( ): **void {raises-exception, use after open, claim}**	1.5
checkHealth (level: *int32***):** **void {raises-exception, use after open, enable}**	1.5

clearInput ( ):
void { }
	Not supported

clearInputProperties ( ):
void { }
	Not supported

clearOutput ( ):
void { }
	Not supported

directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.5
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.9
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.8
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.8
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.9
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.8

Specific

Name	
restartPOS ( ): **void {raises-exception, use after open, enable}**	1.9
shutdownPOS ( ): **void {raises-exception, use after open, enable}**	1.5
standbyPOS (reason: int32): **void {raises-exception, use after open, enable}**	1.9
suspendPOS (reason: int32): **void {raises-exception, use after open, enable}**	1.9

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	
upos::events::DirectIOEvent			1.5
EventNumber:	***int32***	{read-only}	
Data:	***int32***	{read-write}	
Obj:	***object***	{read-write}	
upos::events::ErrorEvent		***Not supported***	
upos::events::OutputCompleteEvent		***Not supported***	
upos::events::StatusUpdateEvent			1.5
Status:	***int32***	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The POS Power programmatic name is “POSPower”.

Capabilities

The POSPower device class has the following capabilities:

- Supports a command to “shut down” the system.
- Supports a command to restart the system.
- Supports a command to “suspend” the system.
- Supports a command to have the system go to standby.
- Supports accessing a power handling mechanism of the underlying operating system and hardware.
- Informs the application if a power fail situation has occurred.
- Informs the application about battery level.
- Informs the application if the UPS charge state has changed.
- Informs the application about high CPU temperature.
- Informs the application about stopped CPU fan.
- Informs the application if an operating system dependent enforced shutdown mechanism is processed.
- Allows the application after saving application data locally or transferring application data to a server to shut down the POS terminal.
- Informs the application about an initiated shutdown.

Device Sharing

The POSPower is a sharable device. Its device sharing rules are:

- After opening and enabling the device, the application may access all properties and methods and will receive status update events.
- If more than one application has opened and enabled the device, all applications may access its properties and methods. Status update events are fired to all of the applications.
- If one application claims the POSPower, then only that application may call the **shutdownPOS, standbyPOS, or suspendPOS** methods. This feature provides a degree of security, such that these methods may effectively be restricted to the main POS application if that application claims the device at startup.
- See the “Summary” table for precise usage prerequisites.

Model

The general model of POSPower is based on the power model of each device in version 1.3 or later. The same common properties are used but all states relate to the POS terminal itself and not to a peripheral device.

There are three states of the POSPower:

- ONLINE. The POS terminal is powered on and ready for use. This is the "operational" state.
- OFF. The POS terminal is powered off or detached from the power supplying net. The POS terminal runs on battery power support. This is the powerfail situation.
- OFFLINE. The POS terminal is powered on but is running in a "lower-power-consumption" mode. It may need to be placed online by pressing a button or key or something else which may wake up the system.

Power reporting only occurs while the device is open, enabled and power notification is switched on.

In a powerfail situation - that means the POSPower is in the state OFF - the POS terminal will be shut down automatically after the last application has closed the POSPower device or the time specified by the **EnforcedShutdownDelayTime** property has been elapsed.

A call to the **shutdownPOS** method will always shut down the POS terminal independent of the system power state.

Version 1.9 or later

Support of battery powered devices is added. In addition to adding properties to report battery levels and power sources, properties are added to allow for the setting of low and critically low battery levels. The POSPower device also includes the ability to request or respond to request to enter the standby and suspend states. The model does not attempt to duplicate other power management models such as APM and ACPI, but leaves those implementation details to the provider. As a rule, the suspend state will consume less power than the standby state, which in turn will consume less power than the on state. A suggested mapping of these states to other power management models is:

State	***ACPI***	***APM***	***Description***
On	S0	ON	Active, Powered On
Standby	S1	SUSPEND	Displays and drives off, CPU, RAM and fans powered on
Suspend	S3	SUSPEND	Only RAM powered
Off	S5	OFF	Completely powered off

POSPower Class Diagram *Updated in Release 1.16*

The following diagram shows the relationships between the POSPower classes.

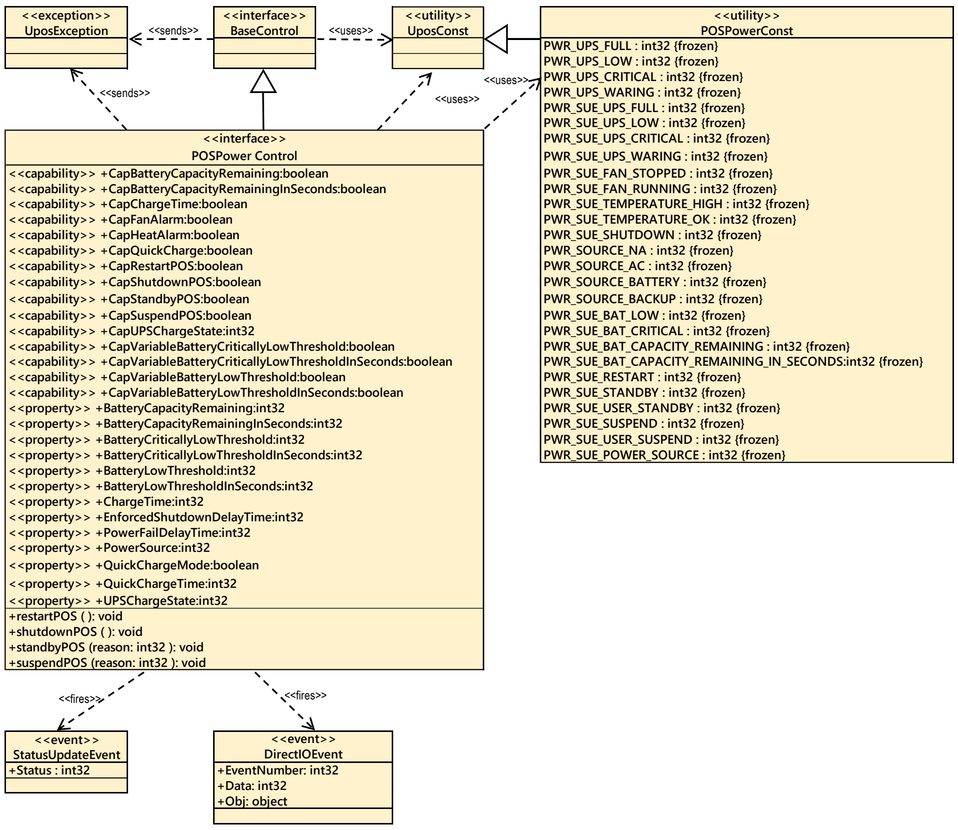

<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<utility>>
POSPowerConst
PWR_UPS_FULL : int32 {frozen}
PWR_UPS_LOW : int32 {frozen}
PWR_UPS_CRITICAL : int32 {frozen}
PWR_UPS_WARING : int32 {frozen}
PWR_SUE_UPS_FULL : int32 {frozen}
PWR_SUE_UPS_LOW : int32 {frozen}
PWR_SUE_UPS_CRITICAL : int32 {frozen}
PWR_SUE_UPS_WARING : int32 {frozen}
PWR_SUE_FAN_STOPPED : int32 {frozen}
PWR_SUE_FAN_RUNNING : int32 {frozen}
PWR_SUE_TEMPERATURE_HIGH : int32 {frozen}
PWR_SUE_TEMPERATURE_OK : int32 {frozen}
PWR_SUE_SHUTDOWN : int32 {frozen}
PWR_SOURCE_NA : int32 {frozen}
PWR_SOURCE_AC : int32 {frozen}
PWR_SOURCE_BATTERY : int32 {frozen}
PWR_SOURCE_BACKUP : int32 {frozen}
PWR_SUE_BAT_LOW : int32 {frozen}
PWR_SUE_BAT_CRITICAL : int32 {frozen}
PWR_SUE_BAT_CAPACITY_REMAINING : int32 {frozen}
PWR_SUE_BAT_CAPACITY_REMAINING_IN_SECONDS:int32 {frozen}
PWR_SUE_RESTART : int32 {frozen}
PWR_SUE_STANDBY : int32 {frozen}
PWR_SUE_USER_STANDBY : int32 {frozen}
PWR_SUE_SUSPEND : int32 {frozen}
PWR_SUE_USER_SUSPEND : int32 {frozen}
PWR_SUE_POWER_SOURCE : int32 {frozen}
<<uses>>
<<uses>>
<<sends>>
<<interface>>
POSPower Control
<<capability>> +CapBatteryCapacityRemaining:boolean
<<capability>> +CapBatteryCapacityRemainingInSeconds:boolean
<<capability>> +CapChargeTime:boolean
<<capability>> +CapFanAlarm:boolean
<<capability>> +CapHeatAlarm:boolean
<<capability>> +CapQuickCharge:boolean
<<capability>> +CapRestartPOS:boolean
<<capability>> +CapShutdownPOS:boolean
<<capability>> +CapStandbyPOS:boolean
<<capability>> +CapSuspendPOS:boolean
<<capability>> +CapUPSChargeState:int32
<<capability>> +CapVariableBatteryCriticallyLowThreshold:boolean
<<capability>> +CapVariableBatteryCriticallyLowThresholdInSeconds:boolean
<<capability>> +CapVariableBatteryLowThreshold:boolean
<<capability>> +CapVariableBatteryLowThresholdInSeconds:boolean
<<property>> +BatteryCapacityRemaining:int32
<<property>> +BatteryCapacityRemainingInSeconds:int32
<<property>> +BatteryCriticallyLowThreshold:int32
<<property>> +BatteryCriticallyLowThresholdInSeconds:int32
<<property>> +BatteryLowThreshold:int32
<<property>> +BatteryLowThresholdInSeconds:int32
<<property>> +ChargeTime:int32
<<property>> +EnforcedShutdownDelayTime:int32
<<property>> +PowerFailDelayTime:int32
<<property>> +PowerSource:int32
<<property>> +QuickChargeMode:boolean
<<property>> +QuickChargeTime:int32
<<property>> +UPSChargeState:int32
+restartPOS ( ): void
+shutdownPOS ( ): void
+standbyPOS (reason: int32): void
+suspendPOS (reason: int32): void
<<fires>>
<<fires>>
<<event>>
StatusUpdateEvent
+Status : int32
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object

Fig. Chap.29-1 POSPower Class Diagram

POSPower Sequence Diagram

The following sequence diagram shows the typical usage of the POSPower device for registering for **StatusUpdateEvent**s and an atypical case of initiating a **shutdownPOS** call.

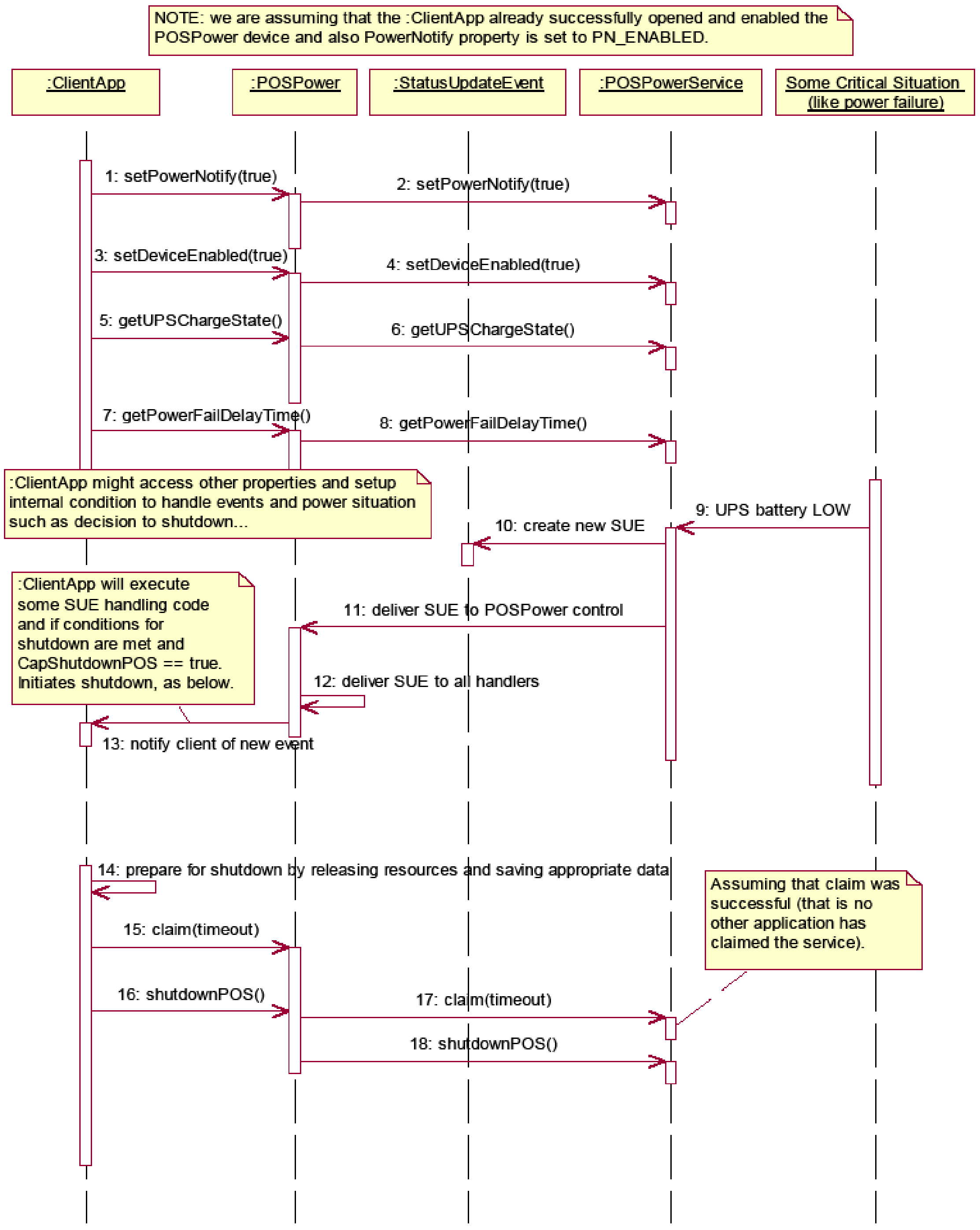

NOTE: we are assuming that the :ClientApp already successfully opened and enabled the POSPower device and also PowerNotify property is set to PN_ENABLED.
:ClientApp
:POSPower
:StatusUpdateEvent
:POSPowerService
Some Critical Situation (like power failure)
1: setPowerNotify(true)
2: setPowerNotify(true)
3: setDeviceEnabled(true)
4: setDeviceEnabled(true)
5: getUPSChargeState()
6: getUPSChargeState()
7: getPowerFailDelayTime()
8: getPowerFailDelayTime()
:ClientApp might access other properties and setup internal condition to handle events and power situation such as decision to shutdown...
9: UPS battery LOW
10: create new SUE
:ClientApp will execute some SUE handling code and if conditions for shutdown are met and CapShutdownPOS == true. Initiates shutdown, as below.
11: deliver SUE to POSPower control
12: deliver SUE to all handlers
13: notify client of new event
14: prepare for shutdown by releasing resources and saving appropriate data
Assuming that claim was successful (that is no other application has claimed the service).
15: claim(timeout)
16: shutdownPOS()
17: claim(timeout)
18: shutdownPOS()

Fig. Chap. 29-2 POSPower Sequence Diagram

POSPower Standby Sequence Diagram

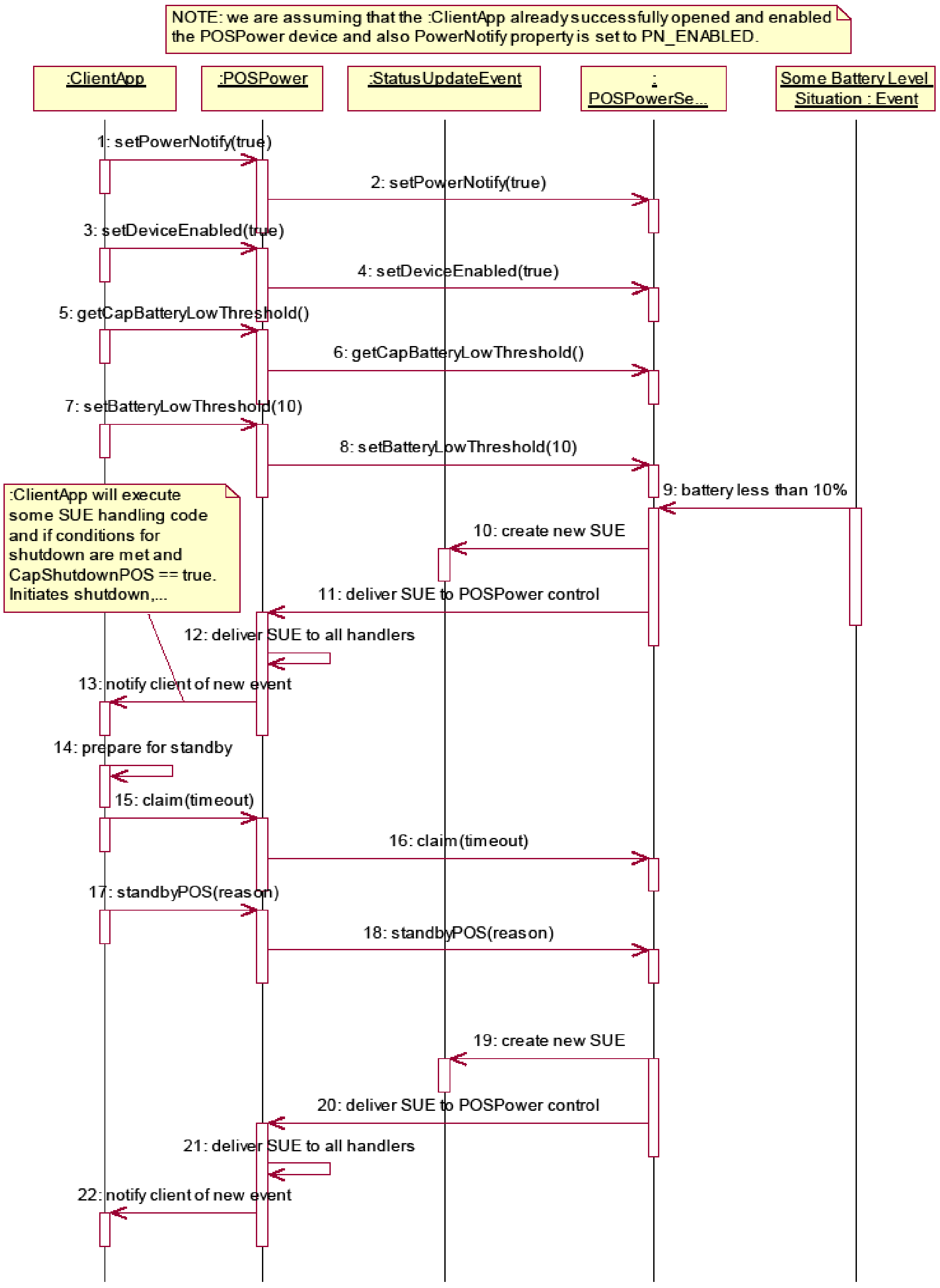

NOTE: we are assuming that the :ClientApp already successfully opened and enabled the POSPower device and also PowerNotify property is set to PN_ENABLED.
:ClientApp
:POSPower
:StatusUpdateEvent
: POSPowerSe...
Some Battery Level Situation : Event
1: setPowerNotify(true)
2: setPowerNotify(true)
3: setDeviceEnabled(true)
4: setDeviceEnabled(true)
5: getCapBatteryLowThreshold()
6: getCapBatteryLowThreshold()
7: setBatteryLowThreshold(10)
8: setBatteryLowThreshold(10)
9: battery less than 10%
:ClientApp will execute some SUE handling code and if conditions for shutdown are met and CapShutdownPOS == true. Initiates shutdown,...
10: create new SUE
11: deliver SUE to POSPower control
12: deliver SUE to all handlers
13: notify client of new event
14: prepare for standby
15: claim(timeout)
16: claim(timeout)
17: standbyPOS(reason)
18: standbyPOS(reason)
19: create new SUE
20: deliver SUE to POSPower control
21: deliver SUE to all handlers
22: notify client of new event

Fig. Chap. 29-3 POSPower Standby Sequence Diagram

POSPower State Diagram

The following state diagram depicts the POSPower Control device model.

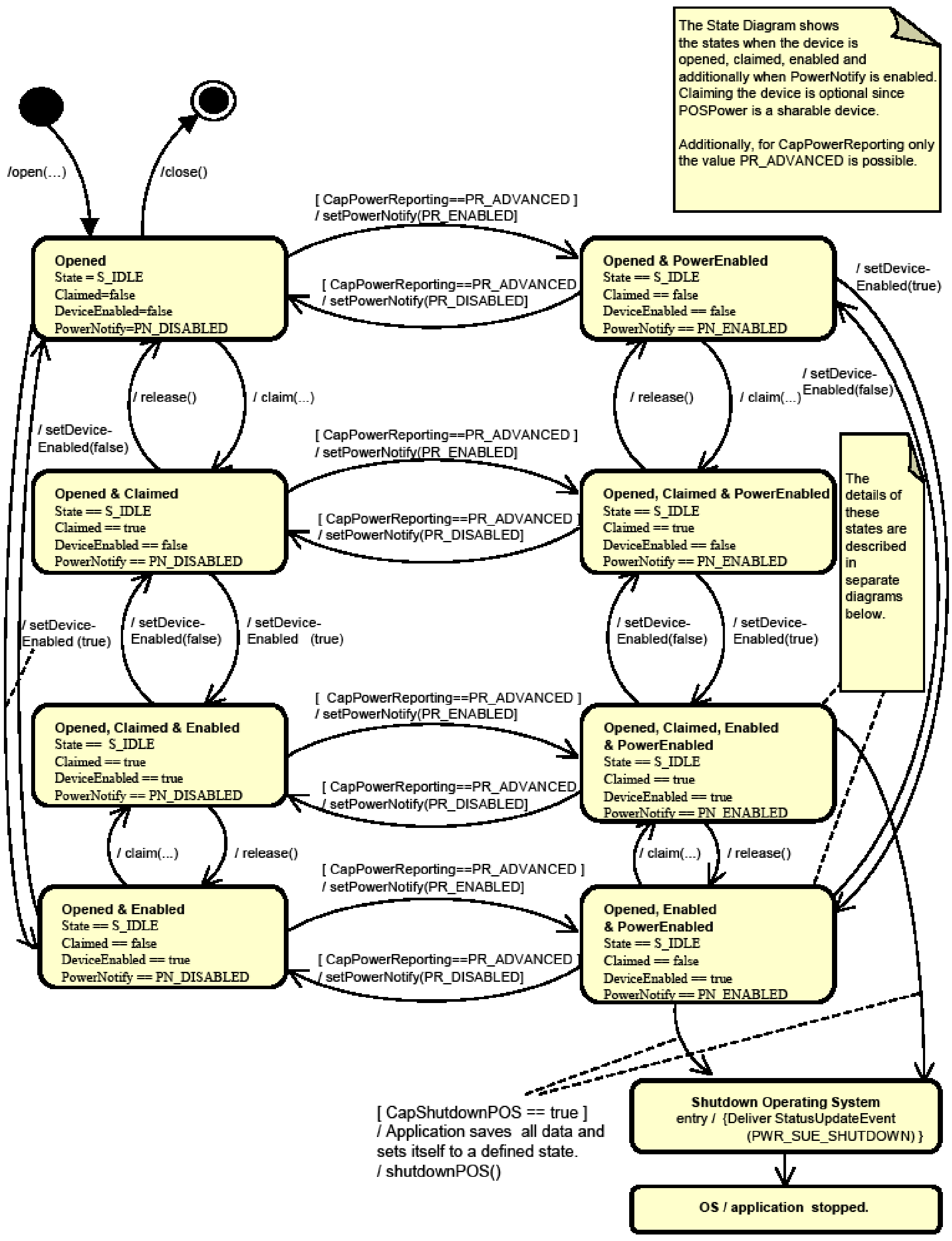

The State Diagram shows the states when the device is opened, claimed, enabled and additionally when PowerNotify is enabled. Claiming the device is optional since POSPower is a sharable device.
Additionally, for CapPowerReporting only the value PR_ADVANCED is possible.
/open(...)
/close()
Opened
State = S_IDLE
Claimed=false
DeviceEnabled=false
PowerNotify=PN_DISABLED
Opened & PowerEnabled
State == S_IDLE
Claimed == false
DeviceEnabled == false
PowerNotify == PN_ENABLED
Opened & Claimed
State == S_IDLE
Claimed == true
DeviceEnabled == false
PowerNotify == PN_DISABLED
Opened, Claimed & PowerEnabled
State == S_IDLE
Claimed == true
DeviceEnabled == false
PowerNotify == PN_ENABLED
Opened, Claimed & Enabled
State == S_IDLE
Claimed == true
DeviceEnabled == true
PowerNotify == PN_DISABLED
Opened, Claimed, Enabled & PowerEnabled
State == S_IDLE
Claimed == true
DeviceEnabled == true
PowerNotify == PN_ENABLED
Opened & Enabled
State == S_IDLE
Claimed == false
DeviceEnabled == true
PowerNotify == PN_DISABLED
Opened, Enabled & PowerEnabled
State == S_IDLE
Claimed == false
DeviceEnabled == true
PowerNotify == PN_ENABLED
[CapPowerReporting==PR_ADVANCED] / setPowerNotify(PR_ENABLED]
[CapPowerReporting==PR_ADVANCED / setPowerNotify(PR_DISABLED]
/ release()
/ claim(...)
/ setDevice-Enabled(false)
/ setDevice-Enabled(true)
/ setDevice-Enabled (true)
The details of these states are described in separate diagrams below.
[CapShutdownPOS == true] / Application saves all data and sets itself to a defined state. / shutdownPOS()
Shutdown Operating System
entry / {Deliver StatusUpdateEvent (PWR_SUE_SHUTDOWN) }
OS / application stopped.

Fig. Chap. 29-4 Power State Diagram (POSPower Control Device Model)

POSPower PowerState Diagram - Part 1

The following state diagram depicts the POSPower Power States.

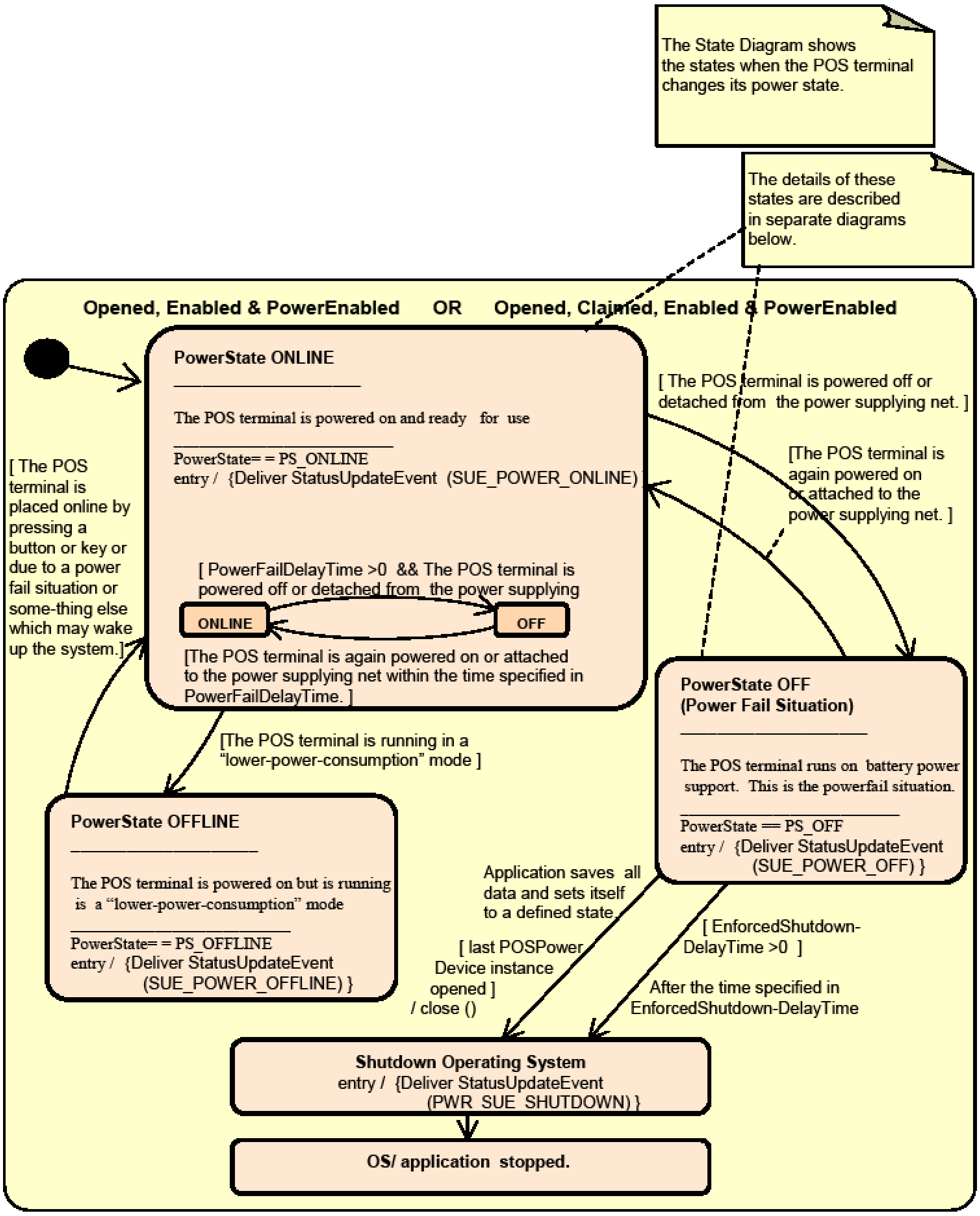

The State Diagram shows the states when the POS terminal changes its power state.
The details of these states are described in separate diagrams below.
Opened, Enabled & PowerEnabled OR Opened, Claimed, Enabled & PowerEnabled
PowerState ONLINE
The POS terminal is powered on and ready for use
PowerState= = PS_ONLINE
entry / {Deliver StatusUpdateEvent (SUE_POWER_ONLINE)
[PowerFailDelayTime >0 && The POS terminal is powered off or detached from the power supplying
ONLINE
OFF
[The POS terminal is again powered on or attached to the power supplying net within the time specified in PowerFailDelayTime.]
[The POS terminal is powered off or detached from the power supplying net.]
[The POS terminal is again powered on or attached to the power supplying net.]
[The POS terminal is placed online by pressing a button or key or due to a power fail situation or some-thing else which may wake up the system.]
[The POS terminal is running in a "lower-power-consumption" mode]
PowerState OFFLINE
The POS terminal is powered on but is running is a "lower-power-consumption" mode
PowerState= = PS_OFFLINE
entry / {Deliver StatusUpdateEvent (SUE_POWER_OFFLINE) }
PowerState OFF (Power Fail Situation)
The POS terminal runs on battery power support. This is the powerfail situation.
PowerState == PS_OFF
entry / {Deliver StatusUpdateEvent (SUE_POWER_OFF) }
Application saves all data and sets itself to a defined state.
[last POSPower Device instance opened] / close ()
[EnforcedShutdown-DelayTime >0]
After the time specified in EnforcedShutdown-DelayTime
Shutdown Operating System
entry / {Deliver StatusUpdateEvent (PWR_SUE_SHUTDOWN) }
OS/ application stopped.

Fig. Chap. 29-5 POSPower PowerState Diagram (Part 1)

POSPower PowerState Diagram - Part 2

The following state diagram depicts the POSPower PowerState ONLINE.

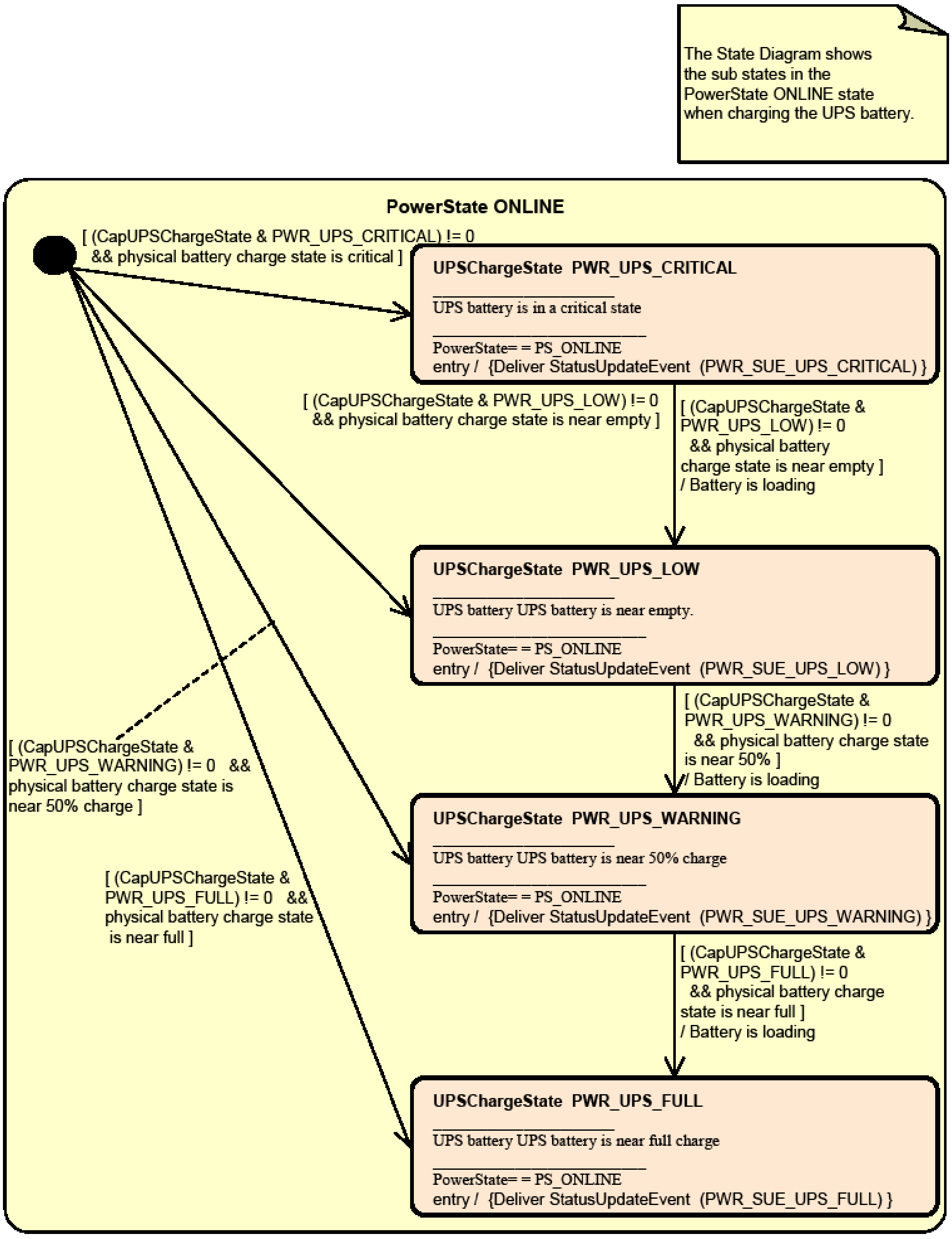

The State Diagram shows the sub states in the PowerState ONLINE state when charging the UPS battery.
PowerState ONLINE
[(CapUPSChargeState & PWR_UPS_CRITICAL) != 0 && physical battery charge state is critical]
UPSChargeState PWR_UPS_CRITICAL
UPS battery is in a critical state
PowerState= = PS_ONLINE
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_CRITICAL) }
[(CapUPSChargeState & PWR_UPS_LOW) != 0 && physical battery charge state is near empty]
[(CapUPSChargeState & PWR_UPS_LOW) != 0 && physical battery charge state is near empty] / Battery is loading
UPSChargeState PWR_UPS_LOW
UPS battery UPS battery is near empty.
PowerState= = PS_ONLINE
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_LOW) }
[(CapUPSChargeState & PWR_UPS_WARNING) != 0 && physical battery charge state is near 50% charge]
[(CapUPSChargeState & PWR_UPS_WARNING) != 0 && physical battery charge state is near 50%] / Battery is loading
UPSChargeState PWR_UPS_WARNING
UPS battery UPS battery is near 50% charge
PowerState= = PS_ONLINE
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_WARNING) }
[(CapUPSChargeState & PWR_UPS_FULL) != 0 && physical battery charge state is near full]
[(CapUPSChargeState & PWR_UPS_FULL) != 0 && physical battery charge state is near full] / Battery is loading
UPSChargeState PWR_UPS_FULL
UPS battery UPS battery is near full charge
PowerState= = PS_ONLINE
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_FULL) }

Fig. Chap. 29-6 POSPower PowerState Diagram (Part 2)

POSPower PowerState Diagram - Part 3

The following state diagram depicts the POSPower PowerState OFF.

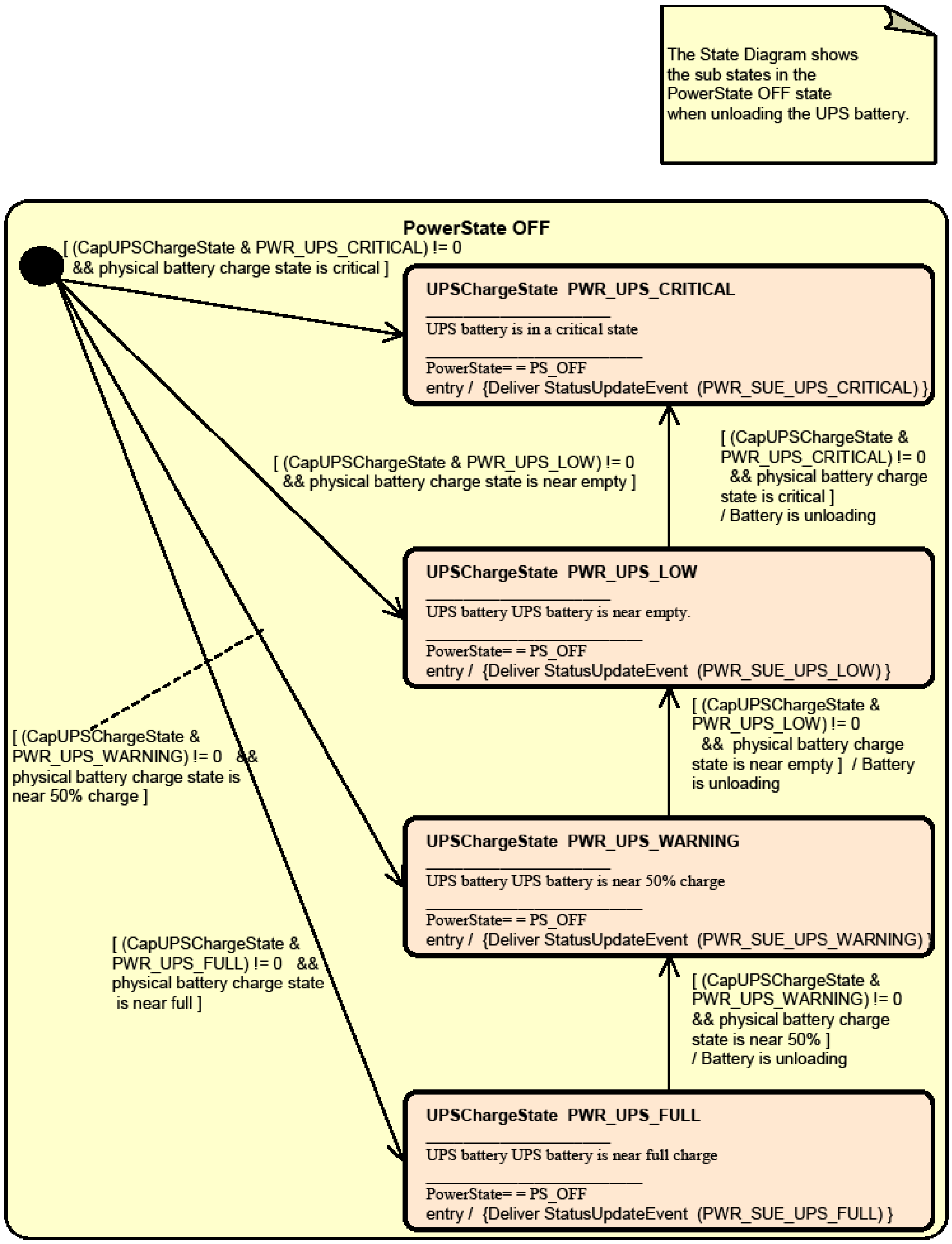

The State Diagram shows the sub states in the PowerState OFF state when unloading the UPS battery.
PowerState OFF
[(CapUPSChargeState & PWR_UPS_CRITICAL) != 0 && physical battery charge state is critical]
UPSChargeState PWR_UPS_CRITICAL
UPS battery is in a critical state
PowerState= = PS_OFF
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_CRITICAL) }
[(CapUPSChargeState & PWR_UPS_LOW) != 0 && physical battery charge state is near empty]
[(CapUPSChargeState & PWR_UPS_CRITICAL) != 0 && physical battery charge state is critical] / Battery is unloading
UPSChargeState PWR_UPS_LOW
UPS battery UPS battery is near empty.
PowerState= = PS_OFF
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_LOW) }
[(CapUPSChargeState & PWR_UPS_WARNING) != 0 && physical battery charge state is near 50% charge]
[(CapUPSChargeState & PWR_UPS_LOW) != 0 && physical battery charge state is near empty] / Battery is unloading
UPSChargeState PWR_UPS_WARNING
UPS battery UPS battery is near 50% charge
PowerState= = PS_OFF
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_WARNING) }
[(CapUPSChargeState & PWR_UPS_FULL) != 0 && physical battery charge state is near full]
[(CapUPSChargeState & PWR_UPS_WARNING) != 0 && physical battery charge state is near 50%] / Battery is unloading
UPSChargeState PWR_UPS_FULL
UPS battery UPS battery is near full charge
PowerState= = PS_OFF
entry / {Deliver StatusUpdateEvent (PWR_SUE_UPS_FULL) }

Fig. Chap. 29-7 POSPower PowerState Diagram (Part 3)

POSPower State Chart Diagram for Fan and Temperature

The following state diagram depicts the handling of fan and temperature alarms.

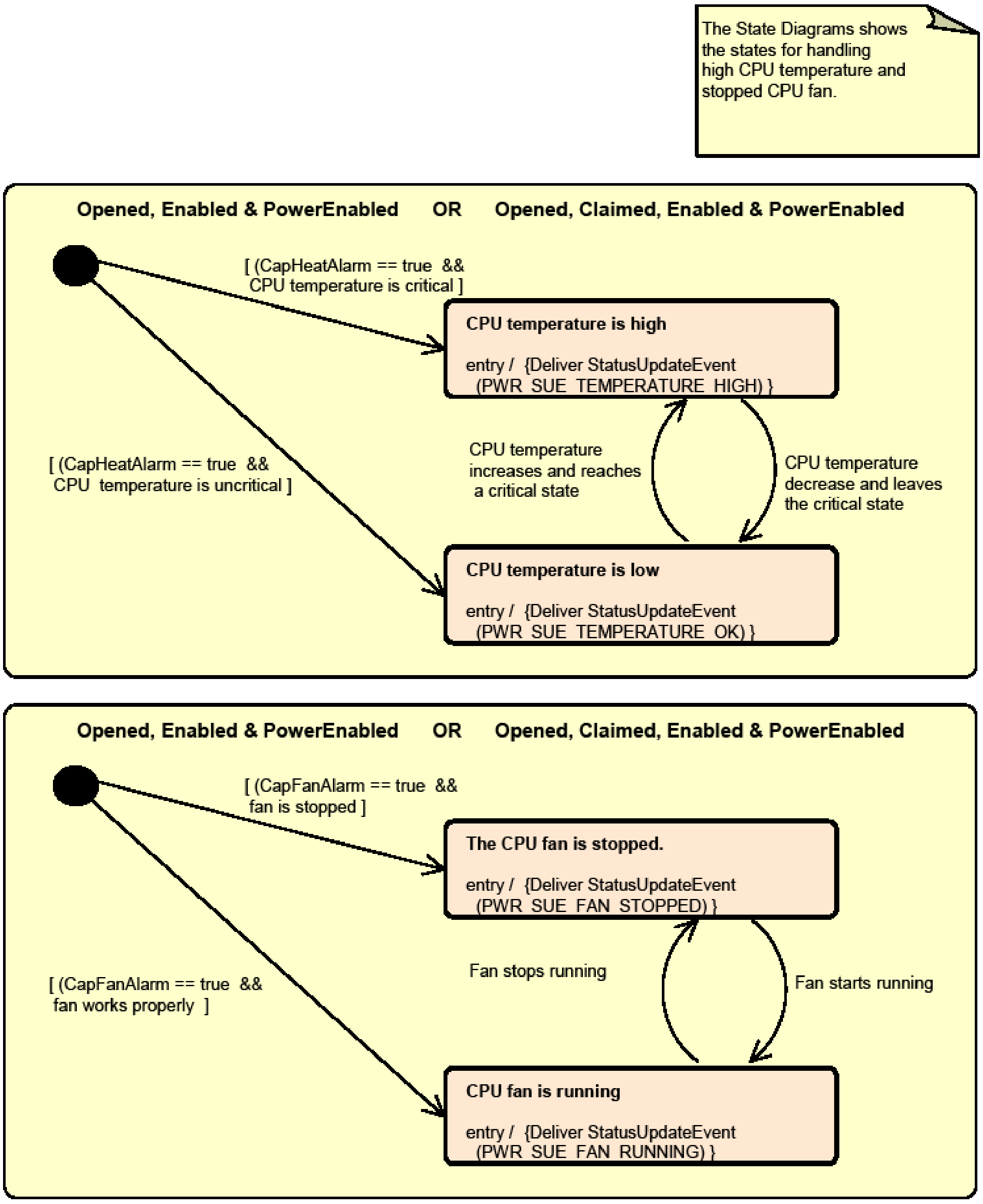

The State Diagrams shows the states for handling high CPU temperature and stopped CPU fan.
Opened, Enabled & PowerEnabled OR Opened, Claimed, Enabled & PowerEnabled
[(CapHeatAlarm == true && CPU temperature is critical]
CPU temperature is high
entry / {Deliver StatusUpdateEvent (PWR_SUE_TEMPERATURE_HIGH) }
[(CapHeatAlarm == true && CPU temperature is uncritical]
CPU temperature increases and reaches a critical state
CPU temperature decrease and leaves the critical state
CPU temperature is low
entry / {Deliver StatusUpdateEvent (PWR_SUE_TEMPERATURE_OK) }
Opened, Enabled & PowerEnabled OR Opened, Claimed, Enabled & PowerEnabled
[(CapFanAlarm == true && fan is stopped]
The CPU fan is stopped.
entry / {Deliver StatusUpdateEvent (PWR_SUE_FAN_STOPPED) }
[(CapFanAlarm == true && fan works properly]
Fan stops running
Fan starts running
CPU fan is running
entry / {Deliver StatusUpdateEvent (PWR_SUE_FAN_RUNNING) }

Fig. Chap. 29-8 POSPower State Chart Diagram (Fan and Temperature)

POSPower Battery State Diagram

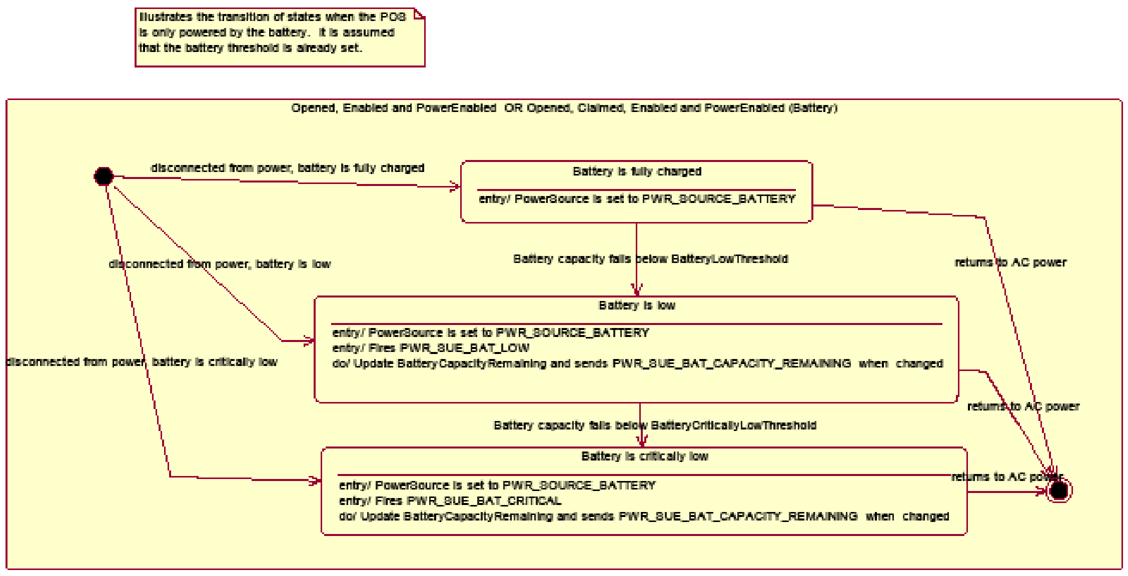

Illustrates the transition of states when the POS is only powered by the battery. It is assumed that the battery threshold is already set.
Opened, Enabled and PowerEnabled OR Opened, Claimed, Enabled and PowerEnabled (Battery)
disconnected from power, battery is fully charged
Battery is fully charged
entry/ PowerSource is set to PWR_SOURCE_BATTERY
disconnected from power, battery is low
Battery capacity falls below BatteryLowThreshold
returns to AC power
Battery is low
entry/ PowerSource is set to PWR_SOURCE_BATTERY
entry/ Fires PWR_SUE_BAT_LOW
do/ Update BatteryCapacityRemaining and sends PWR_SUE_BAT_CAPACITY_REMAINING when changed
disconnected from power, battery is critically low
returns to AC power
Battery capacity falls below BatteryCriticallyLowThreshold
Battery is critically low
returns to AC power
entry/ PowerSource is set to PWR_SOURCE_BATTERY
entry/ Fires PWR_SUE_BAT_CRITICAL
do/ Update BatteryCapacityRemaining and sends PWR_SUE_BAT_CAPACITY_REMAINING when changed

Fig. Chap. 29-9 POSPower Battery State Diagram

POSPower Power Transitions State Diagram

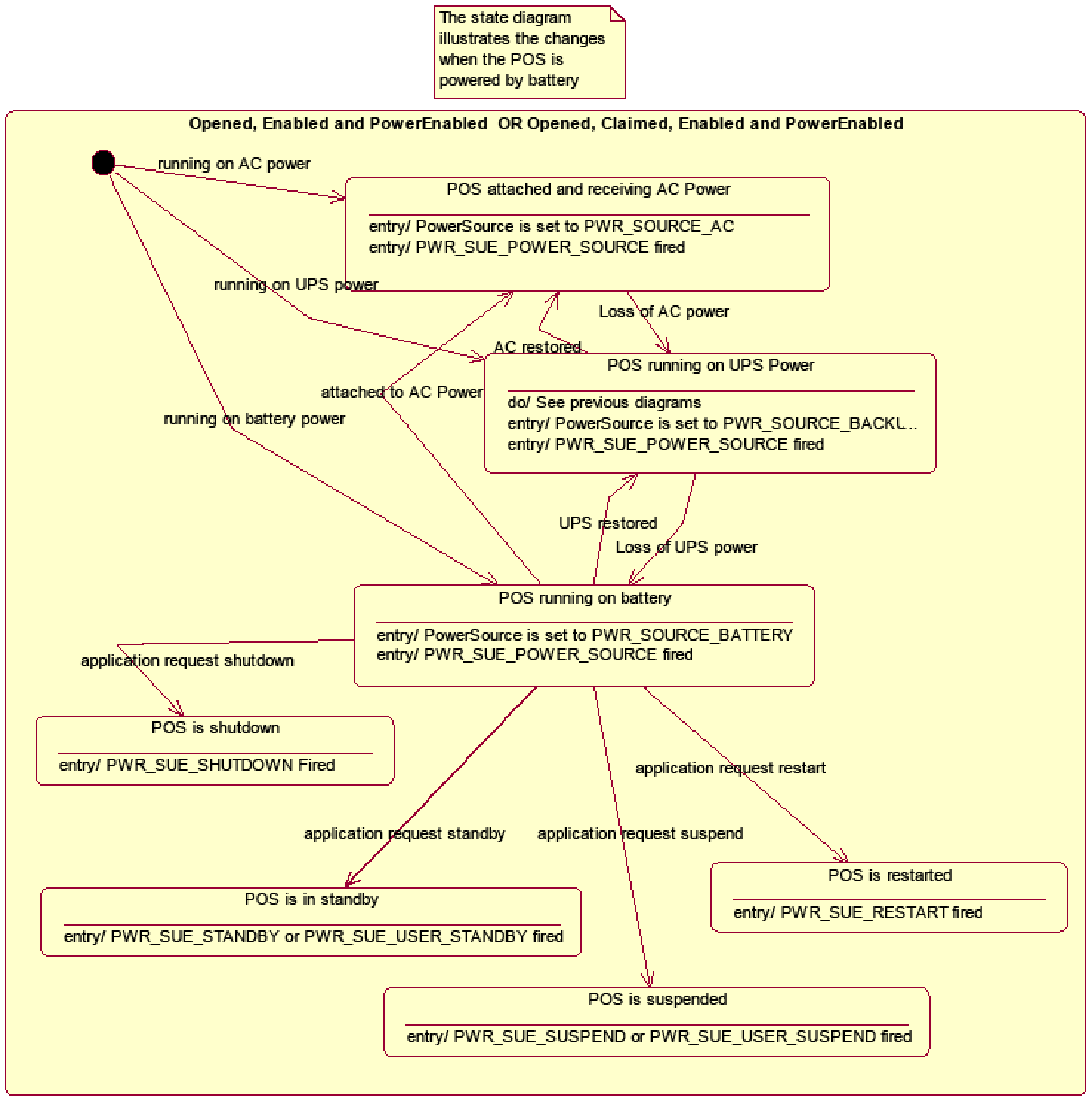

The state diagram illustrates the changes when the POS is powered by battery
Opened, Enabled and PowerEnabled OR Opened, Claimed, Enabled and PowerEnabled
running on AC power
POS attached and receiving AC Power
entry/ PowerSource is set to PWR_SOURCE_AC
entry/ PWR_SUE_POWER_SOURCE fired
running on UPS power
Loss of AC power
AC restored
POS running on UPS Power
do/ See previous diagrams
entry/ PowerSource is set to PWR_SOURCE_BACKL..
entry/ PWR_SUE_POWER_SOURCE fired
attached to AC Power
running on battery power
UPS restored
Loss of UPS power
POS running on battery
entry/ PowerSource is set to PWR_SOURCE_BATTERY
entry/ PWR_SUE_POWER_SOURCE fired
application request shutdown
POS is shutdown
entry/ PWR_SUE_SHUTDOWN Fired
application request restart
application request standby
application request suspend
POS is restarted
entry/ PWR_SUE_RESTART fired
POS is in standby
entry/ PWR_SUE_STANDBY or PWR_SUE_USER_STANDBY fired
POS is suspended
entry/ PWR_SUE_SUSPEND or PWR_SUE_USER_SUSPEND fired

Fig. Chap. 29-10 POSPower Power Transitions State Diagram

Properties (UML attributes)

BatteryCapacityRemaining Property

Syntax **BatteryCapacityRemaining:** ***int32*** **{read-only, access after open}**

Remarks A value of 0 to 100 represents percent of battery capacity remaining.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **CapBatteryCapacityRemaining** Property

BatteryCapacityRemainingInSeconds Property *Added in Release 1.16*

Syntax **BatteryCapacityRemainingInSeconds:** ***int32*** **{read-only, access after open}**

Remarks A value of battery capacity remaining in seconds.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **CapBatteryCapacityRemainingInSeconds** Property

BatteryCriticallyLowThreshold Property

Syntax **BatteryCriticallyLowThreshold:** ***int32*** **{read-write, access after open}**

Remarks If not zero, this property holds the threshold at which a PWR_SUE_BAT_CRITICAL **StatusUpdateEvent** is generated. The values 1 through 99 represent the percentage of the capacity remaining. The value 0 indicates that Battery Critically Low reporting is not supported or is disabled.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **CapVariableBatteryCriticallyLowThreshold** Property**, StatusUpdateEvent**

BatteryCriticallyLowThresholdInSeconds Property

Added in Release 1.16

Syntax **BatteryCriticallyLowThresholdInSeconds:** ***int32*** **{read-write, access after open}**

Remarks If not zero, this property holds the threshold at which a PWR_SUE_BAT_CRITICAL **StatusUpdateEven**t is generated. The values of seconds of the capacity remaining. The value 0 indicates that Battery Critically Low reporting is not supported or is disabled.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **CapVariableBatteryCriticallyLowThresholdInSeconds** Property**, StatusUpdateEvent**

BatteryLowThreshold Property

Syntax **BatteryLowThreshold:** ***int32*** **{read-write, access after open}**

Remarks If not zero, this property holds the threshold at which a PWR_SUE_BAT_LOW **StatusUpdateEvent** is generated. The value 1 to 99 represents the percent capacity remaining. The value 0 indicates that battery low reporting is not supported or is disabled. If variable battery low threshold is supported, setting a value between 1 and 99 sets the threshold to that value. Setting a value of zero disables battery low reporting.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **CapVariableBatteryLowThreshold** Property**, StatusUpdateEvent**

BatteryLowThresholdInSeconds Property *Added in Release 1.16*

Syntax **BatteryLowThresholdInSeconds:** ***int32*** **{read-write, access after open}**

Remarks If not zero, this property holds the threshold at which a PWR_SUE_BAT_LOW **StatusUpdateEvent** is generated. The value of seconds of the capacity remaining. The value 0 indicates that battery low reporting is not supported or is disabled. If variable battery low threshold is supported, setting a value of seconds sets the threshold to that value. Setting a value of zero disables battery low reporting. This property is initialized by the **open** method. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **CapVariableBatteryLowThresholdInSeconds** Property**, StatusUpdateEvent**

CapBatteryCapacityRemaining Property

Syntax **CapBatteryCapacityRemaining: *boolean* {read-only, access after open}**

Remarks If true, the device is able to provide battery capacity information. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryCapacityRemaining** Property

CapBatteryCapacityRemainingInSeconds Property

Added in Release 1.16

Syntax **CapBatteryCapacityRemainingInSeconds**
: *boolean* {read-only, access after open}

Remarks If true, the device is able to provide battery capacity information seconds. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryCapacityRemainingInSeconds** Property

CapChargeTime Property ***Added in Release 1.16***

Syntax **CapChargeTime: *boolean* {read-only, access after open}**

Remarks If true, the device is able to acquire the remaining time until full charging. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **ChargeTime** Property.

CapFanAlarm Property

Syntax **CapFanAlarm: *boolean* {read-only, access after open}**

Remarks If true, the device is able to detect whether the CPU fan is stopped. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

CapHeatAlarm Property

Syntax **CapHeatAlarm:** ***boolean*** **{read-only, access after open}**

Remarks If true the device is able to detect whether the CPU is running at too high of a temperature. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

CapQuickCharge Property

Syntax **CapQuickCharge:** ***boolean*** **{read-only, access after open}**

Remarks If true, the power management allows the charging of the UPS battery in quick mode. The time for charging the battery is shorter than usual. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **QuickChargeMode** Property, **QuickChargeTime** Property.

CapRestartPOS Property

Syntax **CapRestartPOS:** ***boolean*** **{read-only, access after open}**

Remarks If true the device is able to explicitly restart the POS. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **restartPOS** Method.

CapShutdownPOS Property

Syntax **CapShutdownPOS:** ***boolean*** **{read-only, access after open}**

Remarks If true the device is able to explicitly shut down the POS. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **shutdownPOS** Method.

CapStandbyPOS Property

Syntax **CapStandbyPOS:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device is able to request that the POS System enter the Standby state. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **standbyPOS** Method.

CapSuspendPOS Property

Syntax **CapSuspendPOS:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device is able to request that the POS System enter the Suspend state. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **suspendPOS** Method.

CapUPSChargeState Property

Syntax **CapUPSChargeState:** ***int32*** **{read-only, access after open}**

Remarks If not equal to zero, the UPS can deliver one or more charge states. It can contain any of the following values logically ORed together.

Value	Meaning
PWR_UPS_FULL	UPS battery is near full charge.
PWR_UPS_WARNING	UPS battery is near 50% charge.
PWR_UPS_LOW	UPS battery is near empty. Application shutdown should be started to ensure that can be completed before the battery charge is depleted. A minimum of 2 minutes of normal system operation can be assumed when this state is entered unless this is the first state reported upon entering the “Off” power state.
PWR_UPS_CRITICAL	UPS battery is in a critical state and could be disconnected at any time without further warning. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **UPSChargeState** Property.

CapVariableBatteryCriticallyLowThreshold Property

Syntax **CapVariableBatteryCriticallyLowThreshold:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports a variable threshold for critically low battery. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryCriticallyLowThreshold** Property**, StatusUpdateEvent**

CapVariableBatteryCriticallyLowThresholdInSeconds Property

Added in Release 1.16

Syntax **CapVariableBatteryCriticallyLowThresholdInSeconds:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports a second's variable threshold for critically low battery. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryCriticallyLowThresholdInSeconds** Property**, StatusUpdateEvent**

CapVariableBatteryLowThreshold Property

Syntax **CapVariableBatteryLowThreshold:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports a variable threshold for battery low. Otherwise, it is false. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryLowThreshold** Property**, StatusUpdateEvent**

CapVariableBatteryLowThresholdInSeconds Property

Added in Release 1.16

Syntax **CapVariableBatteryLowThresholdInSeconds:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports a second's variable threshold for battery low. Otherwise, it is false. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **BatteryLowThresholdInSeconds** Property**, StatusUpdateEvent**

ChargeTime Property *Added in Release 1.16*

Syntax **ChargeTime:** ***int32*** **{read-only, access after open}**

Remarks Indicates the time remaining until the battery is fully charged in seconds.

If equal to zero the battery is not charging or not supported.

This property is only set if **CapChargeTime** is true.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **CapChargeTime** Property.

EnforcedShutdownDelayTime Property

Syntax **EnforcedShutdownDelayTime:** ***int32*** **{read-write, access after open}**

Remarks If not equal to zero the system has a built-in mechanism to shut down the POS terminal after a determined time in a power fail situation. This property contains the time in milliseconds when the system will shut down automatically after a power failure. A power failure is the situation when the POS terminal is powered off or detached from the power supplying net and runs on UPS.
If zero no automatic shutdown is performed and the application has to call itself the **shutdownPOS** method.
Applications will be informed about an initiated automatic shutdown**.** This property is initialized by the **open** method. Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **shutdownPOS** Method.

PowerFailDelayTime Property

Syntax **PowerFailDelayTime:** ***int32*** **{read-only, access after open}**

Remarks This property contains the time in milliseconds for power fail intervals which will not create a power fail situation. In some countries the power has sometimes short intervals where the power supply is interrupted. Those short intervals are in the range of milliseconds up to a few seconds and are handled by batteries or other electric equipment and should not cause a power fail situation. The power fail interval starts when the POS terminal is powered off or detached from the power supplying net and runs on UPS. The power fail interval ends when the POS terminal is again powered on or attached to the power supplying net. However, if the power fail interval is longer than the time specified in the **PowerFailDelayTime** property a power fail situation is created.

Usually, this parameter is a configuration parameter of the underlying power management. So, the application can only read this property.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

PowerSource Property

Syntax **PowerSource:** ***int32*** **{read-only, access after open}**

Remarks This property holds the current power source if power source reporting is available. A StatusUpdateEvent is generated each time this property is updated.

Value	Meaning
PWR_SOURCE_NA	Power source reporting is not available.
PWR_SOURCE_AC	The current power source is the AC line.
PWR_SOURCE_BATTERY	The current power source is a system battery. This value is only presented for systems that operate normally on battery.
PWR_SOURCE_BACKUP	The current power source is a backup source such as an UPS or backup battery.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **StatusUpdateEvent**

QuickChargeMode Property

Syntax **QuickChargeMode:** ***boolean*** **{read-only, access after open}**

Remarks If true, the UPS battery is being recharged in a quick charge mode.
If false, it is being charged in a normal mode.

This property is only set if **CapQuickCharge** is true.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **CapQuickCharge** Property, **QuickChargeTime** Property.

QuickChargeTime Property

Syntax **QuickChargeTime:** ***int32*** **{read-only, access after open}**

Remarks This time specifies the remaining time for charging the UPS battery in quick charge mode. After the time has elapsed, the UPS battery charging mechanism of power management usually switches into normal mode.

This time is specified in milliseconds.

This property is only set if **CapQuickCharge** is true.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **CapQuickCharge** Property, **QuickChargeTime** Property.

UPSChargeState Property

Syntax **UPSChargeState:** ***int32*** **{read-only, access after open, enable}**

Remarks This property holds the actual UPS charge state.

It has one of the following values:

Value	Meaning
PWR_UPS_FULL	UPS battery is near full charge.
PWR_UPS_WARNING	UPS battery is near 50% charge.
PWR_UPS_LOW	UPS battery is near empty. Application shutdown should be started to ensure that is can be completed before the battery charge is depleted. A minimum of 2 minutes of normal system operation can be assumed when this state is entered unless this is the first state reported upon entering the “Off” power state.
PWR_UPS_CRITICAL	UPS battery is in a critical state and could be disconnected at any time without further warning.

This property is initialized and kept current while the device is enabled.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20

See Also **CapUPSChargeState** Property.

Methods (UML operations)

restartPOS Method

Syntax **restartPOS ( ):void {raises-exception, use after open-enable}**

Remarks Call to restart the POS terminal. This method will always restart the system independent of the system power state.

If the POSPower is claimed, only the application which claimed the device is able to restart the POS terminal.

Applications will be informed about an initiated restart.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	This method is not supported (see the **CapRestartPOS** property**)**

See Also **CapRestartPOS** Property

shutdownPOS Method

Syntax **shutdownPOS ( ):void {raises-exception, use after open-enable}**

Remarks Call to shut down the POS terminal. This method will always shut down the system independent of the system power state.

If the POSPower is claimed, only the application which claimed the device is able to shut down the POS terminal.

Applications will be informed about an initiated shutdown.

It is recommended that in a power fail situation an application has to call this method after saving all data and setting the application to a defined state.
If the **EnforcedShutdownDelayTime** property specifies a time greater than zero and the application did not call the **shutdownPOS** method within the time specified in **EnforcedShutdownDelayTime**, the system will be shut down automatically. This mechanism may be provided by an underlying operating system to prevent the battery from being emptied before the system is shut down.
This method is only supported if **CapShutdownPOS** is true.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	This method is not supported. (See the **CapShutdownPOS** property**)**

See Also **CapShutdownPOS** Property, **EnforcedShutdownDelayTime** Property.

standbyPOS Method

Syntax **standbyPOS (reason: *int32*):**
void {raises-exception, use after open-enable}

Remarks Call to request that the system be placed into the Standby state or to respond to a request from the system, OS or other application that the system be put into Standby state.

The *reason* parameter indicates the reason the POS terminal should enter a standby state:

Value	Description
PWR_REASON_REQUEST	Call is to request that the system enter the standby state.
PWR_REASON_ALLOW	Call is a response to a standby Status Update Event and specifies that the request should be allowed.
PWR_REASON_DENY	Call is a response to a standby Status Update Event and specifies that the request should be denied.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	This method is not supported (see the **CapStandbyPOS** property**)**

See Also **CapStandbyPOS** Property.

suspendPOS Method

Syntax **suspendPOS (reason: *int32*):**
void {raises-exception, use after open-enable}

Remarks Call to request that the system be placed into the Suspend state or to respond to a request from the system, OS or other application that the system be put into Suspend state.

The *reason* parameter indicates the reason the POS terminal should enter a standby state:

Value	Description
PWR_REASON_REQUEST	Call is to request that the system enter the suspend state.
PWR_REASON_ALLOW	Call is a response to a suspend Status Update Event and specifies that the request should be allowed.
PWR_REASON_DENY	Call is a response to a suspend Status Update Event and specifies that the request should be denied.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	This method is not supported (see the **CapSuspendPOS** property**)**

See Also **CapSuspendPOS** Property.

Events (UML Interfaces)

DirectIOEvent

<< event >>	**upos::events::DirectIOEvent**	
	EventNumber	**:** ***int32*** **{read-only}**
	Data	**:** ***int32*** **{read-write}**
	Obj	**:** ***object*****{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor specific POSPower Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attributes	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This property is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and Service. This property is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described. Use of this event may restrict the application program from being used with other vendor's POSPower devices which may not have any knowledge of the Service's need for this event.

See Also **"Errors"** on page Intro-20, **directIO** Method.

StatusUpdateEvent

<< event >>	**upos::events::StatusUpdateEvent**	
	Status	**:** ***int32*** **{read-only}**

Description Delivered when **UPSChargeState** changes or an alarm situation occurs.

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	See below.

The *Status* property contains the updated power status or alarm status.

Value	Meaning
PWR_SUE_UPS_FULL	UPS battery is near full charge. Can be returned if **CapUPSChargeState** contains PWR_UPS_FULL.
PWR_SUE_UPS_WARNING	UPS battery is near 50% charge. Can be returned if CapUPSChargeState contains PWR_UPS_WARNING.
PWR_SUE_UPS_LOW	UPS battery is near empty. Application shutdown should be started to ensure that it can be completed before the battery charge is depleted. A minimum of 2 minutes of normal system operation can be assumed when this state is entered unless this is the first charge state reported upon entering the "Off" state. Can be returned if **CapUPSChargeState** contains PWR_UPS_LOW.

PWR_SUE_UPS_CRITICAL	UPS is in critical state and will in short time be disconnected. Can be returned if **CapUPSChargeState** contains PWR_UPS_CRITICAL.
PWR_SUE_FAN_STOPPED	The CPU fan is stopped. Can be returned if **CapFanAlarm** is true.
PWR_SUE_FAN_RUNNING	The CPU fan is running. Can be returned if **CapFanAlarm** is true.
PWR_SUE_TEMPERATURE_HIGH	The CPU is running on high temperature. Can be returned if **CapHeatAlarm** is true.
PWR_SUE_TEMPERATURE_OK	The CPU is running on normal temperature. Can be returned if **CapHeatAlarm** is true.
PWR_SUE_SHUTDOWN	The system will shut down immediately.
PWR_SUE_BAT_LOW	The system remaining battery capacity is at or below the low battery threshold and the system is operating from the battery.
PWR_SUE_BAT_CRITICAL	The system remaining battery capacity is at or below the critically low battery threshold and the system is operating from the battery.
PWR_SUE_BAT_CAPACITY_REMAINING.	The **BatteryCapacityRemaining** property has been updated
PWR_SUE_BAT_CAPACITY_REMAINING_IN_SECONDS	The **BatteryCapacityRemainingInSeconds** property has been updated
PWR_SUE_RESTART	The system will restart immediately.
PWR_SUE_STANDBY	The system is requesting a transition to the **Standby** state
PWR_SUE_USER_STANDBY	The system is requesting a transition to the **Standby** state, as a result of user input.
PWR_SUE_SUSPEND	The system is requesting a transition to the **Suspend** state.
PWR_SUE_USER_SUSPEND	The system is requesting a transition to the **Suspend** state, as a result of user input.
PWR_SUE_PWR_SOURCE	The **PowerSource** property has been updated.

Note** that **Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability, added in ***Release 1.9***, added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

See Also **CapFanAlarm** Property, **CapHeatAlarm** Property, **CapUPSChargeState** Property**, UPSChargeState** Property.

CHAPTER 39

Video Capture

This Chapter defines the Video Capture device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.16	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	***Not supported***
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAssociatedHardTotalsDevice:	*string*	{read-only}	1.16	open
CapAutoExposure:	*boolean*	{read-only}	1.16	open
CapAutoFocus:	*boolean*	{read-only}	1.16	open
CapAutoGain:	*boolean*	{read-only}	1.16	open
CapAutoWhiteBalance:	*boolean*	{read-only}	1.16	open
CapBrightness:	*boolean*	{read-only}	1.16	open
CapContrast:	*boolean*	{read-only}	1.16	open
CapExposure:	*boolean*	{read-only}	1.16	open
CapGain:	*boolean*	{read-only}	1.16	open
CapHorizontalFlip:	*boolean*	{read-only}	1.16	open
CapHue:	*boolean*	{read-only}	1.16	open
CapPhoto:	*boolean*	{read-only}	1.16	open
CapPhotoColorSpace:	*boolean*	{read-only}	1.16	open
CapPhotoFrameRate:	*boolean*	{read-only}	1.16	open
CapPhotoResolution:	*boolean*	{read-only}	1.16	open
CapPhotoType:	*boolean*	{read-only}	1.16	open
CapSaturation:	*boolean*	{read-only}	1.16	open
CapStorage:	*int32*	{read-only}	1.16	open
CapVerticalFlip:	*boolean*	{read-only}	1.16	open
CapVideo:	*boolean*	{read-only}	1.16	open
CapVideoColorSpace:	*boolean*	{read-only}	1.16	open
CapVideoFrameRate:	*boolean*	{read-only}	1.16	open
CapVideoResolution:	*boolean*	{read-only}	1.16	open
CapVideoType:	*boolean*	{read-only}	1.16	open
AutoExposure:	*boolean*	{read-write}	1.16	open, claim & enable
AutoFocus:	*boolean*	{read-write}	1.16	open, claim & enable
AutoGain:	*boolean*	{read-write}	1.16	open, claim & enable
AutoWhiteBalance:	*boolean*	{read-write}	1.16	open, claim & enable
Brightness:	*int32*	{read-write}	1.16	open, claim & enable
Contrast:	*int32*	{read-write}	1.16	open, claim & enable
Exposure:	*int32*	{read-write}	1.16	open, claim & enable
Gain:	*int32*	{read-write}	1.16	open, claim & enable

HorizontalFlip:	*boolean*	{read-write}	1.16	open, claim & enable
Hue:	*int32*	{read-write}	1.16	open, claim & enable
PhotoColorSpace:	*string*	{read-write}	1.16	open, claim & enable
PhotoColorSpaceList:	*string*	{read-only}	1.16	open
PhotoFrameRate:	*int32*	{read-write}	1.16	open, claim & enable
PhotoMaxFrameRate:	*int32*	{read-only}	1.16	open
PhotoResolution:	*string*	{read-write}	1.16	open, claim & enable
PhotoResolutionList:	*string*	{read-only}	1.16	open
PhotoType:	*string*	{read-write}	1.16	open, claim & enable
PhotoTypeList:	*string*	{read-only}	1.16	open
RemainingRecordingTimeInSec:	*int32*	{read-only}	1.16	open, claim & enable
Saturation:	*int32*	{read-write}	1.16	open, claim & enable
Storage:	*int32*	{read-write}	1.16	open, claim & enable
VerticalFlip:	*boolean*	{read-write}	1.16	open, claim & enable
VideoCaptureMode:	*int32*	{read-write}	1.16	open, claim & enable
VideoColorSpace:	*string*	{read-write}	1.16	open, claim & enable
VideoColorSpaceList:	*string*	{read-only}	1.16	open
VideoFrameRate:	*int32*	{read-write}	1.16	open, claim & enable
VideoMaxFrameRate:	*int32*	{read-only}	1.16	open
VideoResolution:	*string*	{read-write}	1.16	open, claim & enable
VideoResolutionList:	*string*	{read-only}	1.16	open
VideoType:	*string*	{read-write}	1.16	open, claim & enable
VideoTypeList:	*string*	{read-only}	1.16	open

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): void {raises-exception, use after open}	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void { }**	***Not supported***
clearOutput ( ): **void { }**	***Not supported***
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
compareFirmwareVersion (firmwareFileName: *string***, out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	
startVideo (fileName: *string***, overwrite:** *boolean***, recordingTime:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
stopVideo (): **void {raises-exception, use after open, claim, enable}**	1.16
takePhoto (fileName: *string***, overwrite:** *boolean***, timeout:***int32***):** **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	
Status:			
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse	*int32*	{read-write}	
upos::events::OutputCompleteEvent		***Not supported***	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Video Capture Device name is “Video Capture”.

Capabilities

Video capture device class has the following capabilities:

- Take a photo and record it as a file in a host and may store it in the targeted storage device.
- Take a video and record it as a file in a host and may store it in the targeted storage device.
- May read the encoded data from the bar code label with the hydra connected scanner device.
- May detect the individuals faces and/or objects with the hydra connected individual recognition device.

Video Capture Class Diagram

The following diagram shows the relationships between the Video Capture classes.

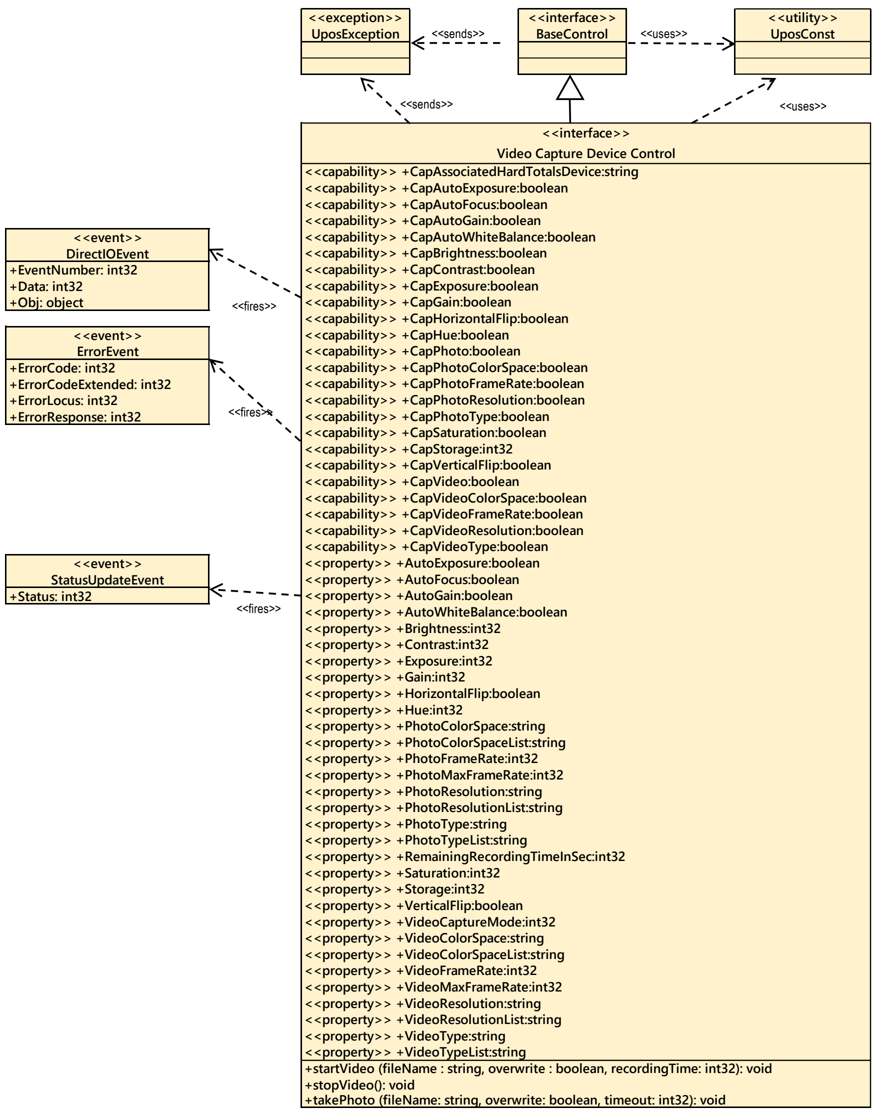

<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<sends>>
<<uses>>
<<interface>>
Video Capture Device Control
<<capability>> +CapAssociatedHardTotalsDevice:string
<<capability>> +CapAutoExposure:boolean
<<capability>> +CapAutoFocus:boolean
<<capability>> +CapAutoGain:boolean
<<capability>> +CapAutoWhiteBalance:boolean
<<capability>> +CapBrightness:boolean
<<capability>> +CapContrast:boolean
<<capability>> +CapExposure:boolean
<<capability>> +CapGain:boolean
<<capability>> +CapHorizontalFlip:boolean
<<capability>> +CapHue:boolean
<<capability>> +CapPhoto:boolean
<<capability>> +CapPhotoColorSpace:boolean
<<capability>> +CapPhotoFrameRate:boolean
<<capability>> +CapPhotoResolution:boolean
<<capability>> +CapPhotoType:boolean
<<capability>> +CapSaturation:boolean
<<capability>> +CapStorage:int32
<<capability>> +CapVerticalFlip:boolean
<<capability>> +CapVideo:boolean
<<capability>> +CapVideoColorSpace:boolean
<<capability>> +CapVideoFrameRate:boolean
<<capability>> +CapVideoResolution:boolean
<<capability>> +CapVideoType:boolean
<<property>> +AutoExposure:boolean
<<property>> +AutoFocus:boolean
<<property>> +AutoGain:boolean
<<property>> +AutoWhiteBalance:boolean
<<property>> +Brightness:int32
<<property>> +Contrast:int32
<<property>> +Exposure:int32
<<property>> +Gain:int32
<<property>> +HorizontalFlip:boolean
<<property>> +Hue:int32
<<property>> +PhotoColorSpace:string
<<property>> +PhotoColorSpaceList:string
<<property>> +PhotoFrameRate:int32
<<property>> +PhotoMaxFrameRate:int32
<<property>> +PhotoResolution:string
<<property>> +PhotoResolutionList:string
<<property>> +PhotoType:string
<<property>> +PhotoTypeList:string
<<property>> +RemainingRecordingTimeInSec:int32
<<property>> +Saturation:int32
<<property>> +Storage:int32
<<property>> +VerticalFlip:boolean
<<property>> +VideoCaptureMode:int32
<<property>> +VideoColorSpace:string
<<property>> +VideoColorSpaceList:string
<<property>> +VideoFrameRate:int32
<<property>> +VideoMaxFrameRate:int32
<<property>> +VideoResolution:string
<<property>> +VideoResolutionList:string
<<property>> +VideoType:string
<<property>> +VideoTypeList:string
+startVideo (fileName : string, overwrite : boolean, recordingTime: int32): void
+stopVideo(): void
+takePhoto (fileName: string, overwrite: boolean, timeout: int32): void
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<event>>
ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>>
StatusUpdateEvent
+Status: int32
<<fires>>

Fig. Chap. 39-1 Video Capture Class Diagram

Model

Modes

The Video Capture Device has two operation modes.
・Photo Mode
・Video Mode
The operation of each mode is as follows.

・Photo Mode
Photo Mode may capture a photo image and may save it in a host as the image data file format, if **CapPhoto** property is true. Its' capable data file format is indicated in the **PhotoType** property and all of the capable values are listed in the **PhotoTypeList** property. And the device may save the file in the targeted storage device that is specified by the **Storage** property, if **CapStorage** value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL.

・Video Mode
Video Mode may capture a video image data and may save it in a host as the video image data file format, if **CapVideo** property is true. Its' capable data file format is indicated in the **VideoType** property and all of the capable values are listed in the **VideoTypeList** property. And the device may save the file in the targeted storage device that is specified by the **Storage** property, if **CapStorage** value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL.

Device behaviors

"Video capture device" device control follows the device behavior as follows.

They are different in each mode as described below.

Photo Mode

If **CapPhoto** property is true, this mode can be executed.
Prior to start this mode, "**Video Capture Device**" device control needs to set the **VideoCaptureMode** property as to be VCAP_VCMODE_PHOTO. And each of **CapPhotoColorSpace**, **CapPhotoFrameRate, CapPhotoResolution**, **CapPhotoType** property is true and these **PhotoColorSpaceLis**t, **PhotoMaxFrameRate, PhotoResolutionList** and **PhotoTypeList** should have the appropriate values to be used as the photo file data in this targeted device. And then it needs to set the appropriate values in the each of **PhotoColorSpace** property, **PhotoFrameRate** property, **PhotoResolution** property and **PhotoType** property.

It starts photo capturing by executing the **takePhoto** method. Then, "**Video Capture Device**" device control may capture a photo image and may save it in a host as an image data file format specified by the value of **PhotoType** property that is listed in the **PhotoTypeList** property. And may store it in the storage device specified by the **Storage** property, if **CapStorage** value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL. Then the file name is set by the **takePhoto** method parameter and can deliver the photo data file to the application. If device needs to be able to write the image data file to an associated Hard Totals device, the **CapAssociatedHardTotalsDevice** property holds the open name of the associated Hard Totals device.

This method is performed synchronously as the process of taking photo. The process of recorded data storing is performed asynchronously. **StatusUpdateEvents** are delivered to the application when the start and the end of device states are changed. Only one call to **takePhoto** method can be in progress at a time. If you try to nest the video capture device operation of the device, before the storing is finished, an UPOSException will be thrown.

When it exceeded the specified parameter time out or when photo file generation is finished or when **clearInput** method is executed, the taking photo process will be ended.

StatusUpdateEvent with status VCAP_SUE_START_PHOTO is evoked when **takePhoto** method is executed to notify the application that recording state has started.

When the taking photo is finished, or the specified time out has been exceeded, a **StatusUpdateEvent** with status VCAP_SUE_END_PHOTO is evoked to notify the application that photo taking has been ended.

An **ErrorEven**t event (or events) is enqueued if an error occurs while gathering or processing input.

If **ErrorEvent** response is ER_RETRY, the process of recorded data storing was retried. However, as long as the cause of the error is not resolved, the **ErrorEvent** will occur again immediately.

If **ErrorEvent** is ER_CLEAR, all of the device buffered data is cleared and the **takePhoto** method is discarded.

All enqueued input may be deleted by calling **clearInput** method. See the **clearInput** method description for more details.

Video Mode

Prior to start this mode, "**Video Capture Device**" device control needs to set the **VideoCaptureMode** property as to be VCAP_VCMODE_VIDEO. And each of **CapVideoColorSpace**, **CapVideoFrameRate, CapVideoResolution** and **CapVideoType** property is true and these V**ideoColorSpaceList**, **VideoMaxFrameRate, VideoResolutionList** and **VideoTypeList** should have the appropriate values to be used as the video image data file in this targeted device. And then it needs to set the appropriate values in the each of **VideoColorSpace** property, **VideoFrameRate** property, **VideoResolution** property and **VideoType** property.

It starts video image capturing by executing the **startVideo** method. This method is executed synchronously. During video image capturing, recorded data storing is processed asynchronously and when the start and end the device state is changed, **StatusUpdateEvents** are delivered to the application. In addition, remaining device recording time is updated in the **RemainingRecordingTimeInSec** property**.**

Then "**Video Capture Device**" device control captures a video image and save it in a host with the filename specified value of **VideoType** property that is listed in the **VideoTypeList** property. And may store it in the storage device specified by the **Storage** property, if **CapStorage** value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL. And the file name is set by the **startVideo** method parameter and can deliver the video image data file to the application. This method is executed synchronously.

The video capturing ends after the specified time has elapsed or when **stopVideo** method is called or when **clearInput** method is called even **startVideo** method is called.

The remaining video capture recording time in seconds can be obtained from the property **RemainingRecordingTimeInSec**.

StatusUpdateEvent with status VCAP_SUE_START_VIDEO is evoked when **startVideo** method is executed to notify the application that taking video has been started.

When the taking video is finished, or the specified time out has been exceeded, a **StatusUpdateEvent** with status VCAP_SUE_STOP_VIDEO is evoked to notify the application that taking video has been ended.

If the time specified by the **startVideo** method is FOREVER(-1), execution will continue until the **stopVideo** method is called. When **stopVideo** is called, the previous taking video data may be recorded in a host and deliver to the targeted storage device specified by the **Storage** property, if **CapStorage** property value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL. And it can be delivered to the application with the specified file name that is set by the **startVideo** method.

Only one call to **startVideo** method can be in progress at a time. An attempt to nest taking video operations will result in an UPOSException being thrown.

If Error occurs during the execution of the **startVideo** method, application may call the **stopVideo** method to terminate the taking video process or cancel the taking video process by calling the **clearInput** method before ending the **ErrorEvent** processing. After this when the **stopVideo** method is called, the video file data until just before the **ErrorEvent** occur is stored to the host and targeted storage device that is specified by the **Storage** property, if **CapStorage** property value is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL and can be delivered to the application.

If **ErrorEvent** response is ER_RETRY, the process of recorded data storing was retried. However, as long as the cause of the error is not resolved, the **ErrorEvent** will occur again immediately.

If **ErrorEvent** is ER_CLEAR, all of the device buffered data is cleared and the error state is exited and the taking video capturing process is discarded.

An **ErrorEven**t event (or events) is enqueued if an error occurs while gathering or processing the data.

If there is no error during the execution of **startVideo** method, it is possible to terminate the taking video process and can stop the taking video anytime. When the **stopVideo** method is called, the video data until just before the method is called, may be recorded in the host and targeted storage device that is specified by the **Storage** property if **CapStorage** property is VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL, and can deliver it to the application.

All enqueued data may be deleted by calling **clearInput** method. See the clearInput method description for more details.

Device Sharing

Video capture is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing many video capture-specific properties.
- The application must claim and enable the device before calling methods that manipulate the device.
- See the “Summary” table for precise usage prerequisites.

Properties (UML attributes)

AutoExposure Property

Syntax **AutoExposure:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, auto exposure of camera is enabled. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapAutoExposure** Property

AutoFocus Property

Syntax **AutoFocus:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, auto focus of camera is enabled. Otherwise, it is false.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapAutoFocus** Property

AutoGain Property

Syntax **AutoGain:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, auto gain of camera is enabled. Otherwise, it is false.

When this property is true, it is possible to read the value of **Gain** property. However, it is not possible to write and change the value of **Gain** property. If **AutoGain** property is false, then, it is possible to read, write and change the value of **Gain** property.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapAutoGain** Property **Gain** Property

AutoWhiteBalance Property

Syntax **AutoWhiteBalance:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, auto white balance of camera is enabled. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapAutoWhiteBalance** Property

Brightness property

Syntax **Brightness:** ***int32*** **{read-write, access after open-claim-enable }**

Remarks Indicate the brightness of camera.
Valid values range from 0 to 100.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **Ca~~p~~Brightness** Property

CapAssociatedHardTotalsDevice Property

Syntax **CapAssociatedHardTotalsDevice:** ***string*** **{read-only, access after open}**

Remarks Indicate that the device is able to store the recorded data into the Associated Hard Totals device and holds its open name**,** if **CapStorage** is either VCAP_CST_ALL or VCAP_CST_HARDTOTALS_ONLY. If **CapStorage** is VCAP_CST_HOST_ONLY the device is not able to store the data into the Associated Hard Totals device and this property value must be the empty string. This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **CapStorage** Property

CapAutoExposure Property

Syntax **CapAutoExposure:** ***boolean*** **{read-only, access after open}**

Remarks If true, the auto exposure of camera can be changed.
Otherwise, it is false. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.

See also **AutoExposure** Property

CapAutoFocus Property

Syntax	**CapAutoFocus:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the auto focus of camera. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**AutoFocus** Property

CapAutoGain Property

Syntax	**CapAutoGain:** ***boolean*** **{read-only, access after open}**
Remarks	If true, automatic gain change of the camera is possible. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**AutoGain** Property

CapAutoWhiteBalance Property

Syntax	**CapAutoWhiteBalance:** ***boolean*** **{read-only, access after open}**
Remarks	If true, auto white balance of camera is possible. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**AutoWhiteBalance** Property

CapBrightness Property

Syntax	**CapBrightness:** ***boolean*** **{read-only, access after open}**
Remarks	If true, the brightness of camera can be changed. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**Brightness** Property

CapContrast Property

Syntax	**CapContrast:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the contrast of camera. Otherwise, it if false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**Contrast** Property

CapExposure Property

Syntax	**CapExposure:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the exposure of camera. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.
See also	**Exposure** Property

CapGain Property

Syntax	**CapGain:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the gain of camera. Otherwise, it is false. This property is initialized by the open method.
Errors	A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.
See also	**Gain** Property

CapHorizontalFlip Property

Syntax	**CapHorizontalFlip:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the horizontal flip of camera. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.
See also	**HorizontalFlip** Property

CapHue Property

Syntax	**CapHue:** ***boolean*** **{read-only, access after open}**
Remarks	If true, the hue of the camera can be changed. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.
See also	**Hue** Property

CapPhoto Property

Syntax	**CapPhoto:** ***boolean*** **{read-only, access after open}**
Remarks	If true, it supports the photo function and can take a photo. And to activate the photo mode, the **VideoCaptureMode** property value needs to set VCAP_VCMODE_PHOTO. If false, it is not supporting the photo function. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.
See also	**takePhoto** Method, **VideoCaptureMode** Property

CapPhotoColorSpace Property

Syntax	**CapPhotoColorSpace:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can handle and change the photo color space. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20
See also	**PhotoColorSpace** Property

CapPhotoFrameRate Property

Syntax	**CapPhotoFrameRate:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can handle and change the capture frame rate. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**PhotoFrameRate** Property

CapPhotoResolution Property

Syntax	**CapPhotoResolution:** ***boolean*** **{read-only, access after open}**
Remarks	If true, taking photo resolution is handled and can be changed. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**PhotoResolution** Property

CapPhotoType Property

Syntax	**CapPhotoType:** ***boolean*** **{read-only, access after open}**
Remarks	If true, photo image format type can be changed. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.
See also	**PhotoType** Property

CapSaturation Property

Syntax	**CapSaturation:** ***boolean*** **{read-only, access after open}**
Remarks	If true, can change the saturation of camera. Otherwise, it is false. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.
See also	**Saturation** Property

CapStorage Property

Syntax **CapStorage:** ***int32*** **{read-only, access after open}**

Remarks This is an enumeration and announces where the device is able to write the recorded video or photo data file to.
It holds one of the following values.

Value	Meaning
VCAP_CST_HARDTOTALS_ONLY	Only an associate Hard Totals device is supported.
VCAP_CST_HOST_ONLY	Only the host's file system is supported.
VCAP_CST_ALL	Both, the associated Hard Totals device and the host's file system is supported.

This property is initialized by the **open** method.

If a Hard Totals device is supported the Storage, the property value should be VCAP_CST_HARDTOTALS_ONLY or VCAP_CST_ALL, and the property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **Storage** Property, **CapAssociatedHardTotalsDevice** Property

CapVerticalFlip Property

Syntax **CapCameraVerticalFlip:** ***boolean*** **{read-only, access after open}**

Remarks If true, can change the vertical flip of camera. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.

See also **VerticalFlip** Property

CapVideo Property

Syntax **CapVideo:** ***boolean*** **{read-only, access after open}**

Remarks If true, video function is supported. Otherwise, it is false. If this property is true, taking video and recording can be done by calling the **startVideo** method. And to activate the video mode, the **VideoCaptureMode** property value needs to set VCAP_VCMODE_VIDEO. If false, taking video and recording cannot be performed. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **StartVideo** Method, **VideoCaptureMode** Property

CapVideoColorSpace Property

Syntax **CapVideoColorSpace:** ***boolean*** **{read-only, access after open}**

Remarks If true, can change the color space when taking the video. Otherwise, it is false. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20

See also **VideoColorSpace** Property

CapVideoFrameRate Property

Syntax **CapVideoFrameRate:** ***boolean*** **{read-only, access after open}**

Remarks If true, can change the video frame rate from 1 to up to **VideoMaxFrameRate** property value. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **VideoMaxFrameRate** Property, **VideoFrameRate** Property

CapVideoResolution Property

Syntax **CapVideoResolution:** ***boolean*** **{read-only, access after open}**

Remarks If true, taking video resolution can be changed and all of possible values are listed in the **VideoResolutionList** property values. If false, taking video resolution cannot be changed. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **VideoResolutionList** Property, **VideoResolution** Property

CapVideoType Property

Syntax **CapVideoType:** ***boolean*** **{read-only, access after open}**

Remarks If true, taking video type can be changed, and all of possible values are listed in the **VideoTypeList** values. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **VideoTypeList** Property, **VideoType** Property

Contrast Property

Syntax **Contrast: *int32* {read-write, access after open-claim-enable}**

Remarks Indicate the contrast of the camera. Valid values range from 0 to 100.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **CapContrast** Property

Exposure Property

Syntax **Exposure: *int32* {read-write, access after open-claim-enable}**

Remarks Indicate the exposure of camera. Valid values range from 0 to 100.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapExposure** Property

Gain Property

Syntax **Gain: *int32* {read-write, access after open-claim-enable}**

Remarks Indicate the gain of camera. Valid values range from 0 to 100.
If **AutoGain** property is true, it is possible to read the value of **Gain** property. However, it is not possible to write and change the value of **Gain** property. If **AutoGain** property is false, then, it is possible to read, write and change the value of **Gain** property.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapGain** Property, **AutoGain** Property

HorizontalFlip Property

Syntax HorizontalFlip: ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, horizontal flip of camera is enabled and it is possible to reverse the camera captured image horizontally. Otherwise, it is false. There is a similar property called **VerticalFlip** property. However, each **VerticalFlip** property and **HorizontalFlip** property value can be set independently. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See Also **CapHorizontalFlip** property, **VerticalFlip** property, **CapVerticalFlip** property

Hue Property

Syntax **Hue:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Indicate the hue of camera. Valid values range from 0 to 100. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapHue** Property

PhotoColorSpace Property

Syntax **PhotoColorSpace:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates the photo color space ID of the frame data to be acquired by the Video Capture Device, if **CapPhotoColorSpace** property is true and it is used **takePhoto** method. Valid values are one of the values listed in the **CapPhotoColorSpaceList** property. This property is referred to when **VideoCaptureMode** property value is VCAP_VCMODE_PHOTO and **CapPhoto** is true. This property is initialized by the **open** method.

Errors A **UposException** may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **PhotoColorSpaceList** Property, **VideoCaptureMode** property,

CapPhoto Property, **CapPhotoColorSpace** Property, **takePhoto** Method

PhotoColorSpaceList Property

Syntax **PhotoColorSpaceList:** ***string*** **{read-only, access after open}**

Remarks Photo Color space information supported by the device is indicated in a comma-separated list. Each color space information is composed of the following information and is shown in the following order separated by a colon (":").
This property is initialized by the **open** method.

Parameter	Description
Color space ID	ID for identifying the color space of RGB, YUV 422, etc. Then if RGB Depth was 16 bits, YUV422 Depth was 32 bits, they are indicating like “RGB:16, YUV422:32,…..”
Depth	Number of bits per 1 pixel

Errors A UposException may be thrown when this property is accessed.
For further information, see **“Errors"** on page Intro-20.

See also **CapPhotoColorSpace** Property, **PhotoColorSpace** Property, **VideoCaptureMode** Property

PhotoFrameRate Property

Syntax **PhotoFrameRate:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Indicates the frame rate of frame data recorded by the Video Capture Device and the photo image capturing and recorded with the **takePhoto** method. This property is only applied when **VideoCaptureMode** property is set to VCAP_VCMODE_PHOTO. Valid values range from 1 to **PhotoMaxFrameRate** property and **CapPhoto** property is true. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **“Errors"** on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **CapPhoto** Property, **CapPhotoFrameRate** Property, **PhotoMaxFrameRate** Property, **VideoCaptureMode** Property, **takePhoto** Method

PhotoMaxFrameRate Property

Syntax **PhotoMaxFrameRate:** ***int32*** **{read-only, access after open}**

Remarks Indicates the maximum frame rate that can be set for the **PhotoFrameRate** property.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further Information, see “**Errors**" on page Intro-20.

See also **PhotoFrameRate** Property, **VideoCaptureMod**e Property

PhotoResolution Property

Syntax **PhotoResolution:** ***string*** **{read-write, access after open-claim-enable}**

Remarks It shows the resolution of the frame data acquired by the Video Capture Device and the photo taken and recorded with the **takePhoto** method. Valid values are one of those listed in **PhotoResolutionList** property. This property is only applied when **VideoCaptureMode** property is set to VCAP_VCMODE_PHOTO and if **CapPhoto** is true. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20. Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **CapPhoto** Property, **PhotoResolutionList** Property、**VideoCaptureMode** Property, **takePhoto** Method

PhotoResolutionList Property

Syntax **PhotoResolutionList:** ***string*** **{read-only, access after open}**

Remarks Indicating the comma-separated list of possible resolutions for the **PhotoResolution** property. Resolution is indicated in "horizontal x height" format. For example, when you support 320x240, 640x480, 640x360, it is the following: "320x240,640x480,640x360". This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20.

See also **CapPhotoResolution** Property**, PhotoResolution** Propert**y, VideoCaptureMode** property

PhotoType Property

Syntax **PhotoType:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates the data format of photo taken with the **takePhoto** method. Valid values are one of the values listed in the **PhotoTypeList** property. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see “**Errors**" on page Intro-20. Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **CapPhoto** Property**, PhotoTypeList** Property**, takePhoto** Method, **VideoCaptureMode** Property

PhotoTypeList Property

Syntax **PhotoTypeList:** ***string*** **{read-only, access after open}**

Remarks A comma-separated list of photo image format values that can be set for the **PhotoType** property.
For example, when supporting BMP and JPEG, it is the following.
"BMP,JPEG".

Note: The notation contents may be different depending on the device.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **PhotoType** Property, **VideoCaptureMode** property

RemainingRecordingTimeInSec Property

Syntax **RemainingRceordingTimeInSec:**
int32 **{read-only, access after open-claim-enable}**

Remarks This property holds the remaining recording time in seconds if a video recording is ongoing. If no video recording is ongoing its value is 0. When a call to method **startVideo** returns, this property initially holds the time passed as argument *recordingTime* to that call. If this argument value is FOREVER (-1), this property also holds this value unchanged until **stopVideo** method has been called. This property is initialized during device set **DeviceEnabled** method to 0.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **startVideo** Method**, stopVideo** Method

Saturation Property

Syntax **Saturation:** ***int32*** **{read-write, access after open-claim-enable }**

Remarks Indicate the saturation of camera. Valid values range from 0 to 100.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapSaturation** Property

Storage Property

Syntax **Storage:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks This is an enumeration and defines where the device writes the recorded video or photo data file to. Should be set before a call to **startVideo** or **takePhoto** method. It holds one of the following values.

Value	Meaning
VCAP_ST_HARDTOTALS	The video or photo data file is written to the associated Hard Totals device. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.
VCAP_ST_HOST	The vide or photo data file is written to the host's file system.
VCAP_ST_HOST_HARDTOTALS	The video or photo data file is written to the associated Hard Totals device and host's file system. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

This property is initialized by the **open** method according to the value hold by **CapStorage**. If **CapStorage** has the value VCAP_CST_ALL, it is initialized to VCAP_ST_HOST_HARDTOTALS.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified or recording is ongoing.

See Also **CapStorage** Property

VerticalFlip Property

Syntax **VerticalFlip:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, vertical flipping of the video is enabled and it is possible to reverse the video or photo image capturing vertically. Otherwise, it is false. There is a similar property called **HorizontalFlip** property and each **VerticalFlip** property and **HorizontalFlip** property value can be set independently. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or it does not support this function.

See also **CapVerticalFlip** Property, **HorizontalFlip** Property, **CapHorizontalFlip** Property

VideoCaptureMode Property

Syntax **VideoCaptureMode:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Indicate the operation mode of video capture device.
Valid values are as follows

Parameter	Description
VCAP_VCMODE_PHOTO	This mode is for taking photo. and their data recording. Can be set when **CapPhoto** property is true. The values of the **PhotoType** property, **PhotoColorSpace** property**, PhotoResolution** property **PhotoFrameRate** property are applied to the taking photo image formats list in the **PhotoTypeList** property, the color space values list in the **PhotoColorSpaceList** property**,** the resolution values list in the **PhotoResolutionList** property, and the frame rate values within the values of **PhotoMaxFrameRate** property. And taking photo is executed by the **takePhoto** method.
VCAP_VCMODE_VIDEO	This mode is for taking the videos and their data recording. Can be set when **CapVideo** property is true. The value of the **VideoTyp**e property, **VideoColorSpace** property, **VideoResolution** property and **VideoFrameRate** property are applied to the taking video image format list in the **VideoTypeList** property, the color space values list in the **VideoColorSpaceList** property, the resolution values list in the **VideoResolutionList** property and frame rate values within the values of **VideoMaxFrameRate** property. Taking the videos and their data recording will be executed by the **startVideo** method and ends taking the video by using the **stopVideo** method.

This property is initialized by the by the **open** method. The default value of this property is VCAP_VCMODE_PHOTO.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **PhotoColorSpace** Property, **VideoColorSpace** Property, **PhotoResolution** Property, **VideoResolution** Property, **VideoFrameRate** Property, **PhotoFrameRate** Property, **CapPhotoColorSpace** Property, **CapVideoColorSpace** Property, **CapPhotoResolution** Property, **CapVidoeResolution** Property, **VideoMaxFrameRate** Property, **PhotoMaxFrameRate** Property, **CapPhoto** Property, **CapVideo** Property, **VideoType** Property, **VideoTypeList** Property **PhotoType** Property, **PhotoTypeList** Property, **takePhoto** Method, **startVideo** Method, **stopVideo** Method.

VideoColorSpace Property

Syntax **VideoColorSpace:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates the video color space ID of the frame data to be acquired by the Video Capture Device, if **CapVideoColorSpace** property is true and it is used by **startVideo** method. Valid values are one of the values listed in the **VideoColorSpaceList** property. This property is referred to when **VideoCaptureMode** property value is VCAP_VCMODE_VIDEO and **CapVideo** is true. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **CapVideoColorSpace** Property, **VideoColorSpaceList** Property, **VideoCaptureMode** Property, **startVideo** Method

VideoColorSpaceList Property

Syntax **VideoColorSpaceList:** ***string*** **{read-only, access after open}**

Remarks Video Color space information supported by the device is indicated in a comma-separated list. Each color space information is composed of the following information and is shown in the following order separated by a colon (":").
This property is initialized by the **open** method.

Parameter	Description
Color space ID	ID for identifying the color space of RGB, YUV422, etc. Then if RGB Depth was 16 bits, YUV422 Depth was 32 bits, they are indicating like"RGB:16, YUV422:32, ….."
Depth	Number of bits per 1 pixel

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See also **CapVideoColorSpace** Property, **VideoCaptureMode** Property, **VideoColorSpace** Property

VideoFrameRate Property

Syntax **VideoFrameRate;** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Indicates the frame rate of the frame data recorded by the Video Capture Device and the video image capturing and recorded with the **startVideo** method. This property is only applied when VCAP_VCMODE_VIDEO is set in **VideoCaptureMode** property. Valid values range from 1 to **VideoMaxFrameRate** property and **CapVideo** property is true.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **CapVideo** Property, **CapVideoFrameRate,** Property**, VideoCaptureMode** Property, **VideoMaxFrameRate** Property, **startVideo** Method

VideoMaxFrameRate Property

Syntax **VideoMaxFrameRate:** ***int32*** **{read-only, access after open}**

Remarks Indicates the maximum video recording frame rate that can be set in **VideoFrameRate** property.
This property is initialized by the open method.

Errors A UposException may be thrown when this property is accessed.
For further information, see "**Errors**" on page Intro-20.

See also **VideoFrameRate** Property, **VideoCaptureMode** Property

VideoResolution Property

Syntax **VideoResolution:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates the resolution of video image data acquired by the Video Capture Device and recorded with the execution of **startVideo** method. Valid values are one of the values listed in the **VideoResolutionList** property. This property is only applied when VCAP_VCMODE_VIDEO is set in **VideoCaptureMode** property and if **CapVide**o property is true.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **VideoResolutionList** Property, **CapVideo** Property, **VideoCaptureMode** Property、**startVideo** Method

VideoResolutionList Property

Syntax **VideoResolutionList:** ***string*** **{read-only, access after open}**

Remarks A comma-separated list of possible resolutions for the **VideoResolution** property. Resolution is indicated by "Horizontal resolution number x Vertical resolution number" format. For example, when it supports 320x240, 640x480, 640x360, it is the following: "320x240,640x480,640x360" This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See also **CapVideoResolution** Property, **VideoResolution** Property

VideoType Property

Syntax **VideoType;** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicate the shape of the taking video and recorded with the **startVideo** method. Valid values are one of those listed in **VideoTypeList** property. This property is applied when VCAP_VCMODE_VIDEO is set in **VideoCaptureMode** property and if **CapVideo** property is true.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See also **VideoCaptureMode** Property, **CapVideo** Property, **VideoTypeList** Property, **startVideo** Method

VideoTypeList Property

Syntax	**VideoTypeList:** ***string*** **{read-only, access after open}**
Remarks	A comma-separated list of video image format values that can be set for the **VideoType** property. *1For example, when AVI_IYUV, AVI_MJPG is supported, it is the following "AVI_IYUV, AVI_MJPG". Note: The notation contents may be different depending on the device. This property is initialized by the **open** method.
Errors	A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.
See also	**VideoType** Property, **VideoCaptureMode** Property

Note *1: The Video type related information are listed in here as the reference.

AVI : Digital container format :
https://en.wikipedia.org/wiki/Digital_container_format

MJPG : Motion JPEG :
https://en.wikipedia.org/wiki/Motion_JPEG

IYUV : 4:2:0 Video Pixel Formats :
https://docs.microsoft.com/en-us/windows-hardware/drivers/display/4-2-0-video-pixel-formats

4:2:2 Video Pixel Formats :
https://docs.microsoft.com/en-us/windows-hardware/drivers/display/4-2-2-video-pixel-formats

Video Formats and their Abbreviation :
http://technewzbd.blogspot.com/2013/05/video-formats-and-their-abbreviation.html

Note: Video Capture Device Property Value Relationship

Properties listed below are related within each Photo / Video Mode group, and if any value change occurs, other values may change accordingly.

Photo Mode Group Properties

PhotoType, PhotoColorSpace, PhotoColorSpaceList, PhotoFrameRate, PhotoMaxFrameRate, PhotoResolution, PhotoResolutionList

Video Mode Group Properties

VideoType, VideoColorSpace, VideoColorSpaceList, VideoFrameRate, VideoMaxFrameRate, VideoResolution, VideoResolutionList

Methods (UML operations)

startVideo Method

Syntax

startVideo (fileName : string, overwrite: ***boolean*****,**
recordingTime: ***int32*****):**
void{raises-exception, use after open-claim-enable}

Parameter	Description
filename	Specify the name of the video file to be recorded.
Overwrite	Specify the behavior when the same name file exists. If true, it is overwritten. If false, it will raise the UposException.
recordingTime	Specify the time for video recording in seconds. If FOREVER (-1) is specified, recording will continue until the **stopVideo** method is called.

Remarks

Before calling this method, it needs to set the **VideoCaptureMode** property to VCAP_VCMODE_VIDEO and **CapVideo** property needs to be true. Video capturing and recording starts with the setting contents of the **VideoColorSpace** property**, VideoResolution** property, **VideoFrameRate** property and **VideoType** property. This method is executed synchronously. During the video image capturing, the recorded data storing is processed asynchronously and when the start and stop states are changed, **StatusUpdateEvents** are delivered to the application.
When the time specified in recordingTime has elapsed, or by calling the **stopVideo** method, recording is completed and the video file specified by fileName is recorded and can deliver to the application.
Also, S_BUSY is set in the **Status** property during video capturing and recording. The place where video files are recorded is controlled through the **Storage** Property.

Errors

A UposException may be thrown when this method is invoked.
For further information, see “**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	fileName is too long or contains characters that cannot be used, or 0 is specified for recordingTime. **VideoCaptureMode** property is not VCAP_VCMODE_VIDEO and **CapVideo** is not true.
E_EXISTS	fileName already exists. (If overwrite is false)
E_BUSY	Cannot execute because it is recording.

See also

VideoColorSpace Property**, VideoResolution** Property**, VideoFrameRate** Property**, VideoType** Property**, stopVideo** Method, **StatusUpdateEvent** Event, **VideoCaptureMode** Property

stopVideo Method

Syntax **stopVideo ( ):**
void {raises-exception, use after open-claim-enable}

Remarks The video capturing and recording process started by the **startVideo** method has been ended and the taking video is completed. This method processed synchronously. **StatusUpdateEven**t is delivered to notify the application that the device video capturing and recording were stopped.

Errors A UposException may be thrown when this method is invoked.
For further information, see "**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	It is not recorded.

See also **startVideo** Method, **StatusUpdateEvent** Event

takePhoto Method

Syntax

takePhoto (fileName: ***string*****,**
overwrite: ***boolean*****, timeout:** ***int32*** **):**
void{raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the image file name to be recorded.
overwrite	Specify the behavior when the same name file exists. If true it overwrites. If false, UposException is thrown.
timeout	Allowed execution time in milliseconds, before the method fails and a timeout **ErrorEvent** is sent to the application. If FOREVER (-1) the service will wait until a photograph is taken or an application error occurs.

Remarks

Take photo and record with setting contents of **PhotoColorSpace** property, **PhotoResolution** property, **PhotoFrameRate** Property and **PhotoType** property. Before calling this method, it needs to set the **VideoCaptureMode** property to VCAP_VCMODE_PHOTO and this method can be executed if **CapPhoto** property is true. This method is executed synchronously. The process of recorded data storing is performed asynchronously. **StatusUpdateEvents** are delivered to the application when the start and the end states were changed. The location where photo files are recorded is controlled through the **Storage** Property. The timeout specifies the number of milliseconds

Errors

A UposException may be thrown when this method is invoked.
For further information, see “**Errors**" on page Intro-20.
Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	One of the following occurred. FileName is too long or contains unusable characters. **VideoCaptureMode** property is not VCAP_VCMODE_PHOTO and **CapPhoto** property is not true.
E_EXISTS	fileName already exist. (When overwrite=false)

See also

VideoCaptureMode Property**, PhotoColorSpace** Property**, PhotoResolution** Property**, CapPhoto** Property, **PhotoType** Property, **PhotoFrameRate** Property, **StatusUpdateEvent** Event

Events (UML interfaces)

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Video Capture Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** method

ErrorEvent

<<event>> **upos::events::ErrorEvent**

ErrorCode : *int32* {read-only}
ErrorCodeExtended : *int32* {read-only}
ErrorLocus : *int32* {read-only}
ErrorResponse : *int32* {read-write}

Description Notifies the application that a Video Capture Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. If EL_INPUT is specified. An error occurred during asynchronous process.
ErrorResponse	*int32*	Error Response, whose default value may be overridden by the application. (i.e., this attribute is settable). See *ErrorResponse* below for values.

If ErrorCode is E_EXTENDED, then ErrorCodeExtended has one of the following values:

Value	Meaning
EVCAP_NOROOM	The image data storage area does not have enough room to store.

The *ErrorLocus* attribute has the following value:

Value	Meaning
EL_INPUT	Error occurred while processing asynchronous input.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry sending the recorded data or storing it. The error state is exited. Typically, valid for asynchronous recorded data storing when the locus is EL_INPUT, which case the asynchronous recorded data storing is retried, and the error state is exited. This is the default response.
ER_CLEAR	Clear all buffered captured or stored data. The error state is exited.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state.

See Also **"Error Handling"** on page Intro-23, **Device information Reporting Model** " on Page Intro-30

StatusUpdateEvent

<< event >> **upos::events::StatusUpdateEvent**
Status : *int32* {read-only}

Description *Notifies the application that there is a change in the power status or a state change of the Video Capture device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change in the power status or a sate change of the unit.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
VCAP_SUE_START_VIDEO	It will be notified when video recording starts.
VCAP_SUE_STOP_VIDEO	It will be notified when video recording stops.
VCAP_SUE_START_PHOTO	It will be notified when photo capturing starts.
VCAP_SUE_END_PHOTO	It will be notified when photo capturing ends.

Remarks Enqueued when the Video Capture Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

C H A P T E R 4 0

Individual Recognition

This Chapter defines the Individual Recognition device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	Open
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	Open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	open
DataEventEnabled:	*boolean*	{read-write}	1.16	open
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	***Not supported***
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapIndividualList:	*string*	{read-only}	1.16	open
IndividualIDs:	*string*	{read-only}	1.16	open, claim & enable
IndividualRecognitionFilter:	*string*	{read-write}	1.16	open
IndividualRecognitionInformation	*string*	{read-only}	1.16	open

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16
clearOutput ( ): **void { }**	***Not supported***
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent			1.16
Status:	*int32*	{read-only}	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse:	*int32*	{read-write}	
upos::events::OutputCompleteEvent		***Not supported***	1.16
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Individual Recognition programmatic name is “Individual Recognition”.

Capabilities

The Individual Recognition has the following set of capabilities:

Analyzes the image of the camera and recognizes individuals such as people and listed goods.

Individual Recognition Class Diagram

The following diagram shows the relationships between the Individual Recognition classes.

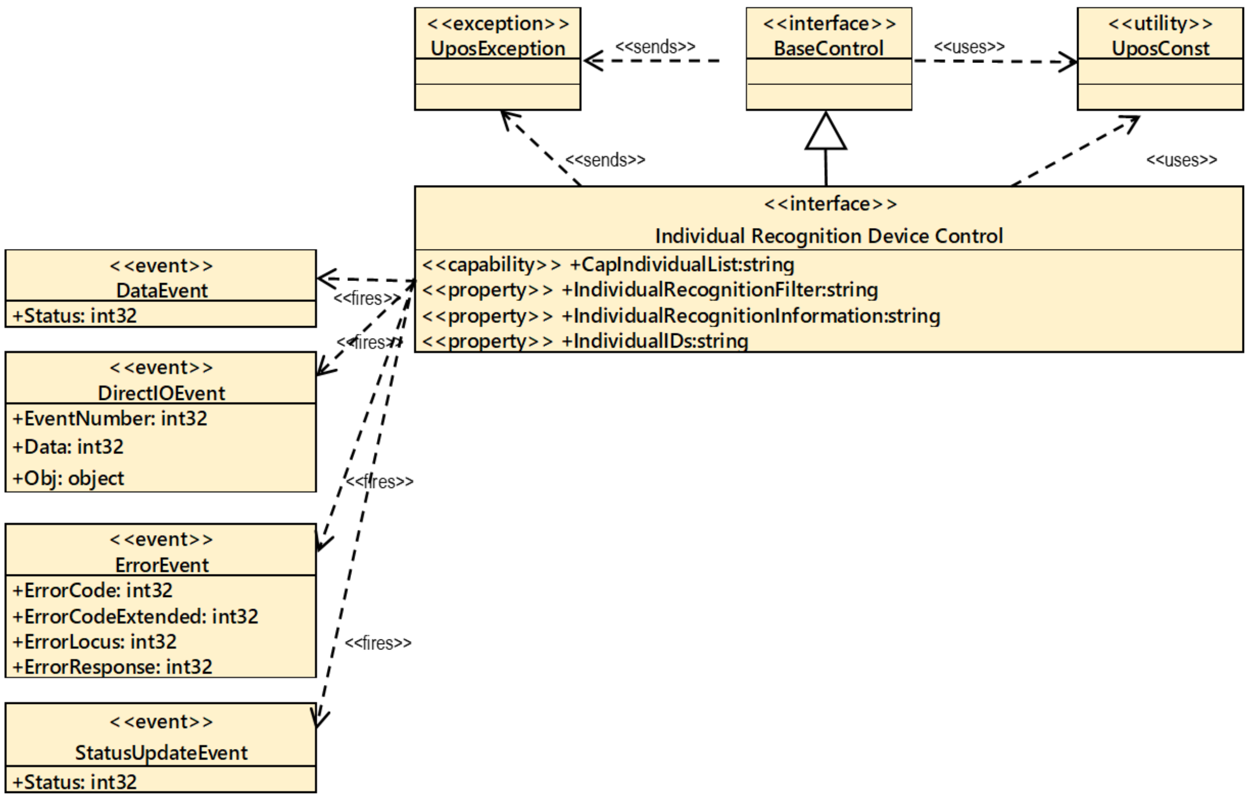


Fig. Chap.40-1 Individual Recognition Class Diagram

Model

The Individual Recognition follows the general “Device Input Model” for event-driven input:

Input Model

• When an individual is recognized by this device, a **DataEvent** is delivered to the application after the **IndividualIDs** property was set to indicate the recognized individuals.

• Identifiable individuals are indicated by the **CapIndividualList** property.

• Check the functions supported by the device, set validity / invalidity, etc. with the **IndividualRecognitionInformation** property.

• Recognized data is stored in the **IndividualRecognitionInformatio**n property, **IndividualIDs** property.

• How to recognize the individuals depends on the IndividualRecognitionFilter function, therefore, please refer to the IndividualRecognitionFilter section.

• Other device behavior about this device supports the general device input model as listed below.

• If the **AutoDisable** property is true, then the device automatically disables itself when a **DataEvent** is enqueued.

• An enqueued **DataEvent** can be delivered to the application when the **DataEventEnabled** property is true and other event delivery requirements are met. Just before delivering this event, data is copied into corresponding properties, and further data events are disabled by setting **DataEventEnabled** to false. This causes subsequent input data to be enqueued while the application processes the current input and associated properties. When the application has finished processing the current input and is ready for more data, it reenables events by setting **DataEventEnabled** to true.

• An ErrorEvent (or events) is enqueued if an error occurs while gathering or processing input and is delivered to the application when **DataEventEnabled** is true and other event delivery requirements are met.

• The **DataCount** property may be read to obtain the total number of enqueued **DataEvent**s.

• All enqueued input may be deleted by calling **clearInput** method. See the **clearInput** method description for more details.

• All data properties that are populated, as a result of firing a **DataEvent** or **ErrorEvent** can be set back to their default values by calling the **clearInputProperties** method.

• The application will be informed about any status change with a **StatusUpdateEvent,** also all corresponding status properties will be updated before event delivery.

Device Sharing

The Individual Recognition is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before the device begins reading input.
- See the “Summary” table for precise usage prerequisites.

IndividualRecognitionFilter

The **IndividualRecognitionFilter** property defines the following data as information for the individual recognition function of Individual Recognition Device.

- Various support function existence or not.
  (Supported functions are defined by the device)
- Enable, disable status of various functions.
- Types handled by various functions (examples: “male”, “female” of gender recognition)
- Filter setting of various functions.

The following data is defined in the IndividualRecognitionInformation property

- Individual Recognition input data

The device defines the individual recognition function information and the individual recognition input data.

The application refers to these contents to determine the support range and so on.
In addition, the application changes the enabled / disabled state of various functions, the filter setting, and controls each function.
The enabled / disabled state of the various functions set by the application, and the filter settings are applied by setting the **DeviceEnabled** property to true and enabling the individual recognition function.
When the application set various functions, it is possible to specify and set only the target ones.
The device fires a DataEvent based on the content set by the application and stores the input data in **IndividualRecognitionInformation** property.

IndividualRecognitionFilter Property Example Format

The IndividualRecognitionFilter property of the individual recognition device may define various information. Here is the example described by using the JSON format.

■ Basic Items

Key			Value	Value change capability	Explanation
IndividualRecognitionFilter			object	N	Information for the various individual recognition. Target device define the supporting individual recognition object.
	[IndividualRecognitionID]		object	N	Recognizable individual recognition information. Key name is the ID of recognized individual
	Enabled		boolean	Y	Enable or disable state of target individual recognition. Application can control the target individual recognition by referring or changing.
	Properties		object	N	Property information of the target individual recognition. Application control the target individual recognition by referring or changing the defined property value.
		[Property01]	-	-	
		[Property02]	-	-	
	Filters		object	N	Input data filter setting information. Application filter the target individual recognition input data by changing the defined value.
		[Filter01]	-	-	
		[Filter02]	-	-	

- Face Recognition device example

Key	Value	Value change capability	Explanation
IndividualRecognitionFilter	object	N	
Face	object	N	
Enabled	boolean	Y	
Properties	object	N	
FaceImageNamePrefix	string	Y	Output image file prefix for face recognition
Gender	object	N	Information on gender recognition
Enabled	boolean	Y	Gender recognition enable, disable state
CapTypeList	array	N	Type list (“female”, “male”)
Age	object	N	Information on age recognition.
Enabled	boolean	Y	Age recognition enable, disable state
Facial Expression	object	N	Information on facial expression recognition
Enabled	boolean	Y	Facial expression recognition enable, disable state.
CapTypeList	array	N	Type list (“smile”, “angry”,…)
Gaze	object	N	Information on gaze recognition
Enabled	boolean	Y	Gaze recognition enable, disable state.
CapTypeList	array	N	Type list (“gaze”, “nogaze”)
Distance	object	N	Information on distance recognition
Enabled	boolean	Y	Distance recognition enable, disable state
CapTypeList	array	N	Type list (“near”, “far”, “very far”,…)
NearLength	number	Y	Distance to recognize as “near”. A recognition event is fired when a person is recognized in the range from 0 to Near Length.
FarLength	number	Y	Distance to recognize as “far”, “very far”. A recognition event is fired when a person is recognized in the range from Near Length to Far Length. A recognition event is fired when a person is recognized in the range more than Far Length.
Authentication	object	N	Information on face authentication
Enabled	boolean	Y	Face authentication enable, disable state.
ImageList	array	Y	Image file name list for comparison.

			Event is fired when it matches the image specified here. (Wild card can be specified)
Filters	object	N	
Gender	object	N	Information on gender recognition filter.
TypeList	array	Y	Target Filter TypeList. Valid values are defined by CapTypeList. Recognition target is specified. To disable the filter, null should be assigned in its value.
Score	number	Y	Recognition score. Valid values are from 0 to 100. The range of the score specified here is the recognition target. To disable the filter, -1 should be assigned in its value.
Age	object	N	Information on age recognition.
Min	number	Y	Minimum age. The age below the specified is not a recognition target. To disable the filter -1 should be specified in its value.
Max	number	Y	Maximum age. The age above the specified is not a recognition target. To disable the filter -1 should be specified in its value.
Expression	object	N	Information on facial expression recognition filter.
TypeList	array	Y	Filter target type list. Valid values are defined in CapTypeList. Recognition target type is specified. To disable the filter null should be assigned in its value.
Score	number	Y	Recognition score. Valid values are from 0 to 100. The range of the score specified here is to be recognized. To disable the filter -1 should be assigned in its value.
Gaze	object	N	Information on gaze recognition filter
TypeList	array	Y	Filter target type list. Valid values are defined by CapTypeList. Recognition target is specified. To disable the filter, null should be assigned in its value.
Distance	object	N	Information on distance recognition filter
TypeList	array	Y	Filter target type list. Valid values are defined by CapTypeList. Recognition target is specified. To disable the filter, null should be assigned in its value.

IndividualRecognition Information Property Example Format

IndividualRecognitionInformation property of individual recognition device may define various information and here is the example format described by JSON.

- Basic Items

Key	Value	Value change capability	Explanation
IndividualRecognitionInformation	object	N	Various Individual recognition input data.
[IndividualRecognitionID]	object	N	Store the input data of individual recognition. Key name is ID of individual recognition.
Properties	Array <object>	N	Input data list of target individual recognition. The content of the data is different for each device or function.
[Data01]	-	-	
[Data02]	-	-	

- Face Recognition Device Example

Key	Value	Value change capability	Explanation
IndividualRecognitionInformation	object	N	
Face	object	N	
DataLists	array <object>	N	
FaceID	string	N	ID assigned to the recognized face
FaceImageName	string	N	Recognized face image file name
Gender	object	N	Recognized gender information
Type	string	N	Recognized type
Score	number	N	Confidence score of recognized type.
Age	object	N	Recognized age information
Age	number	N	Recognized age
Expression	object	N	Recognized facial expression information
Type	string	N	Recognized type. One of CapTypeList items is set.
Score	number	N	Confidence score of recognized type.
Gaze	object	N	A gaze list for each recognized face ID.
Type	string	N	Recognized type
Distance	object	N	Recognized distance information
Type	string	N	Recognized type. One of CapTypeList items is set.
Authentication	object	N	Authentication result information
ImageName	string	N	Matched image file name

Properties (UML attributes)

CapIndividualList Property

Syntax **CapIndividualList:** ***string*** **{read-only, access after open}**

Remarks Recognizable individual information is indicated by the list separated by a separator ",".

Each Individual information consists of the following information and is shown in the following order, separated with a colon (":").

Parameter	Meaning
IndividualID	An ID indicated an identifiable Individual
IndividualName	A Name of an Individual.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see "Errors" on page Intro-20.

See Also **IndividualIDs** Property

IndividualIDs Property

Syntax **IndividualIDs:** ***string*** **{read-only, access after open}**

Remarks Set the IndividualIDs recognizable Individual recognition device.

IndividualIDs values are indicated by separated with a colon (":").

Its value is set prior to a **DataEvent** being delivered to the application.

Errors A UposException may be thrown when this property is accessed. For further information, see "**Errors**" on page Intro-20.

See Also **CapIndividualList** Property

IndividualRecognitionFilter Property

Syntax **IndividualRecognitionFilter:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Individual Recognition Function Information:

- Supporting the various functions (Refer to the Individual Recognition Filter Example Format written by JSON and supported function examples .).
- Various Valid / Invalid State functions.
- Various handled function types. (e.g., "male" "female" in gender recognition, etc.).
- Various filter function settings. All Individual Recognition function data information is defined by the device. By referring to these contents, the application can determine the supporting scope. Thereby, the application can control each function by changing the valid / invalid state and / or the various filter function settings. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

IndividualRecognitionInformation Property

Syntax **IndividualRecognitionInformation:** ***string*** **{read-only, access after open}**

Remarks Holds data indicating the following. Individual recognition input data. All Individual recognition input data is defined by the device.

Errors A UposException may be thrown when this property is accessed.
For further information, see “**Errors**" on page Intro-20.

Events (UML interfaces)

DataEvent

<<event>> **upos::events::DataEvent**

Status : ***int32*****{read-only}**

Description Notifies the application when data from the Individual Recognition device is available to be read.

Attributes This event contains the following attributes:

Attribute	Type	Description
Status	*int32*	*Set to 0.*

Remarks Before this event is delivered, the data is copied into corresponding properties.

See Also **"Events"** on page Intro-19~~.~~

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber : ***int32* {read-only}**
Data : ***int32* {read-write}**
Obj : ***object* {read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Individual Recognition Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** method.

ErrorEvent

<<event>> **upos::events:: ErrorEvent**

ErrorCode	**:** ***int32*** **{read-only}**
ErrorCodeExtended	**:** ***int32*** **{read-only}**
ErrorLocus	**:** ***int32*** **{read-only}**
ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that an Individual Recognition Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. See values below.
ErrorResponse	*int32*	*Error Response, whose default value may be overridden by the application. (i.e., this attribute is settable).* See *ErrorResponse* below for values.

The *ErrorLocus* attribute has one of the following values:

Value	Meaning
EL_INPUT	Error occurred while gathering or processing event-driven input. No previously buffered input data is available.
EL_INPUT_DATA	Error occurred while gathering or processing event-driven input, and some previously buffered data is available.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_CLEAR	Valid for all locus: EL_INPUT, EL_INPUT_DATA. Clear all buffered input or output data (including all asynchronous output). The error state is exited. This is the default response when the locus is EL_INPUT.
ER_CONTINUEINPUT	Only valid when the locus is EL_INPUT_DATA. Acknowledges that a data error has occurred and directs the Device to continue input processing. The Device remains in the error state and will deliver additional **DataEvent**s as directed by the **DataEventEnabled** property. When all input has been delivered and **DataEventEnabled** is again set to true, then another **ErrorEvent** is delivered with locus EL_INPUT. This is the default response when the locus is EL_INPUT_DATA.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state. Input error events are not delivered until **DataEventEnabled** is true, so that proper application sequencing occurs.

Unlike a **DataEvent**, the Device does not disable further **DataEvent**s or input **ErrorEvent**s; it leaves the **DataEventEnabled** property value at true. Note that the application may set **DataEventEnabled** to false within its event handler if subsequent input events need to be disabled for a period of time.

See Also **"Device Input Model"** on page Intro-22, **"Error Handling"** on page Intro-23

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status : *int32* {read-only}

Description *Notifies the application that there is a change in the power status or a status of the Individual Recognition device.*

Attributes This event contains the following attribute:

Attribute	Type	Description
Status	*int32*	Indicates a change in the power status of the unit.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values

For communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Remarks Enqueued when the Individual Recognition Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19

CHAPTER 41

Sound Recorder

This Chapter defines the Sound Recorder device category.

Summary

Properties(UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	open
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	open
DataEventEnabled:	*boolean*	{read-write}	1.16	open
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	***Not supported***
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	open
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAssociatedHardTotalsDevice:	*string*	{read-only}	1.16	open
CapChannel:	*boolean*	{read-only}	1.16	open
CapRecordingLevel:	*boolean*	{read-only}	1.16	open
CapSamplingRate:	*boolean*	{read-only}	1.16	open
CapSoundType:	*boolean*	{read-only}	1.16	open
CapStorage	*int32*	{read-only}	1.16	open
Channel:	*string*	{read-write}	1.16	open, claim & enable
ChannelList:	*string*	{read-only}	1.16	open
RecordingLevel:	*int32*	{read-write}	1.16	open, claim & enable
RemainingRecordingTimeInSec:	*int32*	{read-only}	1.16	open, claim & enable
SamplingRate:	*string*	{read-write}	1.16	open, claim & enable
SamplingRateList:	*string*	{read-only}	1.16	open
SoundData:	*binary*	{read-only}	1.16	open
SoundType:	*string*	{read-write}	1.16	open, claim & enable
SoundTypeList:	*string*	{read-only}	1.16	open
Storage	*int32*	{read-write}	1.16	open, claim & enable

Methods(UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16

Methods (UML operations)(continued)

Common

Name	*Version*
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16

clearOutput ( ):
 void { }
	Not supported

compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	*Version*
startRecording (FileName: *string***, OverWrite:** *boolean***, RecordingTime:***int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
stopRecording ( ): **Void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent			1.16
Status:	*int32*	{read-only}	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
***pErrorResponse:**	*int32*	{read-write}	
upos::events::OutputCompleteEvent		***Not supported***	1.16
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Sound Recorder programmatic name is "Sound Recorder".

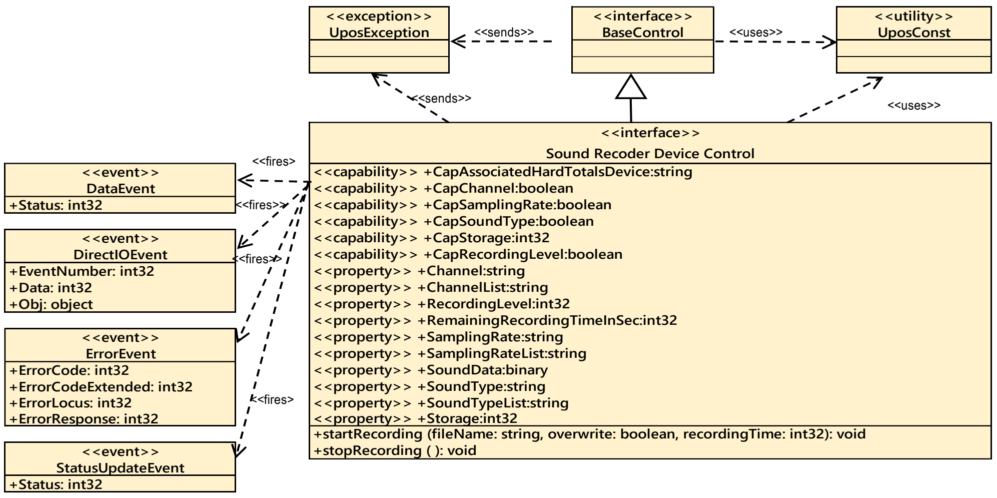
Capabilities

The Sound Recorder has the following capability:

Record the real-time audio to a file, deliver the recorded sound data to the property that application may read and / or retrieve, and save the recorded sound data file to device memory and / or other storage devices.

Sound Recorder Class Diagram

The following diagram shows the relationships between the Sound Recorder classes.



<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<sends>>
<<uses>>
<<interface>>
Sound Recoder Device Control
<<capability>> +CapAssociatedHardTotalsDevice:string
<<capability>> +CapChannel:boolean
<<capability>> +CapSamplingRate:boolean
<<capability>> +CapSoundType:boolean
<<capability>> +CapStorage:int32
<<capability>> +CapRecordingLevel:boolean
<<property>> +Channel:string
<<property>> +ChannelList:string
<<property>> +RecordingLevel:int32
<<property>> +RemainingRecordingTimeInSec:int32
<<property>> +SamplingRate:string
<<property>> +SamplingRateList:string
<<property>> +SoundData:binary
<<property>> +SoundType:string
<<property>> +SoundTypeList:string
<<property>> +Storage:int32
+startRecording (fileName: string, overwrite: boolean, recordingTime: int32): void
+stopRecording ( ): void
<<fires>
<<event>>
DataEvent
+Status: int32
<<fires>>
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<event>>
ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>
<<event>>
StatusUpdateEvent
+Status: int32

Fig. Chap. 41-1 Sound Recorder Class Diagram

Model

Sound Recorder Control follows a general “Device Input Model” in a broad sense. One point of difference is that the Sound Recorder device required the execution of methods to start and stop the sound recording process and creates a sound data file in real time, deliver the data to the property and save the file in device and / or associated storage device.

The Sound Recorder Model defines the following behavior: Sound Recorder device controls the Sound Recorder device to set the input (recording) conditions, specifies the start / end of input data acquisition by the method. And makes the sound data file in real time from the acquired audio and delivers the data to the appropriate property. At the same time, saves the recorded data file in device and /or associated storage devices.

“Sound Recorder” device control starts recording with the **startRecording** method.
Prior to execute the **startRecording** method each value setting of **Channe**l property, **SamplingRate** property, and **RecordingLevel** property are required, if each of **CapChannel** property **CapSamplingRate** property is true. And also need to set the **DataEventEnabled** property to true. At the same time, the recording format setting starts with the **SoundType** property value, if **CapSoundType** property is true.

The recording ends after the specified time has elapsed or when **stopRecording** method is called or when **clearInput** method is called. The generated sound data file will be recorded for either the host file or the Hard Totals device or both, after the end of recording. And generated sound data will be delivered to the **SoundData** property. Just after the delivery of sound data to the property, when the DataEventEnabled property is true, the **DataEvent** is enqueued and delivered to the application.

If the **AutoDisable** property is true, the device will automatically disable itself after the **DataEvent** is enqueued.

The remaining recording time in seconds can be obtained from the property **RemainingRecordingTimeInSec**

StatusUpdateEvent with status SERC_SUE_START_SOUND_RECORDING is evoked when **startRecording** method is executed to notify the application that recording state with has started.

When the sound recording is finished, if the specified time of **startRecording** method has elapsed or **stopRecording** method has been called, a **StatusUpdateEvent** with status SERC_SUE_STOP_SOUND_RECORDING is evoked to notify the application that recording has been stopped.

An enqueued **DataEvent** can be delivered to the application when the **DataEventEnabled** property is true and other event delivery requirements are met. Just before enqueuing this event, the device provides the recorded data to the **SoundData** property and disables further data events by setting the **DataEventEnabled** property to false. This causes subsequent input data to be buffered by the device while the application processes the current input and associated properties. When the application has finished processing the current input and is ready for more data, it re-enables events by setting **DataEventEnabled** to true.

If **ErrorEvent** response is ER_CONTINUEINPUT, the process of input processing continues. However, as long as the cause of the error is not resolved, the **ErrorEvent** will occur again immediately.

If **ErrorEvent** is ER_CLEAR, the input processing process is terminated, and the record is discarded.

If the time specified by the **startRecording** method is FOREVER (-1), execution will continue until the **stopRecording** method is called in the application. When **stopRecording** is called, the previous recording data is recorded to the host file, the Hard Totals device~~,~~ or both, with the specified file name, and the sound data will be delivered to the **SoundData** property. When DataEventEnabled property is true, the **DataEvent** is enqueued and delivered to the application.

Only one call to **startRecording** method can be in progress at a time. An attempt to nest sound recorder operations will result in an **UposException** being thrown.

If Error occurs during the execution of the **startRecording** method application should call the stopRecording method to terminate the recording process or cancel the recording process by calling the **clearInput** method before ending the **ErrorEvent** processing. After this when the **stopRecording** method is called, the recording data until just before the **ErrorEvent** occurs is recorded to the host file, the Hard Totals device, or both. When **DataEventEnabled** property is true, the **DataEvent** is enqueued and delivered to the application.

If there is no Error during the execution of **startRecording** method can terminate the recording process and can stop the recording at any time. When the **stopRecording** method is called, the recording data until just before the method call is recorded to the host file, the Hard Totals or both. When **DataEventEnabled** property is true, the **DataEvent** is enqueued and delivered to the application.

All input data enqueued by the device may be deleted by calling the **clearInput** method.

All data properties that are populated as a result of a **DataEvent** or **Error Event** can be set back to their default values by calling the **clearInputProperties** method.

The device may have the ability to write encoded sound data files to either the Hard Totals devices or the host file system, or both, and the **CapStorage** property will show the device's data storage location capability.

If device supports either or both Hard Totals devices and the host file system, the application should set the **Storage** property accordingly to tell where to write the encoded sound data file.

If device needs to be able to write the encoded sound data to an associated Hard Totals device, the **CapAssociatedHardTotalsDevice** property holds the open name of the associated Hard Totals device.

Device Sharing

The Sound Recorder is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.
- See the "Summary" table for precise usage prerequisites.
- The image display mode of the graphics device control is as follows.

Properties(UML attributes)

CapAssociatedHardTotalsDevice Property

Syntax **CapAssociatedHardTotalsDevice:** ***string*** **{read-write, access after open}**

Remarks Holds the open name of the associated Hard Totals device, if the device is able to write to such devices which is the case if **CapStorage** is either SREC_CST_ALL or SREC_CST_HARDTOTALS_ONLY. If **CapStorage** is SREC_CST_HOST_ONLY this property value must be the empty string. This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **CapStorage** Property

CapChannel Property

Syntax **CapChannel:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the channel.
If false, the application cannot change the channel.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **Channel** Property

CapSamplingRate Property

Syntax **CapSamplingRate:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the sampling rate.
If false, the application cannot change the sampling rate.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **SamplingRate** Property.

CapSoundType Property

Syntax **CapSoundType:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the sound file type.
If false, the application cannot change the sound file type.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **SoundType** Property.

CapStorage Property

Syntax **CapStorage:** ***int32*** **{read-only, access after open}**

Remarks This is an enumeration and announces where the device is able to write the recorded sound data file to.
It holds one of the following values.

Value	Meaning
SREC_CST_HARDTOTALS_ONLY	Only an associate Hard Totals device is supported.
SREC_CST_HOST_ONLY	Only the host's file system is supported.
SREC_CST_ALL	Both, the associated Hard Totals device and the host's file system is supported.

This property is initialized by the **open** method.

If a Hard Totals device is supported the **Storage** the property value should be SREC_CST_HARDTOTALS_ONLY or SREC_CST_ALL, and the property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **Storage** Property, **CapAssociatedHardTotalsDevice** Property

CapRecordingLevel Property

Syntax **CapRecordingLevel:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the recording level.
If false, the application cannot change the recording level.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **CapRecordingLevel** Property.

Channel Property

Syntax **Channel:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Holds the channel during recording.
Valid values are one of the values listed in the **ChannelList** property.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapChannel** Property, **ChannelList** Property

ChannelList Property

Syntax **ChannelList:** ***string*** **{read only, access after open}**

Remarks Contains the comma-delimited list of channels that is supported by the device.

For example, if the device only supports channel1and channel2 and channel4, then this property should be set to "1,2,4".
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **Channel** Property.

RecordingLevel Property

Syntax **RecordingLevel:** ***int32*** **{read-write, access after open- claim-enable}**

Remarks Holds the recording level during recording.
Legal values range from zero through 100.
This property is initialized by the **open** method**.**

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapRecordingLevel** Property

RemainingRecordingTimeInSec Property

Syntax **RemainingRceordingTimeInSec:**
int32 **{read-only, access after open-claim-enable}**

Remarks This property holds the remaining recording time in seconds if a recording is ongoing. If no recording is ongoing its value is 0. When a call to method **startRecording** returns, this property initially holds the time passed as argument *recordingTime* to that call. If this argument value is FOREVER, this property also holds this value unchanged until **stopRecording** has been called.

This property is initialized during device **setDeviceEnbaled** method to 0.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **startRecording** Method**, stopRecording** Method

SamplingRate Property

Syntax **SamplingRate:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Holds the sampling rate during recording.
Valid values are one of the values listed in the **SamplingRateList** property.
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **CapSamplingRate** Property, **SamplingRateList** Property Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

SamplingRateList Property

Syntax **SamplingRateList:** ***string*** **{read only, access after open}**

Remarks Contains the comma-delimited list of sampling rate that are supported by the device.
For example, if the device only supports 44.1kHz and 48kHz and 96kHz, then this property should be set to "44100,48000,96000".
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **SamplingRate** Property.

SoundData Property

Syntax **SoundData:** ***binary*** **{ read-only, access after open }**

Remarks This property is used to store the sound data after the recording time elapse of startRecording method or stopRecording method is called. If no recorded sound data was available, the **SoundData** property will be set to zero length (or empty). Its value is set prior to a **DataEvent** to be enqueued**.** This property is initialized to zero length by the **open** method.

Errors A UposException may be thrown when this property is accessed.
For further information, see **“Errors"** on page Intro-21.

See Also **startRecording** Method, **stopRecording** Method, **DataEvent**.

SoundType Property

Syntax **SoundType:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Holds the audio file format to be recorded.
Valid values are one of the values listed in the **CapSoundTypeList** property.
This property is initialized by the open **method**.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20. Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapSoundType** Property, **CapSoundTypeList** Property.

SoundTypeList Property

Syntax **SoundTypeList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of sound file type that is supported by the device.
For example, if the device only supports WAV and OGG, then this property should be set to "WAV,OGG".
This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **SoundType** Property.

Storage Property

Syntax **Storage:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks This is an enumeration and defines where the device writes the recorded sound data file to. Should be set before a call to **startRecording**.
It holds one of the following values.

Value	Meaning
SREC_ST_HARDTOTALS	The encoded data file is written to the associated Hard Totals device. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.
SREC_ST_HOST	The encoded data file is written to the host's file system.
SREC_ST_HOST_HARDTOTALS	The encoded data file is written to the associated Hard Totals device and host's file system. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

This property is initialized by the **open** method according to the value hold by **CapStorage**. If **CapStorage** has the value SREC_CST_ALL, it is initialized to SREC_ST_HOST_HARDTOTALS.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified, or recording is ongoing.

See Also **CapStorage** Property, **CapAssociatedHardTotalsDevice** Property

Methods(UML operations)

startRecording Method

Syntax **startRecording (fileName:** *string*, **overWrite:** *boolean*,
recordingTime: *int32*)**:**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the file name of the sound to be recorded.
overWrite	Specify the behavior when the same name file exists. If it is true it will be overwritten and if false it will raise the UPOSException.
recordingTime	Specify the time for recording in seconds. If FOREVER (-1) is specified, recording will continue until the **stopRecording** method is called.

Remarks Sound recording starts with the settings of the **Channel** property, **SamplingRate** property, and **RecordingLevel** property and need to set **DataEventEnabled** property to true. At the same time, recording format setting starts with the **SoundType** property. When this method is called, if specified recording time is elapsed, recording process will be ended and recorded sound data is provided at the **SoundData** property that the application may read it and / or process the stored sound data file given as *filename* argument. When the **DataEventEnabled** property is true, the **DataEvent** is enqueued and delivered to the application. **StatusUpdateEvent** with state SREC_SUE_START_SOUND_RECORDING is evoked when **startRecording** method is executed to notify the application, the recording has started. When the sound recording is finished, if the specified time of **startRecording** method has elapsed or **stopRecording** method has been called, the value of **StatusUpdateEvent** with state SREC_SUE_STOP_SOUND_RECORDING is evoked to notify the application, the recording has stopped

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	FileName is too long or contains characters that cannot be used, or 0 is specified for RecordingTime.
E_EXISTS	FileName already exists. (When OverWrite is FALSE)
E_BUSY	It cannot be executed as it is recording.

See Also **Channel** Property, **SamplingRate** Property, **SoundData** Property, **SoundType** Property, **RecordingLevel** Property, **stopRecording** Method, **StatusUpdateEvent** Event

stopRecording Method

Syntax **stopRecording ():**
void {raises-exception, use after open-claim-enable}

Remarks When this method is called the sound recording process that started by **startRecording** method is ended and the recording is finished. This method is processed synchronously. After recording and decoding process has been finished, the recorded sound data will be provided at the **SoundData** property prior to the Data Event is enqueued, when **DataEventEnabled** property is true. When **stopRecording** method is called, a **StatusUpdateEvent** with status SREC_SUE_STOP_SOUND_RECORDING is evoked to notify the application, the recording has stopped.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20 Some possible values of the exception's *ErrorCode* property are:

Value	**Meaning**
E_ILLEGAL	It is not recorded.

See Also **StartRecording** Property, **SoundData** Property, **StatusUpdateEvent**. Event

Events(UML interfaces)

DataEvent

<<event>> **upos::events::DataEvent**

Status :*int32*{**read-only**}

Description Notifies the application when data from the Sound Recorder device is available to be read.

Attributes This event contains the following attributes:

Attribute	Type	Description
Status	*int32*	*Set to 0.*

Remarks Before this event is delivered, the Sound Recorder information is enqueued into the area that is indicated by the startRecording method. Since the stored sound recorder device information might be managed by the associated "Hard Totals" device service, therefore, the application might also support the "Hard Totals" service.

See Also **Channel** Property, **SamplingRate** Property, **SoundType** property, **RecordingLevel** Property, **stopRecording** Method, **startRecording** Method

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber : ***int32*** **{read-only}**
Data : ***int32*** **{read-write}**
Obj : ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Individual Recognition Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** method.

ErrorEvent

<<event>>	**upos::events:: ErrorEvent**	
	ErrorCode	**:** ***int32*****{read-write}**
	ErrorCodeExtended	**:** ***int32*****{read-write}**
	ErrorLocus	**:** ***int32*****{read-write}**
	***pErrorResponse**	**:** ***int32*****{read-write}**

Description Notifies the application that a Sound Recorder Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains following attributes.

Attributes	Type	Description
Error Code	*int32*	Error Code causing the error event. See the list of Error Code.
ErrortCodeExtended	*int32*	Error Code causing the error event. These values are device category specific.
ErrorLocus	*int32*	Location of the error. See values below.
pErrorResponse	*int32*	Pointer to the error event response. See *ErrorResponse* values below.

The ErrorLocus attribute has one of the following values:

Value	Meaning
EL_INPUT	Error occurred while gathering or Processing event-driven input. No previously buffered input data is available.
EL_INPUT_DATA	Error occurred while gathering or processing event-driven input, and some previously buffered data is available.

If ResultCode is E_EXTENDED, ***ResultCodeExtended*** *is set to one of the following values.*

Value	Meaning
ESREC_NOROOM	There is not enough space to store the data file.

The application's error event handler can set the ErrorResponse attribute to one of the following values:

Value	Meaning
ER_CLEAR	I will try its asynchronous output again. The error condition is exited.
ER_CONTINUEINPUT	Only valid when the locus is EL_INPUT_DATA. Acknowledges that a data error has occurred and directs the Device to continue input processing. The Device remains in the error state and will deliver additional **DataEvents** as directed by the **DataEventEnabled** property. When all input has been delivered and **DataEventEnabled** is again set to true, then another **ErrorEvent** is delivered with locus EL_INPUT. This is the default response when the locus is EL_INPUT_DATA.

Remarks It notifies you when an error is detected during recording. Input error events are not delivered until **DataEventEnabled** is true, so that proper application sequencing occurs.

See Also "**Device Input Model**" on page Intro-22, **"Error Handling"** on page Intro-23

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status **:** ***int32*** **{read-only}**

Description *Notifies the application that there is a change in the power status or a status of the Sound Recorder device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change in the power status or a status of the unit.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
SREC_SUE_START_SOUND_RECORDING	It will be notified when sound recording starts.
SREC_SUE_STOP_SOUND_RECORDING	It will be notified when sound recording stops.

Remarks Enqueued when the Sound Recorder Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

C H A P T E R 4 2

Voice Recognition

This Chapter defines the Voice Recognition device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	open
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	open
DataEventEnabled:	*boolean*	{read-write}	1.16	open
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	***Not supported***
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapLanguage:	*boolean*	{read-only}	1.16	open
HearingDataPattern:	*string*	{read-only}	1.16	open, claim & enable
HearingDataWord:	*string*	{read-only}	1.16	open, claim & enable
HearingDataWordList:	*string*	{read-only}	1.16	open, claim & enable
HearingResult:	*int32*	{read-only}	1.16	open, claim & enable
HearingStatus:	*int32*	{read-only}	1.16	open, claim & enable
LanguageList:	*string*	{read-only}	1.16	open

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32* **):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32* **):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16
clearOutput ( ): **void { }**	***Not supported***
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Methods (UML operations)(continued)

Common

Name	*Version*
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	
startHearingFree (language: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
startHearingSentence (language: *string,* **wordList:** *string,* **patternList:** *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
startHearingWord (language: *string,* **wordList:** *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
startHearingYesNo (language: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
stopHearing ( ): **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent			1.16
Status:	*int32*	{read-only}	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse:	*int32*	{read-write}	
upos::events::OutputCompleteEvent		***Not supported***	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Voice Recognition programmatic name is "Voice Recognition".

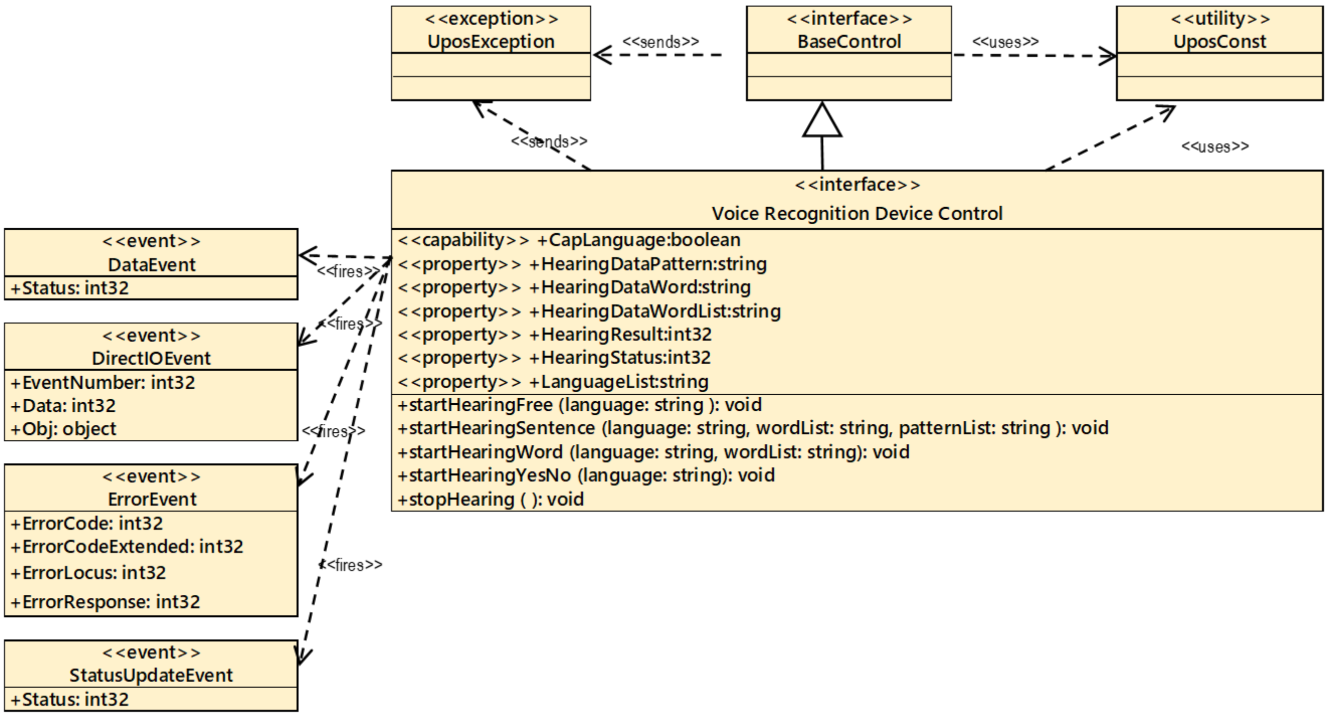
Capabilities

The Voice Recognition has the following capability:

- Convert spoken words to strings.

Voice Recognition Class Diagram

The following diagram shows the relationships between the Voice Recognition classes.



<<exception>> UposException
<<sends>>
<<interface>> BaseControl
<<uses>>
<<utility>> UposConst
<<sends>>
<<uses>>
<<interface>> Voice Recognition Device Control
<<capability>> +CapLanguage:boolean
<<property>> +HearingDataPattern:string
<<property>> +HearingDataWord:string
<<property>> +HearingDataWordList:string
<<property>> +HearingResult:int32
<<property>> +HearingStatus:int32
<<property>> +LanguageList:string
+startHearingFree (language: string): void
+startHearingSentence (language: string, wordList: string, patternList: string): void
+startHearingWord (language: string, wordList: string): void
+startHearingYesNo (language: string): void
+stopHearing ( ): void
<<event>> DataEvent
+Status: int32
<<fires>>
<<event>> DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<event>> ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>> StatusUpdateEvent
+Status: int32
<<fires>>

Fig. Chap. 42-1 Voice Recognition Class Diagram

Model

The Voice Recognition follows the general “Device Input Model” for event-driven input:

Device control starts voice recognition with the **startHearingYesNo** method, **startHearingSentence** method, etc., and generates **DataEvent** when recognizing voice.

If the **AutoDisable** property is true, then the device automatically disables itself when a **DataEvent** is enqueued.

An enqueued **DataEvent** can be delivered to the application when the **DataEventEnabled** property is true and other event delivery requirements are met. Just before delivering this event, data is copied into corresponding properties, and further data events are disabled by setting **DataEventEnabled** to false. This causes subsequent input data to be enqueued while the application processes the current input and associated properties. When the application has finished processing the current input and is ready for more data, it reenables events by setting **DataEventEnabled** to true.

An **ErrorEvent** (or events) is enqueued if an error occurs while gathering or processing input, and is delivered to the application when **DataEventEnabled** is true and other event delivery requirements are met.

The **DataCount** property may be read to obtain the total number of enqueued DataEvents.

All enqueued input may be deleted by calling **clearInput** method. See the **clearInput** method description for more details.

All data properties that are populated as a result of firing a **DataEvent** or **ErrorEvent** can be set back to their default values by calling the **clearInputProperties** method.

The application will be informed about any status change with a **StatusUpdateEvent**, also all corresponding status properties will be updated before event delivery.

Types of voice recognition

Voice recognition is mainly a method of specifying word candidates to be recognized and waiting for those words.

There are the following four types of voice recognition.

<u>Yes/No/Cancel recognition</u>

It listens to the sound of words classified as Yes / No / Cancel defined by the device.

For example, the voice ""OK."" is classified as Yes.

The recognized content is set in the HearingDataWord property.

For details, refer to the **startHearingYesNo** method.

<u>Word recognition</u>

The application specifies a list of words and listens for the voice of that word.

The recognized content is set in the **HearingDataWord** property.

For details, refer to the **startHearingWord** method.

Sentence recognition

The application specifies a word and a list of patterns of the sentences using it and awaits the sound of the sentence.

The recognized content is set in the HearingDataWordList property, **HearingDataPattern** property.

For details, see the **startHearingSentence** method.

Free recognition

Voice recognition leave to the device is performed without specifying the word to wait.

It does not specify waiting words and performs voice recognition entrusted to the device.

The recognized content is set in the **HearingDataWord** property.

For details, see the **startHearingFree** method.

When recognizing voice, the kind of recognition was stored in the **HearingResult** property.

Device Sharing

The Voice Recognition is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.
- See the “Summary” table for precise usage prerequisites.

Properties (UML attributes)

CapLanguage Property

Syntax **CapLanguage:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the language. If false, the application cannot change the language.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

HearingDataPattern Property

Syntax **HearingDataPattern:** ***string*** **{read-only, access after open-claim-enable}**

Remarks The pattern ID recognized by the **startHearingSentence** method is set.
This property is set by the device control just before the **DataEvent** is enqueued.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **startHearingSentence** Method

HearingDataWord Property

Syntax **HearingDataWord:** ***string*** **{read-only, access after open-claim-enable}**

Remarks The content of voice recognition is set.
This property is set as input data of the following method. To know which method it is for, check the **HearingResult** property.

Methods	Meaning
startHearingYesNo Method	The recognized word is set.
startHearingWord Method	Recognized words are set among the word candidates specified by the **startHearingWord** method.
startHearingFree Method	Recognized words and sentences are set. The alphabet 's uppercase letters, Japanese kanji, hiragana, katakana, etc., the contents to be set varies depending on the device.

This property is set by the device control just before the **DataEvent** is enqueued.

Errors A **UposException** may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See Also **HearingResult** Property**, startHearingYesNo** Method**,**

startHearingWord Method**, startHearingFree** Method

HearingDataWordList Property

Syntax **HearingDataWordList:** ***string*** **{read-only, access after open-claim-enable}**

Remarks Comma-separated list of word information recognized by the **startHearingSentence** method.
Each word information consists of the following information and is shown in the following order separated by a colon (":").

Parameter	Description
WordGoupID	Recognized word group ID
Word	Recognized words. The content defined in the word group is set.

For example, in the **startHearingSentence** method, set candidates as follows,
Word list:"item:coffee:tea, count:a:two:three"

Pattern list: "P1:[count] cup of [item], P2:[item]"
startHearingSentence ("en-US", "item:coffee:tea, count:a:two", "P1:[count] cup of [item],P2:[item]")

If you speak "Give me two cups of coffee", device recognize “Pattern” as "P1" and “WordList” as "item:coffee, count:two".

The properties are set as follows,
HearingDataPattern="P1";
HearingDataWordList="item:coffee, count:two";

This property is set by the device control just before the **DataEvent** is enqueued.

Errors A **UposException** may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **startHearingSentence** Method

HearingResult Property

Syntax **HearingResult:** ***int32*** **{read-only, access after open-claim-enable}**

Remarks A value indicating the voice recognition result is set.
The parameters to be set are as follows.

Value	Meaning
VRCG_HRESULT_YESNO_YES	Voice recognition result of **StartHearingYesNo** methods. Also, Device got an answer that is classified as YES. The recognized content is set in the **HearingDataWord** property.
VRCG_HRESULT_YESNO_NO	Voice recognition result of **startHearingYesNo** method. Also, Device got an answer that is classified as NO. The recognition content is set in the **HearingDataWord** property.
VRCG_HRESULT_YESNO_CANCEL	Voice recognition result of **startHearingYesNo** method. Also, Device got responses that are classified as CANCEL. The recognition content is set in the **HearingDataWord** property.
VRCG_HRESULT_WORD	Recognition result of **startHearingWord** method. The recognition content is set in the **HearingDataWord** property.
VRCG_HRESULT_SENTENCE	Recognition result of **startHearingSentence** method. The recognition content is set in the **HearingDataWordList** property and **HearingDataPattern** property.
VRCG_HRESULT_FREE	Recognition result of **startHearingFree** method. The recognition content is set in the **HearingDataWord** property.

This property is set by the device control just before the **DataEvent** is enqueued.

Errors A **UposException** may be thrown when this property is accessed.
For further information, see **"Errors"** on page Intro-20.

See Also **HearingDataWord** Property**, HearingDataWordList** Property**, HearingDataPattern** Property**, startHearingYesNo** Method**, startHearingWord** Method**, startHearingSentence** Method**, startHearingFree** Method.

HearingStatus Property

Syntax **HearingStatus:** ***int32*** **{read-only, access after open-claim-enable}**

Remarks A value indicating the voice recognition status is set.

Value	Meaning
VRCG_HSTATUS_NONE	Voice recognition is not running.
VRCG_HSTATUS_YESNO	Voice recognition by the **startHearingYesNo** method is in progress.
VRCG_HSTATUS_WORD	Voice recognition by the **startHearingWord** method is in progress.
VRCG_HSTATUS_SENTENCE	Voice recognition by the **startHearingSentence** method is in progress.
VRCG_HSTATUS_FREE	Voice recognition by the **startHearingFree** method is in progress.

This property is initialized by the **open** method. Also, it is set by the device control just before the voice recognition state changes.

Errors A **UposException** may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **startHearingYesNo** Method**, startHearingWord** Method**, startHearingSentence** Method**, startHearingFree** Method

LanguageList Property

Syntax **LanguageList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of language that are supported by the device. The value representing the language is a value consisting of the language and country code defined in RFC 4664.
For example, when the device supports US / English, Japan / Japanese, it will be as follows.
"en-US, ja-JP"
This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **startHearingYesNo** Method**, startHearingWord** Method**, startHearingSentence** Method**, startHearingFree** Method.

Methods (UML operations)

startHearingFree Method

Syntax **startHearingFree (language:** ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
Language	Specify the language to recognize. Specify one of the values listed in the **LanguageList** property.

Remarks This method can make a voice recognition from the listed language in the **LanguageList** property. In addition, this method can be called without specifying the word candidate to be recognized from the application, however recognized word depends on the word recognizing device capability. When this method is called, proper values are set in the **HearingDataWord** property, **HearingResult** property and **HearingStatus** property just before the **DataEvent** issuing. This method is executed asynchronously. Voice recognition ends when **stopHearing** method is called.

Errors A **UposException** may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.

Some possible values of the exception’s **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.
E_BUSY	Voice recognition in progress so it cannot be executed.

See Also **HearingDataWord** Property, **HearingResult** Property, **HearingStatus** Property, **LanguageList** Property**, stopHearing** Method.

startHearingSentence Method

Syntax **startHearingSentence (language:** ***string*****, wordList:** ***string*****,**
patternList: ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
language	Specify the language to recognize. Specify one of the values listed in the **LanguageList** property.
wordList	Specify word candidates to be waited on in a comma-separated list.
patternList	Specify the sentence pattern information to be waited for in a comma-separated list.

Each word information specified in wordList consists of the following information and is shown in the following order, separated by a colon (":").

Parameter	Description
wordGroupID	ID to identify word list
wordList	A word candidate to be waited for being separated by a colon (":")

For example, to specify word candidates "one" and "two" for word candidate's "coffee" "tea" and word group "number" in the single item group "product", specify as follows. "item:coffee:tea, number:one:two"

Each word information specified in patternList consists of the following information, and it is shown in the following order separated by a colon (":").

Parameter	Description
patternID	ID to identify the pattern
pattern	A sentence pattern to wait. To add the word list specified in wordList to the candidate, enclose the word group ID with "[" and "]". Example: "[word group ID1]" [word group ID2] "

Example: You can order coffee or tea. You can also specify how many cups you need. If you want to recognize it by voice, do as follows.

Set the **startHearingSentence** method parameter as follows:
WordList:"item:coffee:tea, count:a:two:three"
Coffee, Tea -> item:coffee:tea
How many cups -> count:a:two:three

Invoke the method.
startHearingSentence ("en-US", "item:coffee:tea,count:a:two", "P1:[count] cup of [item],P2:[item]")
HearingStatus=VRCG_HSTATUS_SENTENCE;

People talk to "Give me two cups of coffee"

Speech recognition is performed, properties are set, and an event is notified.
HearingResult=VRCG_HRESULT_SENTENCE;
HearingDataPattern="P1";
HearingDataWordList="item:coffee,count:two";
raise **DataEvent**(0);

Remarks This method can make a voice recognition from the listed language in the **LanguageList** property. In addition, this method can recognize the words and sentences that are defined in *wordList* and *patternList* as parameter. When this method is called, proper values are set in the **HearingDataWord** property. **HearingResult** property and **HearingStatus** property, just before **DataEvent**

issuing. This method is executed asynchronously. Voice recognition ends when **stopHearing** method is called.

Errors A **UposException** may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.

Some possible values of the exception’s **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.
E_BUSY	Voice recognition in progress so it cannot be executed.

See Also **HearingDataWord** Property, **HearingResult** Property, **HearingStatus** Property, **LanguageList** Property**, stopHearing** Method

startHearingWord Method

Syntax **startHearingWord (language: *string*, wordList: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
language	Specify the language to recognize. Specify one of the values listed in the **LanguageList** property.
wordList	Specify word candidates to be waited on in a comma-separated list. Example: "word1, word2, word3"

Remarks This method can make a voice recognition from the listed language in the **LanguageList** property. In addition, this method can recognize the words that are defined in wordList as parameter. When this method is called, proper values are set in the **HearingDataWord** property, **HearingResult** property and **HearingStatus** property just before **DataEvent** issuing.

This method is executed asynchronously.

Voice recognition ends when **stopHearing** method is called.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.

Some possible values of the exception’s **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.
E_BUSY	Voice recognition in progress so it cannot be executed.

See Also **HearingDataWord** Property, **HearingResult** Property, **HearingStatus** Property, **LanguageList** Property**, stopHearing** Method.

startHearingYesNo Method

Syntax **startHearingYesNo (language:** ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
language	Specify the language to recognize. Specify one of the values listed in the **LanguageList** property.

Remarks This method can make a voice recognition from the listed language in the **LanguageList** property. In addition, this method can recognize the words that are defined in the device as the recognition candidate corresponding to "Yes" "No" "Cancel". When this method is called, proper values are set in the **HearingDataWord** property, **HearingResult** property and **HearingStatus** property, just before **DataEvent** issuing. This method is executed asynchronously. Voice recognition ends when **stopHearing** method is called.

Errors A **UposException** may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.
E_BUSY	Voice recognition in progress so it cannot be executed.

See Also **LanguageList** Property**, HearingDataWord** Property, **Hearing Result** Property, **LanguageList** Property**, stopHearing** Method.

stopHearing Method

Syntax **stopHearing ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Voice Recognition ends when this property called.

This method is executed synchronously.

Errors A **UposException** may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.

Events (UML interfaces)

DataEvent

<<event>> **upos::events::DataEvent**

Status **:** ***int32*****{read-only}**

Description Notifies the application when data from the Voice Recognition device is available to be read.

Attributes This event contains the following attributes:

Attribute	Type	Description
Status	*int32*	*Set to 0.*

Remarks Before this event is delivered, the voice recognition information is enqueued into the area that is indicated by the **startHearingXXX** kinds of methods.

See Also HearingResult Property, **"Events"** on page Intro-19, **StartHearingYesNo** Method**,** **StartHearingWord** Method**, StartHearingSentence** Method**, StartHearingFree** Method, **directIO** Method.

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber **:** ***int32*** **{read-only}**
Data **:** ***int32*** **{read-write}**
Obj **:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Voice Recognition Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** Method.

ErrorEvent

<<event>> **upos::events:: ErrorEvent**

ErrorCode	**:** ***int32*****{read-write}**
ErrorCodeExtended	**:** ***int32*****{read-write}**
ErrorLocus	**:** ***int32*****{read-write}**
ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Voice Recognition Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. See values below.
ErrorResponse	*int32*	Error response, whose default value may be overridden by the application (i.e., this attribute is settable). See values below.

The *ErrorLocus* attribute has one of the following values:

Value	Meaning
EL_INPUT	Error occurred while gathering or processing event-driven input. No previously buffered input data is available.
EL_INPUT_DATA	Error occurred while gathering or processing event-driven input, and some previously buffered data is available.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry sending the data. The error state is exited. May be valid for some input devices when the locus is EL_INPUT or EL_INPUT_DATA, which case the input is re-tried, and the error state is exited.
ER_CLEAR	Valid for all locus: EL_INPUT, EL_INPUT_DATA. Clear all buffered input data. The error state is exited. This is the default response when the locus is EL_INPUT.
ER_CONTINUEINPUT	Only valid when the locus is EL_INPUT_DATA. Acknowledges that a data error has occurred and directs the Device to continue input processing. The Device remains in the error state and will deliver additional **DataEvent**s as directed by the **DataEventEnabled** property. When all input has been delivered and **DataEventEnabled** is again set to true, then another **ErrorEvent** is delivered with locus EL_INPUT.

This is the default response when the locus is EL_INPUT_DATA.

Remarks This event is enqueued when an error is detected and the Device's **State** transitions into the error state. Input error events are not delivered until **DataEventEnabled** is true, so that proper application sequencing occurs.

Unlike a **DataEvent**, the Device does not disable further **DataEvent**s or input **ErrorEvent**s; it leaves the **DataEventEnabled** property value at true. Note that the application may set **DataEventEnabled** to false within its event handler if subsequent input events need to be disabled for a period of time.

See Also **"Device Input Model"** on page Intro-22, **"Error Handling"** on page Intro-23,

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status **:** ***int32*** **{read-only}**

Description *Notifies the application that there is a change in the power status or a status of the Voice Recognition device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change in the power status of the unit.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
VRCG_SUE_START_HEARING_FREE	It will be notified when hearing free starts.
VRCG_SUE_START_HEARING_SENTENCE	It will be notified when hearing sentence starts.
VRCG_SUE_START_HEARING_WORD	It will be notified when hearing word starts.
VRCG_SUE_START_HEARING_YESNO	It will be notified when hearing yesno starts.
VRCG_SUE_STOP_HEARING	It will be notified when hearing stops.

Remarks Enqueued when the Voice Recognition Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

CHAPTER 43

Sound Player

This Chapter defines the Sound Player device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.16	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	open
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	-
DeviceControlVersion:	*int32*	{read-only}	1.16	-
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAssociatedHardTotalsDevice	*string*	{read-only}	1.16	open
CapMultiPlay:	*boolean*	{read-only}	1.16	open
CapSoundTypeList:	*string*	{read-only}	1.16	open
CapStorage	*int32*	{read-only}	1.16	open
CapVolume:	*boolean*	{read-only}	1.16	open
DeviceSoundList:	*string*	{read-only}	1.16	open
OutputIDList:	*string*	{read-only}	1.16	open, claim & enable
Storage	*int32*	{read-write}	1.16	open, claim & enable
Volume:	*int32*	{read-write}	1.16	open, claim & enable

Methods (UML operations)

Common

Name	*Version*

open (logicalDeviceName: *string***):**
void {raises-exception}
	1.16

close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim }**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim }**	1.16

clearOutput ( ):
void { }
	Not supported

directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
compareFirmwareVersion (firmwareFileName: *string***, out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string* **):** **void {raises-exception, use after open, claim, enable}**	1.16

Methods (UML operations)(continued)

Common

Name	*Version*
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	*Version*
playSound (fileName: *string*, **loop:** *boolean***):** **void {raises-exception, use after open, claim, enable}**	1.16
stopSound(outputID:*int32***):** **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	1.16
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse:	*int32*	{read-write}	
upos::events::OutputCompleteEvent			1.16
OutputID:	*int32*	{read-only}	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	1.16

General Information

The Sound Player programmatic name is "Sound Player".

Capabilities

The Sound Player has the following capability:

- Play audio file.

Sound Player Class Diagram

The following diagram shows the relationships between the Sound player classes.

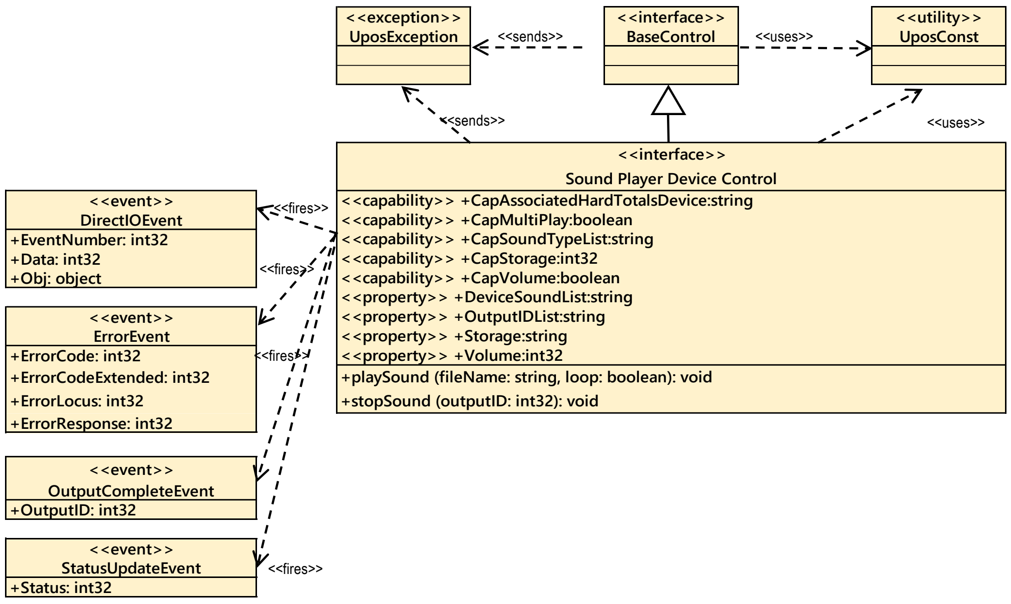

<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<sends>>
<<uses>>
<<interface>>
Sound Player Device Control
<<capability>> +CapAssociatedHardTotalsDevice:string
<<capability>> +CapMultiPlay:boolean
<<capability>> +CapSoundTypeList:string
<<capability>> +CapStorage:int32
<<capability>> +CapVolume:boolean
<<property>> +DeviceSoundList:string
<<property>> +OutputIDList:string
<<property>> +Storage:string
<<property>> +Volume:int32
+playSound (fileName: string, loop: boolean): void
+stopSound (outputID: int32): void
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<fires>>
<<event>>
ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>>
OutputCompleteEvent
+OutputID: int32
<<event>>
StatusUpdateEvent
+Status: int32
<<fires>>

Fig. Chap.43-1 Sound Player Class Diagram

Model

The Sound Player follows the general device behavior model for asynchronous output devices:

- The Device validates the method parameters and produces an error condition immediately if necessary. If the validation is successful, the Device does the following:
- Audio files will be played sequentially. When **playSound** method is called, device starts the playing sound that is specified by the method parameters and the requested sound file data placed in a queue and corresponding OutputID is stored at **OutputID** property and added to the **OutputIDList** property as a listed value. And sets the **OutputID** property to a unique integer identifier for this request.
- When the sound playing starts **StatusUpdateEvent** is evoked as the value of SPLY_SUE_START_PLAY_SOUND.
  When the sound playing is finished an **OutputCompleteEvent** is enqueued for the delivery to the application and corresponding OutputID is stored in **OutputID** property. At the same time, **StatusUpdateEvent** is evoked as the value of SPLY_SUE_STOP_PLAY_SOUND. The application should compare the returned **OutputCompleteEvent** property **OutputID** value with the **OutputID** value set by the asynchronous process method call used to send the data in order to track what data has been successfully sent to the device.
- When **stopSound** method is called, device stop the playing sound according to the OutputID property value and the current playing sound is terminated and enqueued sound file data is cleared. After this method is executed, corresponding **OutputID** property and **OutputIDList** values are not changed. No **OutputCompleteEvent** is fired and only **StatusUpdateEvent** will be evoked the value of SPLY_SUE_STOP_PLAY_SOUND.
- If an error occurs while processing a request, an **ErrorEvent** is enqueued which will be delivered to the application after the events already enqueued, including **OutputCompleteEvent**. No further asynchronous output will occur until the event has been delivered to the application. If the response is ER_CLEAR, then outstanding asynchronous output is cleared. If the response is ER_RETRY, then output is retried; note that if several outputs were simultaneously in progress at the time that the error was detected, then the Service may need to retry all of these outputs.
- Asynchronous output is always performed on a first-in first-out basis. If the device supports concurrent playback, the request will be executed simultaneously. To check if the device supports simultaneous playback, check the **CapMultiPlay** property.
- If the request is terminated before completion, due to reasons such as the application calling the **clearOutput** method, then no **OutputCompleteEvent** is delivered.
- Application can also delete the output individually by calling the **stopSound** method. Also, in this case **OutputCompleteEvent** will not be notified."
- The **CapSoundTypeList** property lists audio file types that the device can play.
- The application will be informed about any status change with a **StatusUpdateEvent**, also all corresponding status properties will be updated before event delivery.
- If device supports either or both of Hard Totals devices and the host file system, the application should set the **Storage** property accordingly to tell where to access the data file.
- If device needs to be able to access the audio files played with **playSound** method from a Hard Totals device, the **CapAssociatedHardTotalsDevice** property holds the open name of the associated Hard Totals device.

Device Sharing

The Sound Player is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.
- See the “Summary” table for precise usage prerequisites.

Properties(UML attributes)

CapAssociatedHardTotalsDevice Property

Syntax **CapAssociatedHardTotalsDevice:** ***string*** **{read-only, access after open}**

Remarks Holds the open name of the associated Hard Totals device if the device is able to write to such devices which is the case if **CapStorage** is either SPLY_CST_ALL or SPLY_CST_HARDTOTALS_ONLY. If **CapStorage** is SPLY_CST_HOST_ONLY this property value must be the empty string. This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see “Errors" on page Intro-20.

See Also **CapStorage** Property

CapMultiPlay Property

Syntax **CapMultiPlay:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can play sound simultaneously.

If false, the application cannot play sound simultaneously.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **playSound** Method.

CapSoundTypeList Property

Syntax **CapSoundTypeList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of file type that is supported by the device.

For example, if the device only supports WAV and OGG, then this property should be set to “WAV, OGG". This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **playSound** Method

CapStorage Property

Syntax **CapStorage:** ***int32*** **{read-only, access after open}**

Remarks This is an enumeration and announces where the device is able to write the recorded sound data file to.
It holds one of the following values.

Value	Meaning
SPLY_ CST_HARDTOTALS_ONLY	Only an associate Hard Totals device is supported.
SPLY_CST_HOST_ONLY	Only the host's file system is supported.
SPLY_CST_ALL	Both, the associated Hard Totals device and the host's file system is supported.

This property is initialized by the **open** method.

If a Hard Totals device is supported the Storage, the property value should be SPLY_CST_HARDTOTALS_ONLY or SPLY_CST_ALL and the property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

See Also **Storage** Property, **CapAssociatedHardTotalsDevice** Property

CapVolume Property

Syntax **CapVolume:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the volume during playback.

If false, the application cannot change the volume during playback.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Volume** Property.

DeviceSoundList Property

Syntax **DeviceSoundList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of device sound ID that is supported by the device. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **playSound** Method

OutputIDList Property

Syntax **OutputIDList:** ***string*** **{read-only, access after open-claim-enable}**

Remarks Contains the comma-delimited list of OutputID that is output by the **playSound** method. This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **playSound** Method

Storage Property

Syntax **Storage:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks It holds one of the following values.

Value	Meaning
SPLY_ST_HARDTOTALS	The encoded data file is written to the associated Hard Totals device. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.
SPLY_ST_HOST	The encoded data file is written to the host's file system.
SPLY_ST_HOST_HARDTOTALS	The encoded data file is written to the associated Hard Totals device and host's file system. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

This property is initialized by the **open** method according to the value hold by **CapStorage**. If **CapStorage** has the value SPLY_CST_ALL, it is initialized to SPLY_ST_HOST_HARDTOTALS.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20. Some possible values of the exception's ErrorCode property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified or recording is ongoing.

See Also **CapStorage** Property

Volume Property

Syntax **Volume :** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the volume at playing sound.

Legal values range from zero through 100.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **playSound** Method

Methods (UML operations)

playSound Method

Syntax **playSound (fileName : *string*, loop : *boolean*):**
void{raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specifies the file name of audio file. Or, specifies one of the sound ID defined by **DeviceSoundList**.
loop	When true is specified, loop playback is performed, and if false is specified, loop playback will not be performed.

Remarks Play audio file specified by fileName or device definition sound.

Audio files might be located in the area managed by "Hard Totals" service.

This method will be performed asynchronously. To stop playback, call the **stopSound** method.

Errors A UposException may be thrown when this method is invoked. For further information , see “Errors” on page Intro-20. Some possible values of the exception’s ErrorCode property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported sound file was specified.
E_NOEXIST	File does not exist.

See Also **CapSoundType** Property, **DeviceSoundList** Property, **stopSound** Method

stopSound Method

Syntax **stopSound(outputID: *int32*):**
void{raises-exception, use after open-claim-enable}

Parameter	Description
outputID	Specify the outputID of the sound to stop.

Remarks Terminates specified audio playback according to the **OutputID** property value.

Errors A UposException may be thrown when this method is invoked. For further information, see “Errors” on page Intro-20. Some possible values of the exception’s ErrorCode property are:

Value	Meaning
E_ILLEGAL	The specified sound is not being played.

See Also **OutputID** Property, **startSound** Method

Events (UML interfaces)

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Sound Player Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor’s devices which may not have any knowledge of the Service’s need for this event.

See Also **“Events"** on page Intro-19, **directIO** Method

ErrorEvent

<<event>>	**upos::events:: ErrorEvent**	
	ErrorCode	**:** ***int32*****{read-write}**
	ErrorCodeExtended	**:** ***int32*****{read-write}**
	ErrorLocus	**:** ***int32*****{read-write}**
	ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Sound Player Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. If EL_OUTPUT is specified. It is indicating that the error occurred while processing asynchronous output.
ErrorResponse	*int32*	Error response, whose default value may be overridden by the application (i.e., this attribute is settable). See values below.

If ErrorCode is E_EXTENDED, then ErrorCodeExtended has one of the following values:

Value	Meaning
ESPLY_NOROOM	The encoded data storage area does not have enough room to store.

The *ErrorLocus* attribute has the following value:

Value	Meaning
EL_OUTPUT	Error occurred while processing asynchronous output.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry the asynchronous output data. The error state is exited. This is the default response.
ER_CLEAR	Clear all buffered output data including all asynchronous output. (The effect is the same as when **clearOutput** method is called.) The error state is exited.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state.

See Also **"Error Handling"** on page Intro-23, **"Device Output Models"** on page Intro-25.

OutputCompleteEvent

<<event>> **upos::events::OutputCompleteEvent**
OutputID : *int32*{read-only}

Description Notify the application that the queued output request associated with the *outputID* property has completed successfully.

Attributes This event contains the following attributes:

Attribute	Type	Description
OutputID	*int32*	The ID number of the asynchronous output request that is complete.

Remarks This event is enqueued after the request's data has been both sent, and the Service has confirmation that it was processed by the device successfully.

See Also **"Device Output Models"** on page Intro-25

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status : *int32* {read-only}

Description *Notifies the application that there is an operation status change or a status of the sound player device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change of operation status of sound player device.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process.

See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
SPLY_SUE_START_PLAY_SOUND	It will be notified when sound playing start.
SPLY_SUE_STOP_PLAY_SOUND	It will be notified when sound playing stop.

Remarks Enqueued when the Sound Player Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

C H A P T E R   4 4

Speech Synthesis

This Chapter defines the Speech Synthesis device category.

Summary

<u>Properties (UML attributes)</u>

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.16	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	open
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapLanguage:	*boolean*	{read-only}	1.16	open
CapPitch:	*boolean*	{read-only}	1.16	open
CapSpeed:	*boolean*	{read-only}	1.16	open
CapVoice:	*boolean*	{read-only}	1.16	open
CapVolume:	*boolean*	{read-only}	1.16	open
Language:	*string*	{read-write}	1.16	open, claim & enable
LanguageList:	*string*	{read-only}	1.16	open
OutputIDList:	*string*	{read-only}	1.16	open, claim & enable
Pitch:	*int32*	{read-write}	1.16	open, claim & enable
Speed:	*int32*	{read-write}	1.16	open, claim & enable
Voice:	*string*	{read-write}	1.16	open, claim & enable
VoiceList:	*string*	{read-only}	1.16	open
Volume:	*int32*	{read-write}	1.16	open, claim & enable

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16

Methods (UML operations)(continued)

clearOutput ( ): **void {raises-exception, use after open, claim}**	1.16

Common

Name	*Version*
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	
speak (text: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
speakImmediate (text: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
stopCurrentSpeaking ( ): **void {raises-exception, use after open, claim, enable}**	1.16
stopSpeaking (outputID: *int32* **):** **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
***pErrorResponse:**	*int32*	{read-write}	
upos::events::OutputCompleteEvent			1.16
OutputID:	*int32*	{read-only}	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	

General Information

The Speech Synthesis programmatic name is "Speech Synthesis".

Capabilities

The Speech Synthesis has the following capability:

- Convert text to speech and read it aloud.

Speech Synthesis Class Diagram

The following diagram shows the relationships between the Speech Synthesis classes.

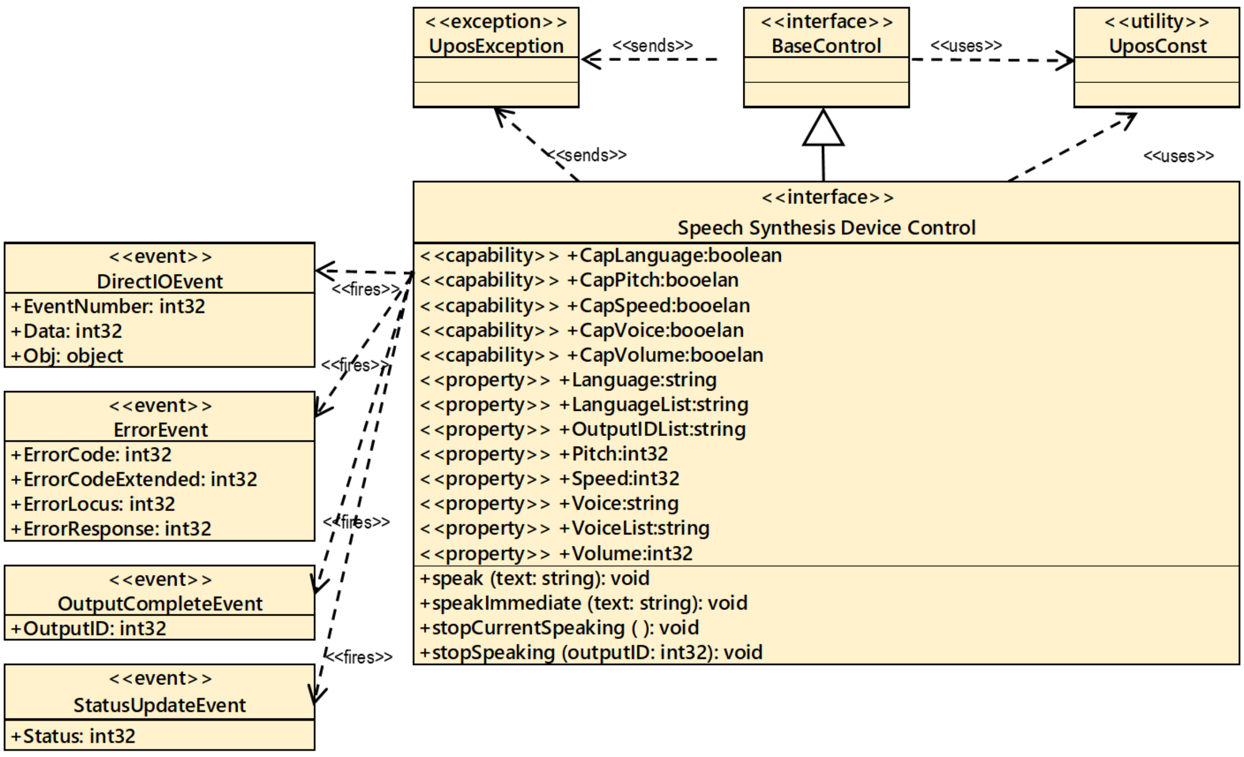

<<exception>> UposException
<<interface>> BaseControl
<<utility>> UposConst
<<sends>>
<<uses>>
<<sends>>
<<uses>>
<<interface>> Speech Synthesis Device Control
<<capability>> +CapLanguage:boolean
<<capability>> +CapPitch:booelan
<<capability>> +CapSpeed:booelan
<<capability>> +CapVoice:booelan
<<capability>> +CapVolume:booelan
<<property>> +Language:string
<<property>> +LanguageList:string
<<property>> +OutputIDList:string
<<property>> +Pitch:int32
<<property>> +Speed:int32
<<property>> +Voice:string
<<property>> +VoiceList:string
<<property>> +Volume:int32
+speak (text: string): void
+speakImmediate (text: string): void
+stopCurrentSpeaking ( ): void
+stopSpeaking (outputID: int32): void
<<event>> DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<event>> ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<event>> OutputCompleteEvent
+OutputID: int32
<<event>> StatusUpdateEvent
+Status: int32
<<fires>>
<<fires>>
<<fires>>
<<fires>>

Fig. Chap. 44-1 Speech Synthesis Class Diagram

Model

The Speech Synthesis follows the general device behavior model for output devices with some enhancements.

The application calls a **speak** method or **speakImmediate** method to speech.

The **speak** method acts to start speaking from the words specified by text, while the **speakImmediate** method ends immediately previous **speak** method, and starts speaking the word specified by text asynchronously and immediately.

When speak or **speakImmediate** method is called device start the speaking based on the setting value of **Language**, **Volume**, **Pitch** and **Speed** properties. And requested utterance written by text data placed in a queue and corresponding OutputID is stored at **OutputID** property and added to the **OutputIDList** property as listed value. And sets the **OutputID** property to a unique integer identifier for this request.

When an utterance of **speak** method or **speakImmediate** method starts, **StatusUpdateEvent** is evoked as the value of SPSY_SUE_START_SPEAK. When the utterance is finished an **OutputCompleteEvent** is enqueued for the delivery to the application and corresponding **OutputID** is stored in **OutputID** property. At the same time **StatusUpdateEvent** is evoked as the value of SPSY_SUE_STOP_SPEAK. The application should compare the returned **OutputCompleteEvent** property **OutputID** value with OutputID value set by the asynchronous process method call used to send the data in order to track what data has been successfully sent to the device

When **speakImmediate** method is called during the utterance of **speak** method or **speakImmediate** method call, utterance will be stopped immediately. And **StatusUpdateEvent** is evoked as the value of SPSY_SUE_STOP_SPEAK. However, **OutputCompleteEvent** is not fired. And current **speak** method or **speakImmediate** method corresponding **OutputID** property and **OutputIDList** property values are not changed.

When s**topCurrentSpeaking** method is called, current utterance generated by **speak** method or **speakImmediate** method will be stopped and **StatusUpdateEvent** is evoked as the value of SPSY_SUE_STOP_SPEAK. And no **OutputCompleteEven**t is fired. And current **speak** method or **speakImmediate** method corresponding **OutputID** property and **OutputIDList** property values are not changed.

When **stopSpeaking** method is called, specified **OutputID** valued utterance is stopped and deleted. And **OutputID** property value in the **OutputIDList** property is eliminated.

When utterance is stopped **StatusUpdateEvent** is evoked as the value of SPSY_SUE_STOP_SPEAK. And no **OutputCompleteEvent** is fired.

If an error occurs while processing a request, an **ErrorEvent** is enqueued which will be delivered to the application after the events already enqueued, including **OutputCompleteEvent**. No further asynchronous output will occur until the event has been delivered to the application. If the response is ER_CLEAR, then outstanding asynchronous output is cleared. If the response is ER_RETRY, then output is retried; note that if several outputs were simultaneously in progress at the time that the error was detected, then the service may need to retry all of these outputs.

Asynchronous output is always performed on a first-in first-out basis.

If the request is terminated before completion, due to reasons such as the application calling the **clearOutput** method, then no **OutputCompleteEvent** is delivered.

The application will be informed about any status change with a **StatusUpdateEvent**, also all corresponding status properties will be updated before event delivery.

Device Sharing

The Speech Synthesis is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.
- See the “Summary” table for precise usage prerequisites.

Properties (UML attributes)

CapLanguage Property

Syntax **CapLanguage:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the language. If false, the application cannot change the language.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Language** Property

CapPitch Property

Syntax **CapPitch:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the pitch. If false, the application cannot change the pitch.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Pitch** Property

CapSpeed Property

Syntax **CapSpeed:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the speed. If false, the application cannot change the speed.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Speed** Property

CapVoice Property

Syntax **CapVoice:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the voice. If false, the application cannot change the voice.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Voice** Property

CapVolume Property

Syntax **CapVolume:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the volume. If false, the application cannot change the volume.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Volume** Property

Language Property

Syntax **Language:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates the language to speak. Valid values are one of the values listed in the **LanguageList** property.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported language was specified.

See Also **speak** Method, **speakImmediate** Method

LanguageList Property

Syntax **LanguageList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of language that are supported by the device. The value representing the language is a value consisting of the language and country code defined in RFC 4664. For example, when the device supports US / English, Japan / Japanese, it will be as follows.
"en-US, ja-JP"

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Language** Property

OutputIDList Property

Syntax **OutputIDList:** ***string*** **{read-only, access after open-claim-enable}**

Remarks Comma-separated list of **OutputID** property values of audio being played by **speak** method or **speakImmediate** method. This list indicates the capability how many and what kinds of utterance can be done by the targeted Speech Synthesis device

This property is initialized by the **open** method. It will also be updated as the speech request increases or decreases.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **speak** Method, **speakImmediate** Method

Pitch Property

Syntax **Pitch:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the pitch at speech. Legal values range from 50% through 200%.

This property is initialized to 100% by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **speak** Method, **speakImmediate** Method

Speed Property

Syntax **Speed:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the speed at speech. Legal values range from 50% through 200%.

This property is initialized to 100% by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **speak** Method, **speakImmediate** Method

Voice Property

Syntax **Voice :** ***string*** **{read-write, access after open-claim-enable }**

Remarks Indicates the voice tone to speak. Valid values are one of the values listed in the **VoiceList** property.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported voice was specified.

See Also **speak** Method, **speakImmediate** Method

VoiceList Property

Syntax **VoiceList:** ***string*** **{read-only, access after open}**

Remarks A list of speech able voices is shown in a comma-separated list. For example, when the device supports male and female voice tones, it looks like the following.
"MALE_VOICE, FEMALE_VOICE"
(The content of the value depends on the device)

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

See Also **Voice** Property

Volume Property

Syntax **Volume:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the volume at speech. Legal values range from zero through 100.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **speak** Method, **speakImmediate** Method

Methods (UML operations)

speak Method

Syntax **speak (text: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
Text	Specify the text to speak.

Remarks Device utters after converting the specified string into speech.

The utterance is executed according to the setting contents of **Language** property, **Volume** property, **Pitch** property, **Speed** property, but by inserting the following tag in the text, it is possible to change the utterance after the tag.

Content written in text is uttered with the following parameter settings.

Tag	Description	Value (decimal integer)	Default Value (decimal integer)
volume	Specify the volume of the uttered voice.	1 to 100	50
pitch	Specify the high or low of the uttered voice.	50 to 200	100
speed	Specify the speed of the uttered voice.	50 to 200	100
pause	Specify the time to pause in milliseconds.	1 to 50000	1
reset	Rest the effect of volume, pitch, speed to the default value.	-	-

If dialogue is “Hello. Today, it’s nice weather.”

Then if you would like to use the default setting of speed, volume, pitch for the “Hello”. And would like to put a pose between “Hello” and “Today” 1000 milliseconds and would like to change the speaking pith of “Today” to 150 and increase the volume to 80. Then for the “It’s nice weather” would like return to the default value by using the reset. It is described as follows

Hello.{pause=1000,pitch=150,volue=80}Today,{reset}It's nice weather.

Those utterance defined as follows.

Name	Data	Remarks	
Utterance written by text with the **speak** method parameter. Text will be spoken under the assigned parameter condition.	{#=f}XXXX{#=f}YYYY	#:Tag names It is volume, pitch, speed, pause and reset.	f:Tag values It is described in the Tag Value Table.

When this method is called by the application, device validate the method parameters, and if validation is successful buffer the request in program memory and deliver it to the device and process it. And device sets the unique integer identifier into the **OutputID** property. When device successfully complete a request an **OutputCompleteEvent** is enqueued for delivery to the application.

If the device does not support volume change etc., that tag will be ignored. This method is executed asynchronously. To end an utterance halfway, call the **stopCurrentSpeaking** method or the **stopSpeaking** method.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.
Some possible values of the exception’s **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. The language set in the **Language** property and the language specified by Text do not match.

See Also **Language** Property**, Volume** Property, **Pitch** Property, **OutputID** Property, **Speed** Property, **stopCurrentSpeaking** Method, **stopSpeaking** Method

speakImmediate Method

Syntax **speakImmediate (text: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
text	Specify the text to speak.

Remarks The **speak** method acts to start speaking the words specified by text, while the **speakImmediate** method ends immediately previous **speak** method, and starts speaking the word specified by text asynchronously and immediately.

After executing the same processing as the **clearOutput** method, speak the wording specified by text.

Like this **speak** method, this method can also change a specific wording by inserting a tag. For details, refer to the description of **speak** method.

This method is executed asynchronously. To end an utterance halfway, call the **stopCurrentSpeaking** method or the **stopSpeaking** method.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. The language set in the **Language** property and the language specified by Text do not match.

See Also **Language** Property**, Volume** Property, **Pitch** Property, **Speed** Property, **speak** Method, **stopCurrentSpeaking** Method, **stopSpeaking** Method

stopCurrentSpeaking Method

Syntax **stopCurrentSpeaking ( ):**
void {raises-exception, use after open-claim-enable}

Remarks The **speak** method and **speakImmediate** method start the speaking words specified by text and ends when **stopCurrentSpeaking** method is called. This method handles asynchronously.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	Speech is not running.

See Also **speak** Method, **speakImmediate** Method

stopSpeaking Method

Syntax **stopSpeaking (outputID:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
outputID	Specify the value of the **OutputID** property you wish to terminate.

Remarks Stop and delete the utterance specified in OutputID.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20.

Some possible values of the exception's **ErrorCode** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **OutputID** Property, **speak** Method, **speakImmediate** Method

Events (UML interfaces)

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Sound Player Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** method

ErrorEvent

<<event>>	**upos::events:: ErrorEvent**	
	ErrorCode	**:** ***int32*****{read-write}**
	ErrorCodeExtended	**:** ***int32*****{read-write}**
	ErrorLocus	**:** ***int32*****{read-write}**
	ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Speech Synthesis Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. If EL_OUTPUT is specified. It is indicating that the error occurred while processing asynchronous output.
ErrorResponse	*int32*	Error response, whose default value may be overwritten by the application (i.e., this attribute is settable). See values below.

The *ErrorLocus* attribute has the following value:

Value	Meaning
EL_OUTPUT	Error occurred while processing asynchronous output.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry the asynchronous output. The error state is exited. This is the default response.
ER_CLEAR	Clear all buffered output data including all asynchronous output. (The effect is the same as when **clearOutput** method is called.) The error state is exited.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state.

See Also **"Error Handling"** on page Intro-23, **"Device Output Models"** on page Intro-25.

OutputCompleteEvent

<<event>> **upos::events::OutputCompleteEvent**
OutputID : *int32*{read-only}

Description Notify the application that the queued output request associated with the *outputID* property has completed successfully.

Attributes This event contains the following attributes:

Attribute	Type	Description
OutputID	*int32*	The ID number of the asynchronous output request that is complete.

Remarks This event is enqueued after the request's data has been both sent, and the Service has confirmation that it was processed by the device successfully.

See Also **"Device Output Models"** on page Intro-25

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status : *int32* {read-only}

Description *Notifies the application that there is an operation status change or a status of the Speech Synthesis device.*

Attributes This event contains the following attribute:

Attribute	Type	Description
Status	*int32*	Indicates a change of operation status of sound player device

.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
SPCH_SUE_START_SPEAK	It will be notified when speech synthesis starts.
SPCH_SUE_STOP_SPEAK	It will be notified when speech synthesis stops.

Remarks Enqueued when the Speech Synthesis Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

C H A P T E R 4 5

Gesture Control

This Chapter defines the Gesture Control device category.

Summary

Properties (UML attributes)

Common	***Type***	***Mutability***	***Version***	***May Use After***
AutoDisable:	*boolean*	{read-write}	---	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	---	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	---	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	open
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Methods (UML operations)

Common

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAssociatedHardTotalsDevice:	*string*	{read-only}	1.16	open
CapMotion:	*boolean*	{read-only}	1.16	open
CapMotionCreation:	*boolean*	{read-only}	1.16	open
CapPose:	*boolean*	{read-only}	1.16	open
CapPoseCreation:	*boolean*	{read-only}	1.16	open
CapStorage:	*int32*	{read-only}	1.16	open
AutoMode:	*string*	{read-write}	1.16	open, claim & enable
AutoModeList:	*string*	{read-only}	1.16	open
JointList:	*string*	{read-only}	1.16	open
MotionList:	*string*	{read-only}	1.16	open
PoseCreationMode:	*boolean*	{read-write}	1.16	open, claim & enable
PoseList:	*string*	{read-only}	1.16	open
Storage:	*int32*	{read-write}	1.16	open, claim & enable

Name	*Version*

open (logicalDeviceName: *string***):**
 void {raises-exception}
	1.16

close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16
clearOutput ( ): **void {raises-exception, use after open, claim}**	1.16
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Methods (UML operations)(continued)

Specific

Name	*Version*
createMotion (fileName: *string*, **poseList:** *string***):** **void { raises-exception, use after open, claim, enable }**	1.16
createPose (fileName: *string*, **time:** *int32***):** **void { raises-exception, use after open, claim, enable }**	1.16
getPosition (jointID: *string*, **out position:** *int32***):** **void { raises-exception, use after open, claim, enable }**	1.16
setPosition (positionList: *string,* **time:** *int32 ,* **absolute:** *boolean***):** **void { raises-exception, use after open, claim, enable }**	1.16
setSpeed (speedList: *string*, **time:** *int32***):** **void { raises-exception, use after open, claim, enable }**	1.16
startMotion (fileName: *string***):** **void { raises-exception, use after open, claim, enable }**	1.16
startPose (fileName: *string***):** **void { raises-exception, use after open, claim, enable }**	1.16
stopControl (outputID: *int32***):** **void { raises-exception, use after open, claim, enable }**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent		***Not supported***	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse:	*int32*	{read-write}	
upos::events::OutputCompleteEvent			1.16
OutputID:	*int32*	{read-only}	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	

General Information

The Gesture Control device programmatic name is "Gesture Control".

Capabilities

The Gesture Control device has the following capability:

- It controls the behavior of various joint components and parts.
- The operation is automatically controlled by interlocking various joints and other devices.
- Register and play the defined pose and motion.

Gesture Control Class Diagram

The following diagram shows the relationships between the Gesture Control classes.

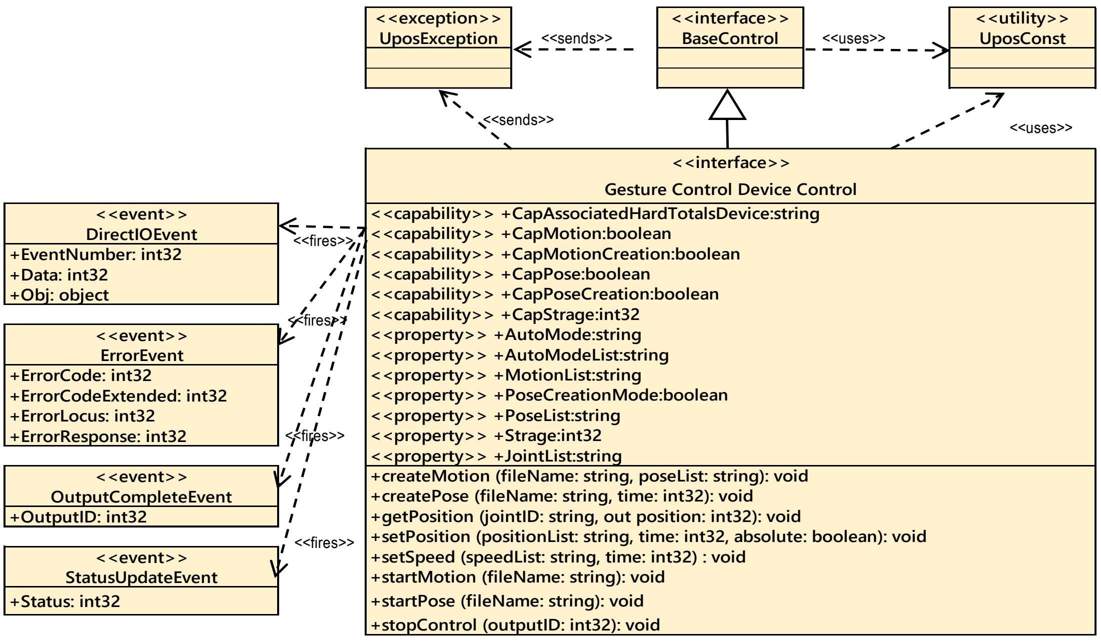

<<exception>> UposException
<<sends>>
<<interface>> BaseControl
<<uses>>
<<utility>> UposConst
<<sends>>
<<uses>>
<<interface>> Gesture Control Device Control
<<capability>> +CapAssociatedHardTotalsDevice:string
<<capability>> +CapMotion:boolean
<<capability>> +CapMotionCreation:boolean
<<capability>> +CapPose:boolean
<<capability>> +CapPoseCreation:boolean
<<capability>> +CapStrage:int32
<<property>> +AutoMode:string
<<property>> +AutoModeList:string
<<property>> +MotionList:string
<<property>> +PoseCreationMode:boolean
<<property>> +PoseList:string
<<property>> +Strage:int32
<<property>> +JointList:string
+createMotion (fileName: string, poseList: string): void
+createPose (fileName: string, time: int32): void
+getPosition (jointID: string, out position: int32): void
+setPosition (positionList: string, time: int32, absolute: boolean): void
+setSpeed (speedList: string, time: int32) : void
+startMotion (fileName: string): void
+startPose (fileName: string): void
+stopControl (outputID: int32): void
<<event>> DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<event>> ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>> OutputCompleteEvent
+OutputID: int32
<<fires>>
<<event>> StatusUpdateEvent
+Status: int32
<<fires>>

Fig. Chap. 45-1 Gesture Control Class Diagram

Model

The Gesture Control follows the general device behavior model for asynchronous output devices:

- The application calls a **setPosition**, **setSpeed**, **startPose**, **startMotion** method to start output. The Device validates the method parameters and produces an error condition immediately if necessary. If the validation is successful, the Device does the following:

  ･Buffers the request in program memory, for delivery to the Physical Device as soon as the Physical Device can receive and process it.

  ･Sets the **OutputID** property to a unique integer identifier for this request.

  ･Returns as soon as possible.

- When the Device successfully completes a request, an **OutputCompleteEvent** is enqueued for delivery to the application. A property of this event contains the outputID of the completed request. The application should compare the returned **OutputCompleteEvent** property OutputID value with the OutputID value set by the asynchronous process method call used to send the data, in order to track what data has been successfully sent to the device.
- If an error occurs while processing a request, an **ErrorEvent** is enqueued which will be delivered to the application after the events already enqueued, including **OutputCompleteEvent**. No further asynchronous output will occur until the event has been delivered to the application. If the response is ER_CLEAR, then outstanding asynchronous output is cleared. If the response is ER_RETRY, then output is retried; note that if several outputs were simultaneously in progress at the time that the error was detected, then the Service may need to retry all of these outputs.
- Asynchronous output is always performed on a first-in first-out basis.
- If the request is terminated before completion, due to reasons such as the application calling the **clearOutput** method, then no **OutputCompleteEvent** is delivered.
- Application can also delete the output individually by calling the **stopControl** method. Also, in this case **OutputCompleteEvent** will not be notified.
- The application will be informed about any status change with a **StatusUpdateEvent**, also all corresponding status properties will be updated before event delivery.

Automatic control

Automatic control of a joint means to automatically control a joint on the device side, such as tracking according to the movement of a person's face, in cooperation with a camera or the like connected to the device.

The automatic control function is device dependent. For possible automatic control, it is enabled by confirming with the **AutoModeList** property and setting a value in the **AutoMode** property.

Pose / Motion

Pose refers to setting the position of one or more defined joints.

For example, it is an action that lifts a hand.

To execute a pose, specify the pose file name by the **startPose** method or the pose name defined in the device.

Create the pose file with the **createPose** method described later. Pose defined in the device will be checked in the value of **PoseList** property.

To execute motion, specify the motion file name or the motion name defined in the device with the **startMotion** method.

Motion files are created by the **createMotion** method to be described later. Motion defined in the device can be checked with the value of **MotionList** property.

To create a pose file, first set the **PoseCreationMode** property to TRUE and enable the pose registration function. When pose registration function is enabled, each joint is set to the default position. At this time, if the automatic control mode is enabled, the automatic control mode is temporarily invalidated.

Then, application can create a pose file by setting the value defined as a pose with the **setPosition** method and calling the **createPose** method.

A motion file can be created and recorded by specifying the pose defined in the created pose file or the pose defined in the device and creating it as a series of continuously changing actions and calling the **createMotion** method.

Since the created pose and motion files are recorded in the area may store in either the "Hard Totals" devices or the host file system, or both, and the **CapStorage** property will show the device's data file storage location capability.

If device supports either of both Hard Totals devices and the host file system, the application should set the **Storage** property accordingly to tell where to write the data file.

If device needs to be able to write the pose and motion files to a Hard Totals device, the **CapAssociatedHardTotalsDevice** property holds the open name of the associated Hard Totals device.

Device Sharing

The Gesture Control device is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.
- See the "Summary" table for precise usage prerequisites.

Properties (UML attributes)

AutoMode Property

Syntax **AutoMode:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Indicates automatic control mode ID. Valid values are the empty string "" or one of the **AutoModeList** properties listed.

If one of the properties described in the **AutoModeList** property is set, the automatic control mode will be enabled in the set mode.

Setting the empty character "" disables the automatic control mode.

This property is initialized to the empty string "" by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **AutoModeList** Property

AutoModeList Property

Syntax **AutoModeList:** ***string*** **{read-only, access after open}**

Remarks Comma-separated list of joint automatic control IDs supported by the device.

For example, in conjunction with the camera, if the mode of tracking the face of a person by moving only the joint of Joint01, this is "FaceTrack_Joint01".

Another example, in conjunction with the camera, if the mode of tracking the face of a person by moving all joints are supported, this is "FaceTrack_ALL".

(Content and order are dependent on the device.)

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **AutoMode** Property.

CapAssociatedHardTotalsDevice Property

Syntax **CapAssociatedHardTotalsDevice:** ***string*** **{read-only, access after open}**

Remarks Holds the open name of the associated Hard Totals device if the device is able to write to such devices which is the case if **CapStorage** is either GCTL_CST_ALL or GCTL_CST_HARDTOTALS_ONLY. If **CapStorage** is GCTL_CST_HOST_ONLY this property value must be the empty string. This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **CapStorage** Property

CapMotion Property

Syntax **CapMotion:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports making the motion function. Otherwise, it is false. When this property is false, **startMotion** method, **createMotion** method is not available. This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **startMotion** Method, **createMotion** Method.

CapMotionCreation Property

Syntax **CapMotionCreation:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports motion registration function.

If false, the device does not support motion registration function.

If this property is FALSE, the **createMotion** method is not available.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **createMotion** Method.

CapPose Property

Syntax **CapPose:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports pose function. Otherwise, it is false.

When this property is FALSE, **PoseCreationMode** property value cannot be changed, in addition, **startPose** method, and **createPose** method are not available.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **PoseCreationMode** Property, **startPose** Method, **createPose** Method.

CapPoseCreation Property

Syntax **CapPoseCreation:** ***boolean*** **{read-only, access after open}**

Remarks If true, the device supports pose registration function.

If false, the device does not support pose registration function.

When this property is FALSE, the **createPose** method that can change the **PoseCreationMode** property is not available.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **PoseCreationMode** Property, **createPose** Method.

CapStorage Property

Syntax **CapStorage: *int32* {read-only, access after open}**

Remarks This is an enumeration and announces where the device is able to write the recorded motion and/or pose data file to.
It holds one of the following values.

Value	Meaning
GCTL_CST_HARDTOTALS_ONLY	Only an associate Hard Totals device is supported.
GCTL_CST_HOST_ONLY	Only the host's file system is supported.
GCTL_CST_ALL	Both, the associated Hard Totals device and the host's file system is supported.

This property is initialized by the **open** method.

If a Hard Totals device is supported the **Storage** the property value should be GCTL_CST_HARDTOTALS_ONLY or GCTL_CST_ALL, and the property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **Storage** Property, **CapAssociatedHardTotalsDevice** Property

JointList Property

Syntax **JointList: *string* {read-only, access after open}**

Remarks Comma-separated list of joint information supported by the device.

Each piece of joint information consists of the following information and is shown in the following order, separated by a colon (":").

Parameter	Description
JointID	Indicates a unique ID in the service that identifies the joint. Position range availability: If position range is 0, the Joint does not have the position range. If position range is 1, the joint holds the position range. For example, arm joint has a range of rotation width but wheel for movement does not have the range of movement amount. If there is a device with joints that supports pitch, roll, yaw and wheels that supports rotating and moving back and forth. In this case they are indicated as follows: "Joint01_Pitch:1, Joint01_Roll:1, Joint01_Yaw:1, Wheel_Turn:0, Wheel_Move:0"

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

MotionList Property

Syntax **MotionList:** ***string*** **{read-only, access after open}**

Remarks Comma-separated list of motion IDs defined on the device.

For example, “bowing, welcoming, clapping,…”

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

PoseCreationMode Property

Syntax **PoseCreationMode:** ***boolean*** **{read-write, access after open-claim-enable}**

Remarks If true, pose registration function is enabled.

If false, pose registration function is invalid.

When this property is set to true, pose registration function is enabled. When false is set, the pose registration function is disabled.

This property is initialized to false when you first enable the device after calling the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapPose** Property, **CapPoseCreation** Property.

PoseList Property

Syntax **PoseList:** ***string*** **{read-only, access after open}**

Remarks A comma-separated list of pose IDs defined on the device.

For example, “surprise, bow, think,….”

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Storage Property

Syntax **Storage: *int32* {read-write, access after open-claim-enable}**

Remarks This is an enumeration and defines where the device writes the recorded motion and/or pose data file to. Should be set before an appropriate method call. It holds one of the following values.

Value	Meaning
GCTL_ST_HARDTOTALS	The motion and/or pose data file is written to the associated Hard Totals device. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.
GCTL_ST_HOST	The motion and/or pose data file is written to the host's file system.
GCTL_ST_HOST_HARDTOTALS	The motion and/or pose data file is written to the associated Hard Totals device and host's file system. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

This property is initialized by the **open** method according to the value hold by **CapStorage**. If **CapStorage** has the value GCTL_CST_ALL, it is initialized to GCTL_ST_HOST_HARDTOTALS.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified, or recording is ongoing.

See Also **CapStorage** Property, **CapAssociatedHardTotalsDevice** Property

Table of Gesture Control Device Listed Items in Property

Property Name	Item ID, File Name, Name	Parameter
AutoModeList	Face Track	Joint01 Joint_ALL
	Chase	Joint01, Wheel01, Wheel02 Joint_ALL, Wheel_ALL,
MotionList	Bowing, Welcoming, Clapping, Farewelling01, Farewelling02, Greeting01, Greeting02 ,	
PoseList	Surprise, Bow01, Bow02, Think01, Think02 Doubt01, Doubt02	
JointList	Joint	Pitch Roll Yaw
	Wheel	Turn Move Back Move Forth

Methods (UML operations)

createMotion Method

Syntax **createMotion (fileName:** ***string*****, poseList:** ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the motion file name recorded as motion.
poseList	Specify the comma-separated list of pose information to be registered.

Remarks A motion file can be created and recorded by specifying the pose defined in the created pose file or the pose defined in the device and creating it as a series of continuously changing actions.

The place where the motion file is recorded is the area value of the **Storage** property.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	fileName is too long or contains unusable characters.
E_EXISTS	fileName already exists.

createPose Method

Syntax **createPose (fileName:** ***string*****, time:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the pose file name to record the pose.
time	Specify the time to reach the pose position.

Remarks Record the position of each joint in the pose file.

Before calling this method, it needs to set the **PoseCreationMode** property to TRUE and to make enabling pose registration mode.

The place where the motion file is recorded is the area value of the **Storage** property.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	FileName is too long or contains unusable characters. Or PoseCreationMode is FALSE.
E_EXISTS	FileName already exists.

See Also **PoseCreationMode** Property.

getPosition Method

Syntax **getPosition (jointID: *string*, out position: *int32*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
jointID	Specify the one of the joint ID values that are listed in the JointList property. And specified JointList property should be the position range present one.
position	Store the specified value as the position associated with jointID.

Remarks It acquires the position specified by jointID and stores it in position.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **JointList** Property.

setPosition Method

Syntax **setPosition (positionList:** ***string*****, time:** ***int32*****, absolute:** ***boolean*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
positionList	Specify the position information in a comma-separated list.
time	Specify the time of device control completion in seconds. If this value is too small, it will be changed to an appropriate value depending on the service.
absolute	If true, the specified position indicates the absolute value. If false, the specified position indicates relative value.

Each position information specified in the positionList consists of the following information and is shown in the following order separated by a colon (":").

Parameter	Description
jointID	Specify the joint ID. Specify one of the values listed in the **JointList** property. However, it must be an ID whose position range is present.
position	Specify the position to be set. Valid values range from -100 to 100. 100 represents the limit value in the positive direction of the target joint, and -100 represents the limit value in the negative direction. If absolute is a relative value (false) and the value specified here exceeds the limit value, it will be changed to an appropriate value by the service

For example, to move Yow of Joint01 up to the limit of the positive direction and move Pitch of Joint02to the middle, specify as follows.
"Joint01_Yaw:100,Joint02:Pitch:0"

Remarks The joint position is set with the contents specified in PositionList and device control is started so that device control is completed at the time specified by Time.

Joints that can be specified with this method are only those that have a position range.

Check the **JointList** property for the presence or absence of the position range.

This method is executed asynchronously. To terminate the operation prematurely, call the **stopControl** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **JointList** Property, **stopControl** Method.

setSpeed Method

Syntax **setSpeed (speedList: *string*, time: *int32*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
speedList	Specify speed information in a comma-separated list.
time	Specify the time to device control in seconds. If the value of FOREVER(-1) is specified, it will continue to operate until you call the **stopControl** method.

Each speed information specified in the SpeedList consists of the following information, and it is shown in the following order separated by a colon (":").

Parameter	Description
jointID	Specify the joint ID. Specify one of the values listed in the **JointList** property.
speed	Specify the speed to set. Valid values range from -100 to 100. 100 represents the maximum speed in the positive direction of the target joint, and -100 represents the maximum speed in the negative direction.

For example, to move Wheel's X at the maximum speed in the positive direction and Y at the Wheel at half the speed in the negative direction, specify as follows.

"Wheel_X:100, Wheel_Y:-50"

Remarks It sets the speed of the joint with the contents specified by speedList and performs device control for the time specified by time.

This method is executed asynchronously. To terminate the operation prematurely, call the **stopControl** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **JointList** Property, **stopControl** Method.

startMotion Method

Syntax **startMotion (fileName:** ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Prior to start this method, need to specify the name of the motion file or the motion ID value that is listed in the **MotionList** property.

Remarks Start the motion defined by fileName or motion defined by the device.
This method is executed asynchronously and when the device successfully completes a request, an **OutputCompleteEvent** is enqueued and a property of corresponding event's OutputID is placed into the **OutputID** property.
The application should compare the returned **OutputCompleteEvent** property outputID value set by this method to track what data has been sent to device.

Motion files are placed in the area as the value of **Storage** property.

To terminate motion control prematurely, call the **stopControl** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.
E_NOEXIST	File does not exist.

See Also **MotionList** Property.

startPose Method

Syntax **startPose (fileName:** ***string*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the name of the pose file to start. Or one of the pose ID lists listed in the **PoseList** property.

Remarks Start the pose defined by the pose file or device specified by fileName. This method is executed asynchronously and when the device successfully completes a request, an **OutputCompleteEvent** is enqueued and a property of corresponding event's OutputID is placed into the **OutputID** property. The application should compare the returned **OutputCompleteEvent** property **OutputID** value set by this method to track what data has been sent to device. Pose files are placed in the area as the values of **Storage** property. To terminate pause control prematurely, call the **stopControl** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.
E_NOEXISTS	File does not exist.

See Also **PoseList** Property, **stopControl** Method.

stopControl Method

Syntax **stopControl (outputID:** ***int32*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
outputID	Specify the value of the **OutputID** property to be terminated.

Remarks Stop the control specified for outputID. When device successfully complete the request, and **OutputCompleteEvent** is enqueued. A property of this event contains the outputID of the completed request. The application should compare the returned **OutputCompleteEven**t property OutputID value with OutputID value set by this method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **setPosition** Method, **setSpeed** Method, **startPose** Method, **startMotion** Method.

Events (UML interfaces)

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Sound Player Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor’s devices which may not have any knowledge of the Service’s need for this event.

See Also **“Events"** on page Intro-19, **directIO** method

ErrorEvent

<<event>>	**upos::events:: ErrorEvent**	
	ErrorCode	**:** ***int32*****{read-write}**
	ErrorCodeExtended	**:** ***int32*****{read-write}**
	ErrorLocus	**:** ***int32*****{read-write}**
	ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Gesture Control Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. If EL_OUTPUT is specified it is indicating that error occurred while processing asynchronous output.
ErrorResponse	*int32*	Error response, whose default value may be overridden by the application (i.e., this attribute is settable). See values below.

If ErrorCode is E_EXTENDED, then ErrorCodeExtended has one of the following values:

Value	Meaning
EGCTL_NOROOM	There is not enough room for the targeted data file storage area.

The *ErrorLocus* attribute has the following value:

Value	Meaning
EL_OUTPUT	Error occurred while processing asynchronous output.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry the asynchronous output. The error state is exited. This is the default response.
ER_CLEAR	Clear all buffered input or output data including all asynchronous output. (The effect is the same as when clearOutput method is called.) The error state is exited.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state.

See Also **"Error Handling"** on page Intro-23, **"Device Output Models"** on page

OutputCompleteEvent

<<event>> **upos::events::OutputCompleteEvent**
OutputID: int32{read-only}

Description Notify the application that the queued output request associated with the *outputID* property has completed successfully.

Attributes This event contains the following attributes:

Attribute	Type	Description
OutputID	*int32*	The ID number of the asynchronous output request that is complete.

Remarks This event is enqueued after the request's data has been both sent, and the Service has confirmation that it was processed by the device successfully.

See Also **"Device Output Models"** on page Intro-25

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status : ***int32*** **{read-only}**

Description *Notifies the application that there is an operation status change or a status of the Gesture Control device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change of operation status of sound player device

. ***Note that Release 1.3*** added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
GCTL_SUE_START_MOTION	It will be notified when Gesture Motion start.
GCTL_SUE_STOP_MOTION	It will be notified when Gesture Motion stop.

Remarks Enqueued when the Gesture Control Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

CHAPTER 46

Device Monitor

This Chapter defines the Device Monitor device category.

Summary

Properties (UML attributes)

Common	**Type**	**Mutability**	***Version***	***May Use After***
AutoDisable:	*boolean*	{read-write}	1.16	open
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	open
DataEventEnabled:	*boolean*	{read-write}	1.16	open
DeviceEnabled:	*boolean*	{read-write}	1.16	open & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	***Not supported***
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
DeviceData:	*string*	{read-only}	1.16	open, claim & enable
DeviceList:	*string*	{read-only}	1.16	open
MonitoringDeviceList:	*string*	{read-only	1.16	open, claim & enable

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16
clearOutput ( ): **void { }**	***Not supported***
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

addMonitoringDevice (deviceID: *string***, monitoringMode:** *int32,* **boundary:** *int32,* **subBoundary:** *int32,* **intervalTime:** *int32* **):** **void {raises-exception, use after open, claim, enable}**	1.16
clearMonitoringDevices ( ): **void {raises-exception, use after open, claim, enable}**	1.16
deleteMonitoringDevice (deviceID: *string* **):** **void {raises-exception, use after open, claim, enable}**	1.16
getDeviceValue (deviceID: *string***, pValue:** *int32***)** **void {raises-exception, use after open}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent			1.16
Status:	*int32*	{read-only}	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse:	*int32*	{read-write}	
upos::events::OutputCompleteEvent		***Not supported***	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	

General Information

The Device Monitor programmatic name is "Device Monitor".

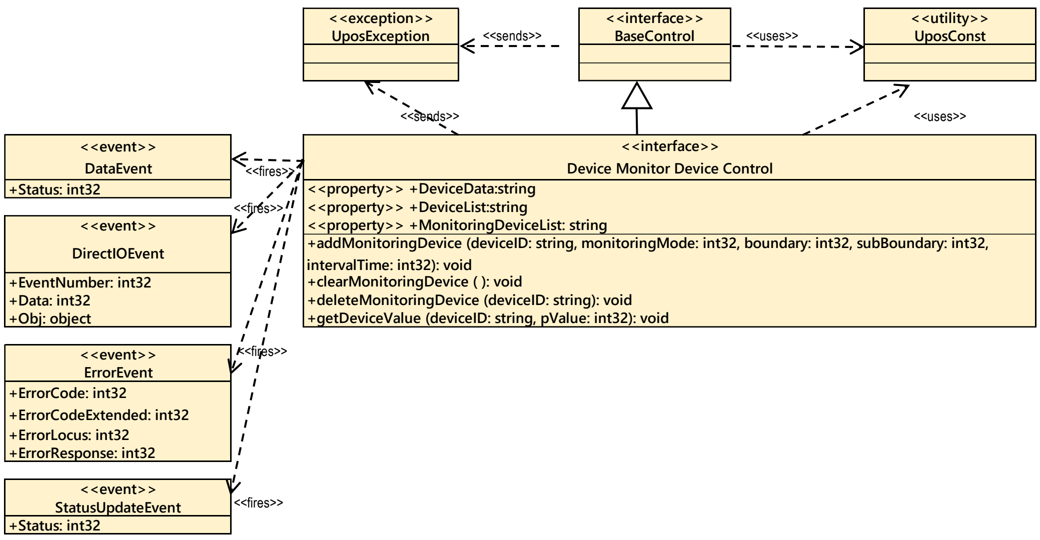
Capabilities

The Device Monitor Device has the following capability:

・Get values measured by various devices.

・Notify the application of changes in values measured by various devices.

Device Monitor Class Diagram


<<exception>>
UposException
<<sends>>
<<interface>>
BaseControl
<<uses>>
<<utility>>
UposConst
<<sends>>
<<uses>>
<<event>>
DataEvent
+Status: int32
<<fires>>
<<interface>>
Device Monitor Device Control
<<property>> +DeviceData:string
<<property>> +DeviceList:string
<<property>> +MonitoringDeviceList: string
+addMonitoringDevice (deviceID: string, monitoringMode: int32, boundary: int32, subBoundary: int32, intervalTime: int32): void
+clearMonitoringDevice ( ): void
+deleteMonitoringDevice (deviceID: string): void
+getDeviceValue (deviceID: string, pValue: int32): void
<<fires>>
<<event>>
DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<event>>
ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>>
StatusUpdateEvent
+Status: int32
<<fires>>

The following diagram shows the relationships between the Device Monitor classes.

Fig. Chap. 46-1 Device Monitor Class Diagram

Model

The Device Monitor follows the general "Device Input Model" for event-driven input:

- The Device Monitor supports monitoring of values measured by multiple devices connected to the device. A device that can be monitored and its type / value unit is listed in the **DeviceList** property.
- Device Monitor receives a change in the value measured by the device set as the monitoring target and generates a **DataEvent** when it matches the specified condition.
- To add a device to be monitored, specify the monitoring mode with the **addMonitoringDevice** method and add it. For details on monitoring mode, see the description of **addMonitoringDevice** method.
- If the **AutoDisable** property is true, the device will automatically disable itself when a **DataEvent** is enqueued.
- An enqueued **DataEvent** can be delivered to the application when the **DataEventEnabled** property is true and other event delivery requirements are met. Just before delivering this event, data is copied into corresponding properties, and further data events are disabled by setting **DataEventEnabled** to false. This causes subsequent input data to be enqueued while the application processes the current input and associated properties. When the application has finished processing the current input and is ready for more data, it reenables events by setting **DataEventEnabled** to true.
- An **ErrorEvent** (or events) is enqueued if an error occurs while gathering or processing input and is delivered to the application when **DataEventEnabled** is true and other event delivery requirements are met.
- The **DataCount** property can be read to obtain the total number of enqueued **DataEvents**.
- All enqueued input may be deleted by calling **clearInput** method. See the **clearInput** method description for more details.
- All data properties that are populated as a result of firing a **DataEvent** or **ErrorEvent** can be set back to their default values by calling the **clearInputProperties** method.
- The notified data is stored in the **DeviceData** property.
- In the Device Monitor device control, the measured values of the devices are managed most of cases with the int32 type integers, but some are decimals.
- In that case, the decimals are implicit, and the actual value can be calculated by dividing the measured value by the coefficient of each device that can be obtained in the **DeviceList** property.

The application will be informed about any status change with a **StatusUpdateEvent**, also, all corresponding status properties will be updated before event delivery.

Device Sharing

The Device Monitor is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before the device begins reading input, or before calling methods that manipulate the device.

See the "Summary" table for precise usage prerequisites.

Properties (UML attributes)

DeviceData Property

Syntax **DeviceData:** ***string*** **{read-only, access after open-claim-enable}**

Remarks Measurement information of the device that matches the condition registered by **addMonitoringDevice** method is set.

Each measurement information consists of the following information and is shown in the following order, separated by a colon (":").

Parameter	Description
DeviceID	The target device ID.
Measured value	Measurement value of the device. The measured value is represented by an integer type. To convert it to an actual value, divide the measured value by the coefficient acquired by the **DeviceList** property. For example,"Device01:365" Its value is set prior to a **DataEvent** being delivered to the application.

Errors A UposException may be thrown when this property is accessed. For further information, see **"Errors"** on page Intro-20.

DeviceList Property

Syntax **DeviceList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of device information that are supported by the device.

Each object information consists of the following information and is shown in the following order, separated by a colon (":").

Parameter	Description
DeviceID	Indicates a unique ID in the service that identifies the device.
Type	Indicates the device type. For example, if it is a touch sensor it is expressed as "Touch Sensor" and so on. However, this value depends on the service.
Unit	Indicates the unit of value held by various devices. For example, it is expressed as "on / off" for a touch sensor, "rad / s" for a gyroscope. However, this value depends on the service.
Coefficient	Indicates the coefficient for calculating the actual measured value held by various devices. The **DeviceData** property and the measured value of the device that can be obtained with the **GetDeviceValue** method are expressed as integers, but by dividing this value by the coefficient it is the actual value. Example: Device value = 365, coefficient = 10, actual value = 36.5 For example, if one device supports one touch sensor and one gyroscope, it will be as follows. "Touch 01: Touch Sensor: ON/OFF: 1, GyroX: Gyroscope: rad/s: 100000, GyroY: Gyroscope: rad/s: 100000, GyroZ: Gyroscope: rad/s: 100000"

This property is initialized by the **open** method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **DeviceData** Property, **addMonitoringDevice** Method, **getDeviceValue** Method.

MonitoringDeviceList Property

Syntax **MonitoringDeviceList:** ***string*** **{read-only, access after open-claim-enable}**

Remarks Contains the comma-delimited list of monitoring information on registered devices that are supported by the device.

Each monitoring information consists of the following information and is shown in the following order, separated by a colon (":").

Parameter	Description
DeviceID	Registered devices ID.
Monitoring mode	Registered monitoring mode.
Boundary	Registered boundary value. This value is set to 0 when the monitoring mode does not require a boundary value.
Sub boundary	Registered sub boundary value. This value is set to 0 when the monitoring mode does not require a sub boundary value.
Interval	Registered interval. (millisecond)

For example, if you set monitoring targets as follows,

[Monitor target 1]

Device ID = Device 01, monitoring mode = DMON_MM_UPDATE,

boundary line = 0, sub boundary line = 0, interval time = 0

[Monitor target 2]

Device ID = Device 02, monitoring mode = DMON_MM_STRADDLED,

boundary line = 365, sub boundary line = 0, interval time = 500

The values shown are as follows.

"Device01:0:0:0:0, Device02:1:365:0:500"

This property is initialized by the **open** method. It is also updated by calling

addMonitoringDevice method, **deleteMonitoringDevice** method,

clearMonitoringDevice method.

Errors A UposException may be thrown when this property is accessed. For further information, see **“Errors"** on page Intro-20.

See Also **addMonitoringDevice** Method, **deleteMonitoringDevice** Method, **clearMonitoringDevice** Method.

Methods (UML operations)

addMonitoringDevice Method

Syntax **addMonitoringDevice (deviceID:*string*, monitoringMode:*int32*, boundary:*int32*, subBoundary:*int32*, intervalTime:*int32*): void{raises-exception, use after open-claim-enable}**

Parameter	Description
deviceID	The deviceID of the monitored device. Valid values are one of the device ID lists listed in the **DeviceList** property.
monitoringMode	Specify the monitoring mode for monitoring.
boundary	Specify the boundary value to be monitored.
subBoundary	Specify the sub boundary value to be monitored. This value must be less than Boundary.
intervalTime	Specify the interval in milliseconds between the occurrence of the event and the start of the next monitoring.

The monitoring modes specified for MonitoringMode are as follows.

Value	Description
DMON_MMODE_UPDATE	Every time the measured value of the target device is updated, an event is notified. When set to this mode, the values of the argument boundary and subBoundary are ignored.
DMON_MMODE_STRADDLED	When the measured value of the target device crosses the value of the argument boundary, it notifies the event. In addition, when the measured value matches the value of boundary, it notifies the event even when it changes from the matched state. When set to this mode, the value of the argument subBoundary is ignored.
DMON_MMODE_HIGH	When the measured value of the target device becomes equal to or larger than the value of the argument Boundary, it notifies the event. Even if the measured value is updated and it was again equal to or greater than the value of boundary, the event will be notified in each time. When it is set to this mode, the value of the argument subBoundary is ignored.

DMON_MMODE_LOW

Notifies the event when the measured value of the target device becomes less than or equal to the value of the argument boundary. Even when the measured value is updated and it was again less than the value of boundary, the event will be notified in each time.

When it is set to this mode, the value of the argument subBoundary is ignored.

DMON_MMODE_WITHIN

It notifies the event while the measured value of the target device is within the range specified by the argument boundary and subBoundary. Even if the measured value is updated and its value is within the range again, the event is notified in each time.

DMON_MMODE_OUTSIDE

It notifies the event while the measured value of the target device is outside the range specified by the argument boundary and subBoundary. Even if the measured value is updated and its value was out of range again, the event will be notified in each time.

DMON_MMODE_POLLING

It notifies the measured value of the target device at the interval specified by intervalTime. When it is set to this mode, the values of the argument boundary and subBoundary are ignored.

Remarks Add the device specified by deviceID to the monitoring target. The monitoring mode is specified for monitoringMode, but there are monitoring modes not supported by some devices. In that case, E_ILLEGAL is raised as the UPOS exception. Devices added by this method will be added to the list of **MonitoringDeviceList** properties. If a device to be monitored is specified, it will be changed to a new condition. To exclude the added device from the monitoring target, call **deleteMonitoringDevice** method or **clearMonitoringDevice** method.

Errors A UposException may be thrown when this method is invoked. For further information, see **"Errors"** on page Intro-20. Some possible values of the exception's ErrorCode property are:

Value	Description
E_ILLEGAL	An invalid value was specified, or unsupported operation with the Device

See Also **DeviceList** Property, **MonitoringDeviceList** Property, **deleteMonitoringDevice** Method, **clearMonitoringDevice** Method, **DataEvent**.

clearMonitoringDevices Method

Syntax **clearMonitoringDevices ():**
void {raises-exception, use after open-claim-enable}

Remarks Exclude all devices to be monitored.

Errors A UposException may be thrown when this method is invoked.
For further information, see “Errors" on page Intro-20.

See Also **addMonitoringDevice** Method.

deleteMonitoringDevice Method

Syntax **deleteMonitoringDevice (deviceID: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
deviceID	Specify the device ID of the device to be excluded from monitoring targets.

Remarks Exclude the device specified by deviceID from monitoring targets.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.
Some possible values of the exception’s ErrorCode property are:

Value	Description
E_ILLEGAL	An invalid value was specified, or unsupported operation with the Device.

An invalid value was specified, or unsupported operation

with the Device.

See Also **AddMonitoringDevice** Method.

getDeviceValue method

Syntax **getDeviceValue (deviceID: *string*, pValue: *int32*):**
void {raises-exception, use after open}

Parameter	Description
deviceID	Specify the device ID of the device from which the measurement value is to be acquired. Specify one of the device ID lists listed in the **DeviceList** property.
pValue	Pointer that stores measurement values obtained from the device.

Remarks Get the measured value of the device specified by deviceID. The retrieved value is stored in pValue.

Errors A UposException may be thrown when this method is invoked. For further information, see **“Errors"** on page Intro-20.
Some possible values of the exception’s ErrorCode property are:

Value	Description
E_ILLEGAL	An invalid value was specified, or unsupported operation with the Device.

See Also **DeviceList** Property.

Events (UML interfaces)

DataEvent

<<event>> **upos::events::DataEvent**

Status **:** ***int32*****{read-only}**

Description Notifies the application when data from the Device Monitor device is available to be read.

Attributes This event contains the following attributes:

Attribute	Type	Description
Status	*int32*	*Set to 0.*

Remarks Before this event is delivered, the individual recognition information is enqueued into the area that is indicated by the **addMonitoringDevice** method.

See Also **addMonitoringDevice** method.

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber **:** ***int32*** **{read-only}**
Data **:** ***int32*** **{read-write}**
Obj **:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Device Monitor Device Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor’s devices which may not have any knowledge of the Service’s need for this event.

See Also **“Events"** on page Intro-19, **directIO** method

-

ErrorEvent

<<event>>	**upos::events:: ErrorEvent**	
	ErrorCode	**:** ***int32*****{read-write}**
	ErrorCodeExtended	**:** ***int32*****{read-write}**
	ErrorLocus	**:** ***int32*****{read-write}**
	ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Device Monitor Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error.
ErrorResponse	*int32*	Error response, whose default value may be overridden by the application (i.e., this attribute is settable). See values below.

The *ErrorLocus* attribute has one of the following values:

Value	Meaning
EL_INPUT	Error occurred while gathering or processing event-driven input. No previously buffered input data is available.
EL_INPUT_DATA	Error occurred while gathering or processing event-driven input, and some previously buffered data is available.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_CLEAR	Valid for all locus: EL_INPUT and EL_INPUT_DATA. Clear all buffered input data. The error state is exited. This is the default response when the locus is EL_INPUT.
ER_CONTINUEINPUT	Only valid when the locus is EL_INPUT_DATA. Acknowledges that a data error has occurred and directs the Device to continue input processing. The Device remains in the error state and will deliver additional **DataEvent**s as directed by the **DataEventEnabled** property. When all input has been delivered and **DataEventEnabled** is again set to true, then another **ErrorEvent** is delivered with locus EL_INPUT. This is the default response when the locus is EL_INPUT_DATA.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state. Input error events are not delivered until **DataEventEnabled** is true, so that proper application sequencing occurs.

Unlike a **DataEvent**, the Device does not disable further **DataEvent**s or input **ErrorEvent**s; it leaves the **DataEventEnabled** property value at true. Note that the application may set **DataEventEnabled** to false within its event handler if subsequent input events need to be disabled for a period of time.

See Also **“Device Input Model"** on page Intro-22, **“Error Handling"** on page Intro-23,

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status **:** ***int32*** **{read-only}**

Description *Notifies the application that there is an operation status change or a status of the Device Monitor device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change in the Device Monitor status of the unit.

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See “**StatusUpdateEvent**” description on page 1-34.

Value	Meaning
DMON_SUE_START_MONITERING	It will be notified when Device Monitoring start.
DMON_SUE_STOP_MONITORING	It will be notified when Device Monitoring stop.

Remarks Enqueued when the Device Monitor Device detects a power state change or a status change.

See Also **“Events"** on page Intro-19.

C H A P T E R 4 7

Graphic Display

This Chapter defines the Graphic Display device category.

Summary

Properties (UML attributes)

Common	*Type*	*Mutability*	*Version*	*May Use After*
AutoDisable:	*boolean*	{read-write}	1.16	***Not supported***
CapCompareFirmwareVersion:	*boolean*	{read-only}	1.16	open
CapPowerReporting:	*int32*	{read-only}	1.16	open
CapStatisticsReporting:	*boolean*	{read-only}	1.16	open
CapUpdateFirmware:	*boolean*	{read-only}	1.16	open
CapUpdateStatistics:	*boolean*	{read-only}	1.16	open
CheckHealthText:	*string*	{read-only}	1.16	open
Claimed:	*boolean*	{read-only}	1.16	open
DataCount:	*int32*	{read-only}	1.16	***Not supported***
DataEventEnabled:	*boolean*	{read-write}	1.16	***Not supported***
DeviceEnabled:	*boolean*	{read-write}	1.16	open, & claim
FreezeEvents:	*boolean*	{read-write}	1.16	open
OutputID:	*int32*	{read-only}	1.16	open
PowerNotify:	*int32*	{read-write}	1.16	open
PowerState:	*int32*	{read-only}	1.16	open
State:	*int32*	{read-only}	1.16	--
DeviceControlDescription:	*string*	{read-only}	1.16	--
DeviceControlVersion:	*int32*	{read-only}	1.16	--
DeviceServiceDescription:	*string*	{read-only}	1.16	open
DeviceServiceVersion:	*int32*	{read-only}	1.16	open
PhysicalDeviceDescription:	*string*	{read-only}	1.16	open
PhysicalDeviceName:	*string*	{read-only}	1.16	open

Properties (Continued)

Specific	*Type*	*Mutability*	*Version*	*May Use After*
CapAssociatedHardTotalsDevice:	*string*	{read-only}	1.16	open
CapBrightness:	*boolean*	{read-only}	1.16	open
CapImageType:	*boolean*	{read-only}	1.16	open
CapStorage:	*int32*	{read-only}	1.16	open
CapURLBack:	*boolean*	{read-only}	1.16	open
CapURLForward:	*boolean*	{read-only}	1.16	open
CapVideoType:	*boolean*	{read-only}	1.16	open
CapVolume:	*boolean*	{read-only}	1.16	open
Brightness:	*int32*	{read-write}	1.16	open, claim & enable
DisplayMode:	*int32*	{read-write}	1.16	open, claim & enable
ImageType:	*string*	{read-write}	1.16	open, claim & enable
ImageTypeList:	*string*	{read-only}	1.16	open
LoadStatus:	*int32*	{read-only}	1.16	open
Storage:	*int32*	{read-write}	1.16	open, claim & enable
URL:	*string*	{read-only}	1.16	open
VideoType:	*string*	{read-write}	1.16	open, claim & enable
VideoTypeList:	*string*	{read-only}	1.16	open
Volume:	*int32*	{read-write}	1.16	open, claim & enable

Methods (UML operations)

Common

Name	*Version*
open (logicalDeviceName: *string***):** **void {raises-exception}**	1.16
close ( ): **void {raises-exception, use after open}**	1.16
claim (timeout: *int32***):** **void {raises-exception, use after open}**	1.16
release ( ): **void {raises-exception, use after open, claim}**	1.16
checkHealth (level: *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
clearInput ( ): **void {raises-exception, use after open, claim}**	1.16
clearInputProperties ( ): **void {raises-exception, use after open, claim}**	1.16

Methods (UML operations)(Continued)

clearOutput ( ): **void {raises-exception, use after open, claim}**	1.16
compareFirmwareVersion (firmwareFileName: *string,* **out result:** *int32***):** **void {raises-exception, use after open, claim, enable}**	1.16
directIO (command: *int32***, inout data:** *int32***, inout obj:** *object***):** **void {raises-exception, use after open}**	1.16
resetStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
retrieveStatistics (inout statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateFirmware (firmwareFileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
updateStatistics (statisticsBuffer: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16

Specific

Name	*Version*
cancelURLLoading ( ): **void {raises-exception, use after open, claim, enable}**	1.16
goURLBack ( ): **void {raises-exception, use after open, claim, enable}**	1.16
goURLForward ( ): **void {raises-exception, use after open, claim, enable}**	1.16
loadImage (fileName: *string***):** **void {raises-exception, use after open, claim, enable}**	1.16
loadURL (uRL: ***string*** **):** **void {raises-exception, use after open, claim, enable}**	1.16
playVideo (fileName: *string***, loop:** *boolean***):** **void { raises-exception, use after open, claim, enable}**	1.16
stopVideo ( ): **void {raises-exception, use after open, claim, enable}**	1.16
updateURLPage ( ): **void {raises-exception, use after open, claim, enable}**	1.16

Events (UML interfaces)

Name	*Type*	*Mutability*	*Version*
upos::events::DataEvent			
Status:		***Not supported***	
upos::events::DirectIOEvent			1.16
EventNumber:	*int32*	{read-only}	
Data:	*int32*	{read-write}	
Obj:	*object*	{read-write}	
upos::events::ErrorEvent			1.16
ErrorCode:	*int32*	{read-only}	
ErrorCodeExtended:	*int32*	{read-only}	
ErrorLocus:	*int32*	{read-only}	
ErrorResponse	*int32*	{read-write}	
upos::events::OutputCompleteEvent			1.16
OutputID:	*int32*	{read-only}	
upos::events::StatusUpdateEvent			1.16
Status:	*int32*	{read-only}	
upos::events::TransitionEvent		***Not supported***	

General Information

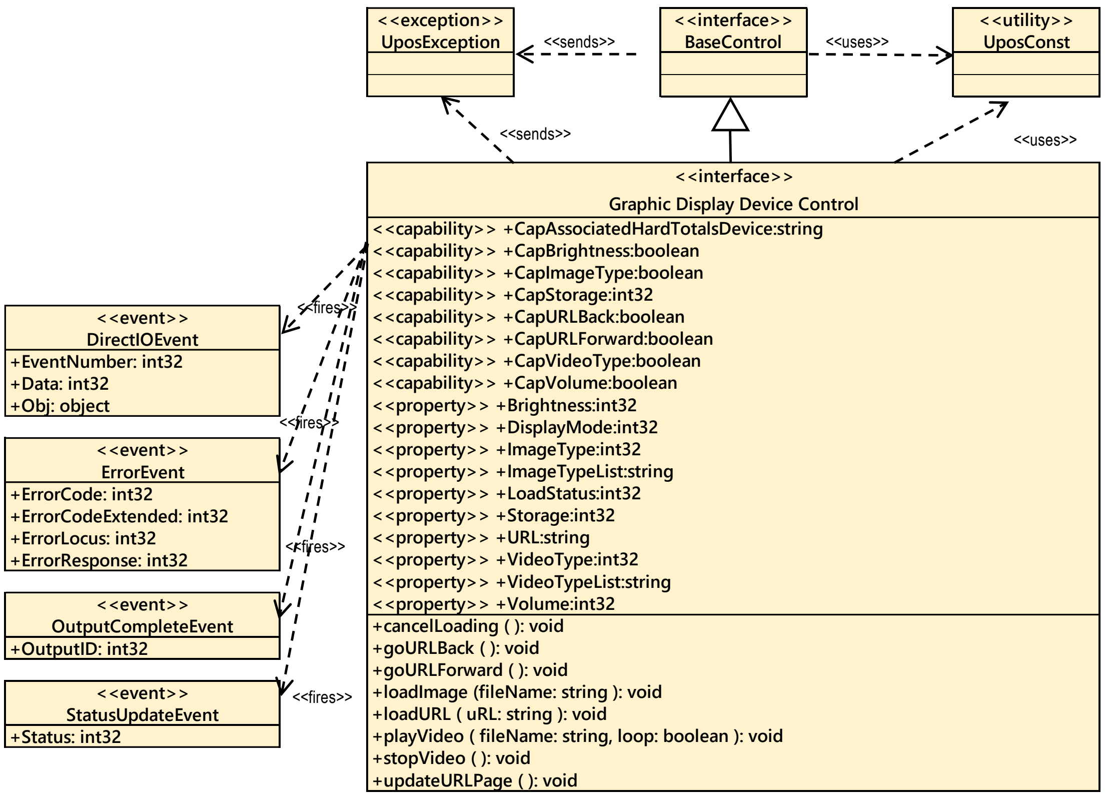
The Graphic Display programmatic name is “Graphic Display”.

Capabilities

The Graphic Display has the following capability:

- Displays the specified image files.
- Play the specified video.
- Display the specified web page.
- Notify the application of changes in the load status of the web page.

Graphics Display Class Diagram



<<exception>> UposException
<<sends>>
<<interface>> BaseControl
<<uses>>
<<utility>> UposConst
<<sends>>
<<uses>>
<<interface>> Graphic Display Device Control
<<capability>> +CapAssociatedHardTotalsDevice:string
<<capability>> +CapBrightness:boolean
<<capability>> +CapImageType:boolean
<<capability>> +CapStorage:int32
<<capability>> +CapURLBack:boolean
<<capability>> +CapURLForward:boolean
<<capability>> +CapVideoType:boolean
<<capability>> +CapVolume:boolean
<<property>> +Brightness:int32
<<property>> +DisplayMode:int32
<<property>> +ImageType:int32
<<property>> +ImageTypeList:string
<<property>> +LoadStatus:int32
<<property>> +Storage:int32
<<property>> +URL:string
<<property>> +VideoType:int32
<<property>> +VideoTypeList:string
<<property>> +Volume:int32
+cancelLoading ( ): void
+goURLBack ( ): void
+goURLForward ( ): void
+loadImage (fileName: string): void
+loadURL (uRL: string): void
+playVideo (fileName: string, loop: boolean): void
+stopVideo ( ): void
+updateURLPage ( ): void
<<event>> DirectIOEvent
+EventNumber: int32
+Data: int32
+Obj: object
<<fires>>
<<event>> ErrorEvent
+ErrorCode: int32
+ErrorCodeExtended: int32
+ErrorLocus: int32
+ErrorResponse: int32
<<fires>>
<<event>> OutputCompleteEvent
+OutputID: int32
<<fires>>
<<event>> StatusUpdateEvent
+Status: int32
<<fires>>

The following diagram shows the relationships between the Graphic Display classes.

Fig. Chap. 47-1 Graphic Display Class Diagram

Model

The following display modes exist in the graphics control, and the model differs depending on the display mode:

- Image display mode
- Video display mode.
- Web display mode.

The application can change the display mode by changing the value of the **DisplayMode** property.

Image Display Mode

The image display mode of the graphics control is as follows.

The application calls the **loadImage** method to display the image.
The **ImageTypeList** property lists image files that the device can display.
Applications need to support “hard total” services as image files displaying with **loadImage** method must be placed in the area managed by the “hard total” service.

Prior to start this mode, need to set the appropriate image type file value in the **ImageType** property from the listed values in the **ImageTypeList** property, if **CapImageType** property is true. Then the application can call the **loadImage** method to display the image.
Raises **StatusUpdateEvent** at the status change timing of image load start with status GDSP_SUE_START_IMAGE_LOAD and image load end with status GDSP_SUE_END_IMAGE_LOAD.

Applications may need to support “Hard Totals” services as image files displaying with **loadImage** method might be placed in the area managed by the associated “Hard Totals" service device. If the **CapStorage** is either GDSP_CST_ALL or GDSP_CST_HARDTOTALS_ONLY, it is possible to store it in the Associated Hard Totals device and storage device’s open name is held in the **CapAssociatedHardTotalsDevice** property.

If device supports both Hard Totals device and the host file system, the application should set the **Storage** property accordingly to tell where to write the image data file.

Video Display Mode

The video display mode of Graphic Display follows the general device behavior model for asynchronous output devices.
The graphics control of video display modes are as follows.

Prior to start this mode, need to set the appropriate video type file value in the **VideoType** property from the listed values in the **VideoTypeList** property, if **CapVideoType** property is true.
Then the application can call the **playVideo** method to display the video. Also, the video being displayed is stopped by calling the **stopVideo** method.

Raises **StatusUpdateEvent** at the status change timing of start play video with status GDSP_SUE_START_PLAY_VIDEO and stop play video with status GDSP_SUE_STOP_PLAY_VIDEO.

The Device validates the method parameters an error condition immediately if necessary. If the validation is successful, the Device does the following:

•Buffers the request in program memory, for delivery to the Physical Device as soon as the Physical Device can receive and process it.

• Sets the **OutputID** property to a unique integer identifier for this request.

• Returns as soon as possible.

When the Device successfully completes a request, an **OutputCompleteEvent** is enqueued for delivery to the application.

A property of this event contains the output ID of the completed request.

The application should compare the returned **OutputCompleteEvent** property OutputID value with the **OutputID** value set by the asynchronous process method call used to send the data in order to track what data has been successfully sent to the device.

If an error occurs while processing a request, an **ErrorEvent** is enqueued which will be delivered to the application after the events already enqueued, including **OutputCompleteEvents**. No further asynchronous output will occur until the event has been delivered to the application. If the response is ER_CLEAR, then outstanding asynchronous output is cleared.

If the response is ER_RETRY, then output is retried; note that if several outputs were simultaneously in progress at the time that the error was detected, thenthe Service may need to retry all of these outputs.

Asynchronous output is always performed on a first-in first-out basis. If the device supports concurrent playback, the request will be executed simultaneously.

If the request is terminated before completion, due to reasons such as the application calling the **clearOutput** method, then no **OutputCompleteEven**t is delivered. It can also delete the output individually by calling the **stopVideo** method. Also, in this case **OutputCompleteEvent** will not be notified.

The video files that the device can display are listed in the **VideoTypeList** property. Since video files to be displayed using the **playVideo** method must be placed in an area managed by the associated “Hard Totals" service device. If the **CapStorage** is either GDSP_CST_ALL or GDSP_CST_HARDTOTALS_ONLY, it is possible to store it in the Associated Hard Totals device and storage device’s open name is held in the **CapAssociatedHardTotalsDevice** property.

If device supports either or both Hard Totals device and the host file system, the application should set the **Storage** property accordingly to tell where to write the image data file.

The video display mode of graphics control follows an asynchronous output model. Raises **StatusUpdateEvent** if Graphic Display device power status or a device status changes are occurred during the video displaying.

Web Display Mode

The web display mode of graphics control is as follows.

The application calls the **loadURL** method to display the web page.

Raises **StatusUpdateEvent** at the timing of Web page load start with status GDSP_SUE_START_LOAD_WEBPAGE, load finish with status GDSP_SUE_FINISH_LOAD_WEBPAGE, and load cancel with status GDSP_SUE_CANCEL_LOAD_WEBPAGE. And application can detect the web page loading status.

The latest loading status of the web page is stored in the **LoadStatus** property when **loadURL** method is called, and its URL information is stored in the **URL** property.

In case when **cancelURLLoading** method is called during the loading process, current accessed URL information will be stored in the **URL** property.

The graphics control web display mode follows an asynchronous output model.

Device Sharing

The Graphic Display Device is an exclusive-use device, as follows:

- The application must claim the device before enabling it.
- The application must claim and enable the device before accessing some properties or calling methods that update the device.

See the “Summary” table for precise usage prerequisites.

Properties (UML attributes)

Brightness Property

Syntax **Brightness:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the brightness of screen. Legal values range from zero through 100. This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapBrightness** Property.

CapAssociatedHardTotalsDevice Property

Syntax **CapAssociatedHardTotalsDevice:** ***string*** **{read-only, access after open}**

Remarks Holds the open name of the associated Hard Totals device if the device is able to write to such devices which is the case if **CapStorage** is either GDSP_CST_ALL or GDSP_CST_HARDTOTALS_ONLY. If **CapStorage** is GDSP_CST_HOST_ONLY this property value must be the empty string. This property is initialized by the **open** method.

Errors UposException may be thrown when this property is accessed. For further information, see “Errors" on page Intro-20.

See Also **CapStorage** Property

CapBrightness Property

Syntax **CapBrightness:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the screen brightness.
If false, the application cannot change the screen brightness.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **Brightness** Property.

CapImageType Property

Syntax **CapImageType:** ***boolean*** **{read-only, access after open}**

Remarks If true, indicate the image type file to be used in this target device as the value of the **ImageType** property. Otherwise, it is false. This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **ImageType** Property**, ImageTypeList** Property

CapStorage Property

Syntax **CapStorage:** ***int32*** **{read-only, access after open}**

Remarks This is an enumeration and announces where the device is able to write the image data file to.
It holds one of the following values.

Value	Meaning
GDSP_CST_HARDTOTALS_ONLY	Only an associate Hard Totals device is supported.
GDSP_CST_HOST_ONLY	Only the host's file system is supported.
GDSP_CST_ALL	Both, the associated Hard Totals device and the host's file system is supported.

This property is initialized by the **open** method.

If a Hard Totals device is supported the Storage the property value should be GDSP_CST_HARDTOTALS_ONLY or GDSP_CST_ALL, and the property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

See Also **Storage** Property, **CapAssociatedHardTotalsDevice** Property

CapURLBack Property

Syntax **CapURLBack:** ***boolean*** **{read-only, access after open}**

Remarks If true, the previous page exists in the browsing history. Application can return to the previous page with **goURLBack** method.

If false, there is no previous page in the browsing history.

This property is initialized to false by the open method. Also, as the web page loading state changes, it is set by the device control.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **goURLBack** Method.

CapURLForward Property

Syntax **CapURLForward:** ***boolean*** **{read-only, access after open}**

Remarks If true, the next page exists in the browsing history. Application can go to the next page with the **goURLForward** method.
If false, there is no next page in the browsing history.
This property is initialized to false by the open method. Also, as the web page loading state changes, it is set by the device control.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **goURLForward** Method.

CapVideoType Property

Syntax **CapVideoType:** ***boolean*** **{read-only, access after open}**

Remarks If true, indicate the vide type value that can be used in this targeted graphics display device as the value of VideoType Property. Otherwise, it is false.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **VideoType** Property, **VideoTypeList** Property

CapVolume Property

Syntax **CapVolume:** ***boolean*** **{read-only, access after open}**

Remarks If true, the application can change the volume of video.
If false, the application cannot change the volume of video.
This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **Volume** Property.

DisplayMode Property

Syntax **DisplayMode:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the image and/or video displaying mode.

Value	Meaning
GDSP_DMODE_HIDDEN	It is a mode to hide images and/or video
GDSP_DMODE_IMAGE_FIT	It is a mode to display images. The displayed image is enlarged / reduced to the size that maintains the aspect and fits on the screen.
GDSP_DMODE_IMAGE_FILL	It is a mode to display images. The displayed image is scaled to the size that maintains the aspect and covers the entire screen.
GDSP_DMODE_IMAGE_CENTER	It is a mode to display images. The displayed image is displayed in the center of the screen without changing the size.
GDSP_DMODE_VIDEO_NORMAL	It is a mode to display video. The displayed video will be displayed in the center of the screen without resizing.
GDSP_DMODE_VIDEO_FULL	It is a mode to display video. The displayed video will be displayed in full screen.
GDSP_DMODE_WEB	Display the web screen.

If application hide other modes and screens while displaying images, videos, or web, all displayed contents will be cleared. The video will be stopped while the video is playing.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **loadImage** Method, **playVideo** Method

ImageType Property

Syntax **ImageType:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Contains the image file type that are support by the device, if **CapImageType** property is true. For example, if the device supports BMP, then this property should be set to “BMP”. This property value should be set prior to execute the loadImage method. All of the capable image file types are listed in the ImageTypeList property. *Notation contents may be different depending on the device. This property is initialized by the **open** method. Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **CapImageType** Property, **ImageTypeList** Property, **loadImage** Method.

ImageTypeList Property

Syntax **ImageTypeList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of image file type that are support by the device. For example, if the device only supports BMP and JPEG, then this property should be set to “BMP,JPEG”. One of value in the property should be set in the **ImageType** property, if **CapImageType** property is true, prior to execute the **loadImage** method.

*Notation contents may be different depending on the device.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

See Also **CapImageType** Property, **ImageType** Property, **loadImage** Method.

LoadStatus Property

Syntax **LoadStatus:** ***int32*** **{read-only, access after open}**

Remarks Holds loading state of web page.

The parameters to be set are as follows.

Value	Meaning
GDSP_LSTATUS_START	Start loading the web page.
GDSP_LSTATUS_FINISH	It has finished loading the web page.
GDSP_LSTATUS_CANCEL	It has canceled loading the web page

Its value is set prior to a **StatusUpdateEvent** being delivered to the application.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Storage Property

Syntax **Storage:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks This is an enumeration and defines where the device writes the recorded image data file to. Should be set before an appropriate method call.
It holds one of the following values.

Value	Meaning
GDSP_ST_HARDTOTALS	The image data file is written to the associated Hard Totals device. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.
GDSP_ST_HOST	The image data file is written to the host's file system.
GDSP_ST_HOST_HARDTOTALS	The encoded data file is written to the associated Hard Totals device and host's file system. The property **CapAssociatedHardTotalsDevice** holds the open name of the associated Hard Totals device.

This property is initialized by the **open** method according to the value hold by **CapStorage**. If **CapStorage** has the value GDSP_CST_ALL, it is initialized to GDSP_ST_HOST_HARDTOTALS.

Errors UposException may be thrown when this property is accessed.
For further information, see "Errors" on page Intro-20.

Value	Meaning
E_ILLEGAL	An invalid value was specified, or recording is ongoing.

See Also **CapStorage** Property, **CapAssociatedHardTotalsDevice** Property

URL Property

Syntax **URL:** ***string*** **{read-only, access after open-claim-enable}**

Remarks When the **LoadStatus** property is GDSP_LSTATUS_START, the URL of the Web page that starts loading is set.

When the **LoadStatus** property is GDSP_LSTATUS_FINISH, the URL of the loaded Web page is set.

When the **LoadStatus** property is GDSP_LSTATUS_CANCEL, the URL of the canceled Web page is set.

Its value is set prior to a **StatusUpdateEvent** being delivered to the application.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **loadStatus** Property.

VideoType Property

Syntax **VideoType:** ***string*** **{read-write, access after open-claim-enable}**

Remarks Contains the video file type that are support by the device, if **CapVideoType** property is true. For example, if the device supports AVI_MJPG, then this property should be set to "AVI_MJPG". This property value should be set prior to execute the **playVideo** method. All of the capable video file types are listed in the **VideoTypeList** property.
*Notation contents may be different depending on the device.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20. Some possible values of the exception's *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

See Also **CapVideoType** Property, **VideoTypeList** Property, **playVideo** Method.

VideoTypeList Property

Syntax **VideoTypeList:** ***string*** **{read-only, access after open}**

Remarks Contains the comma-delimited list of video file type that are support by the device. if the device only supports AVI_IYUV and AVI_MJPG, then this property should be set to "AVI_IYUV, AVI_MJPG". One of value in the property should be set in the **VideoType** property, if **CapImageType** property is true, prior to execute the **playVideo** method.

*Notation contents may be different depending on the device.

This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

See Also **CapVideoType** Property, **VideoType** Property, **playVideo** Method.

Volume Property

Syntax **Volume:** ***int32*** **{read-write, access after open-claim-enable}**

Remarks Holds the volume at playing video. Legal values range from zero through 100. This property is initialized by the **open** method.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's ***ErrorCode*** property are:

Value	**Meaning**
E_ILLEGAL	An invalid value was specified.

See Also **CapVolume** Property**, playVideo** Method.

Methods (UML operations)

cancelURLLoading Method

Syntax **cancelURLLoading ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Cancel loading web page.

This method is executed asynchronously. The load status is reported by **StatusUpdateEvent** and **OutputCompleteEven**t or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	It is not loading.

goURLBack Method

Syntax **goURLBack ( ):**
void {raises-exception, use after open-claim-enable}

Remarks It returns to the previous page of browsing history.

This method is executed asynchronously. The load status is reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	There is no previous page in the browsing history.

See Also **CapURLBack** Property.

goURLForward Method

Syntax **goURLForward ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Go to the next page of browsing history.

This method is executed asynchronously. The load status is reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	There is no next page in the browsing history.

See Also **CapURLForward** Property.

loadImage Method

Syntax **loadImage (fileName: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the file name of the image to be loaded.

Remarks Load the specified image.

This method fails if the value of the **DisplayMode** Property is not set to GDSP_DMODE_IMAGE_FIT, GDSP_DMODE_IMAGE_FILL, or GDSP_DMODE_IMAGE_CENTER.

Image files are located in the area as the stored values of the **Storage** property.

This method is executed asynchronously. Image file loading status is reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported image file was specified.
E_NOEXIST	File does not exist.

See Also **DisplayMode** Property.

loadURL Method

Syntax **loadURL (uRL: *string*):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
uRL	Specify the uRL of the web page to load.

Remarks Load the web page with the specified URL.

This method is executed asynchronously. The load status is reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see "**Errors**" on page Intro-20.

Some possible values of the exception's ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified.

playVideo Method

Syntax **playVideo (fileName:** ***string*****, loop:** ***boolean*****):**
void {raises-exception, use after open-claim-enable}

Parameter	Description
fileName	Specify the file name of the video to be played.
loop	If true, loop playback is performed, and if false, loop playback is not performed.

Remarks Play the video type file content that is specified using **VideoType** property. All of the video file values are listed in the **VideoTypeList** property, if **CapVideoType** property is true.

If the value of the **DisplayMode** property is not set to GDSP_DMODE_VIDEO_NORMAL, GDSP_DMODE_VIDEO_FULL, this method will fail.

This method is executed asynchronously. To stop video displaying in the middle, call the **stopVideo** method.

Video files are located in the area as the stored values of the **Storage** property.

The video file playing status will be informed by the **StatusUpdateEvent.**

This method is executed asynchronously. Image file loading status and video file playing status are reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s ***ErrorCode*** property are:

Value	Meaning
E_ILLEGAL	An invalid value was specified. Or an unsupported video file was specified.
E_NOEXIST	File does not exist.

See Also **DisplayMode** Property.

stopVideo Method

Syntax **stopVideo ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Stop the video being displayed.

This method is executed asynchronously. Video file loading status is reported by **StatusUpdateEven**t and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	The Video is not playing.

See Also **playVideo** Method.

updateURLPage Method

Syntax **updateURLPage ( ):**
void {raises-exception, use after open-claim-enable}

Remarks Reload the current web page.

This method is executed asynchronously. The load status is reported by **StatusUpdateEvent** and **OutputCompleteEvent** or **ErrorEvent**.

Errors A UposException may be thrown when this method is invoked. For further information, see “**Errors**" on page Intro-20.

Some possible values of the exception’s *ErrorCode* property are:

Value	Meaning
E_ILLEGAL	Web page loading.

Events (UML interfaces)

DirectIOEvent

<<event>> **upos::events::DirectIOEvent**

EventNumber	**:** ***int32*** **{read-only}**
Data	**:** ***int32*** **{read-write}**
Obj	**:** ***object*** **{read-write}**

Description Provides Service information directly to the application. This event provides a means for a vendor-specific Sound Player Service to provide events to the application that are not otherwise supported by the device control.

Attributes This event contains the following attributes:

Attribute	Type	Description
EventNumber	*int32*	Event number whose specific values are assigned by the Service.
Data	*int32*	Additional numeric data. Specific values vary by the *EventNumber* and the Service. This attribute is settable.
Obj	*object*	Additional data whose usage varies by the *EventNumber* and the Service. This attribute is settable.

Remarks This event is to be used only for those types of vendor specific functions that are not otherwise described.

Use of this event may restrict the application program programform being used with other vendor's devices which may not have any knowledge of the Service's need for this event.

See Also **"Events"** on page Intro-19, **directIO** method

ErrorEvent

<<event>> **upos::events:: ErrorEvent**

ErrorCode	**:** ***int32*****{read-write}**
ErrorCodeExtended	**:** ***int32*****{read-write}**
ErrorLocus	**:** ***int32*****{read-write}**
ErrorResponse	**:** ***int32*****{read-write}**

Description Notifies the application that a Graphic Display Device error has been detected and suitable response by the application is necessary to process the error condition.

Attributes This event contains the following attributes:

Attributes	Type	Description
ErrorCode	*int32*	Error code causing the error event. See a list of Error Codes on page 20.
ErrorCodeExtended	*int32*	Extended Error code causing the error event. If *ErrorCode is* E_EXTENDED, then see values below. Otherwise, it may contain a Service-specific value.
ErrorLocus	*int32*	Location of the error. If EL_OUTPUT is specified it is indicating that the error occurred while processing asynchronous output.
ErrorResponse	*int32*	Error response, whose default value may be overridden by the application (i.e., this attribute is settable).

See values below.

If ErrorCode is E_EXTENDED, then ErrorCodeExtended has one of the following values:

Value	Meaning
EGDSP_NOROOM	There is not enough room to store the targeted device for the image data file.

The *ErrorLocus* attribute has the following value:

Value	Meaning
EL_OUTPUT	Error occurred while processing asynchronous output.

The application's error event handler can set the *ErrorResponse* attribute to one of the following values:

Value	Meaning
ER_RETRY	Retry the asynchronous output. The error state is exited. This is the default response.
ER_CLEAR	Clear all buffered output data including all asynchronous output. (The effect is the same as when clearOutput method is called.) The error state is exited.

Remarks This event is enqueued when an error is detected, and the Device's **State** transitions into the error state.

See Also **"Error Handling"** on page Intro-23, **"Device Output Models"** on page Intro-25.

OutputCompleteEvent

<<event>> **upos::events::OutputCompleteEvent**
OutputID : int32{read-only}

Description Notify the application that the queued output request associated with the *outputID* property has completed successfully.

Attributes This event contains the following attributes:

Attribute	Type	Description
OutputID	*int32*	The ID number of the asynchronous output request that is complete.

Remarks This event is enqueued after the request's data has been both sent and the Service has confirmation that it was processed by the device successfully.

See Also **"Device Output Models"** on page Intro-25

StatusUpdateEvent

<<event>> **upos::events:: StatusUpdateEvent**
Status : *int32* {read-only}

Description *Notifies the application that there is an operation status change or a status of the Graphic Display device.*

Attributes This event contains the following attribute:

Attributes	Type	Description
Status	*int32*	Indicates a change of operation status of graphic display device

Note that Release 1.3 added Power State Reporting with additional *Power reporting* **StatusUpdateEvent** *values.*

The Update Firmware capability added additional *Status* values for communicating the status/progress of an asynchronous update firmware process. See "**StatusUpdateEvent**" description on page 1-34.

Value	Meaning
GDSP_SUE_START_IMAGE_LOAD	It will be notified when image loading start.
GDSP_SUE_END_IMAGE_LOAD	It will be notified when image loading end.
GDSP_SUE_START_LOAD_WEBPAGE	Start loading the web page.
GDSP_SUE_FINISH_LOAD_WEBPAGE	It has finished loading the web page.
GDSP_SUE_CANCEL_LOAD_WEBPAGE	It has canceled loading the web page.
GDSP_SUE_START_PLAY_VIDEO	Start playing video.
GDSP_SUE_STOP_PLAY_VIDEO	Stop playing video.

Remarks Enqueued when the Graphic Display Device detects a power state change or a status change.

See Also **"Events"** on page Intro-19.

A P P E N D I X K

Relationship to other OMG specification and activities

Robotics Domain Task Force

Activities in Robotics Domain Task Force

The OMG Robotics Domain Task Force (Robotics DTF) fosters the integration of robotics systems from modular components through the adoption of OMG standards. It recommends the adoption and extends OMG technologies that apply to the specific domain of robotics systems where no current baseline specifications exist, such as MDA for Robotics. The object technology is not solely limited to software but is extended to real objects. It also collaborates with other organizations for standardization, such as the one for home information appliances, and makes an open effort to increase interoperability in the field of robotics.

(https://www.omg.org/robotics/)

RoIS Specification

Robotic Interaction Service Framework [RoIS] defines several functional components for robotic interaction services.

Definitions related to locations of entities in robotic services will be described with Robotic Localization Service[RLS]. Definitions of status of components in services will be described in conjunction with Robotic Technology Component [RTC], Finite State Machine Component for RTC [FSM4RTC] and Unified Component Model for Distributed Real-Time and Embedded Systems [UCM].

RoIS specification seeks that specify a RoIS framework, on top of which various service robot applications are developed.

Scope of RoIS specification

They are summarized in the following items.

- Interface between service application and Human Robot Interaction (HRI) engine
- Interface to obtain information from HRI Engine according to the timing of the service application’s needs (Query)
- Interface to receive information from HRI Engine triggered by real time events (Event notification / subscription / cancellation)
- Interface for instructions to device control HRI Engine functions (Command)
- Definition of common messages for all HRI Engines

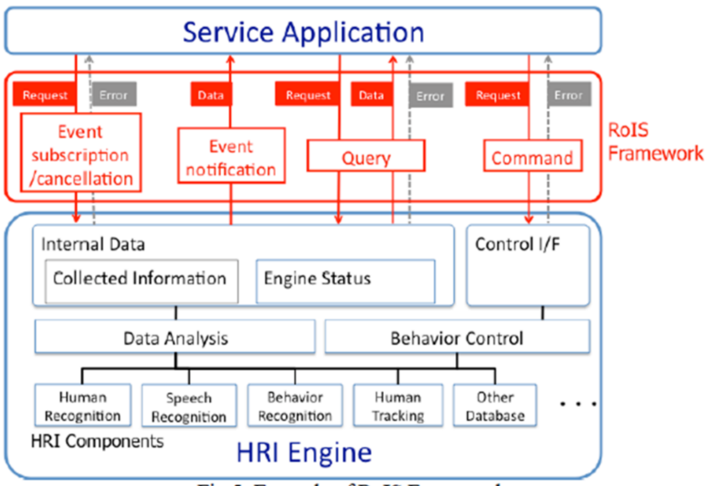


Fig.5: Example of RoIS Framework

Robot Service Ontology [RoSO] RFP

A new RFP of Robot Service Ontology[RoSO] currently being discussed in Robotics DTF are based on the concept of RoIS.

RoSO is aiming to define the specification (ontology) that clarifies the concept of a common vocabulary and / or a robot service in order to describe a service provided by a robot or exchange a description of a service provided by a service robot

Below is an example of HRI main component examples from this point of view.

Table K-1 – (From RoIS 1.2) Basic HRI Components

HRI Component Name	**Description**
system information	Provides the information of the system such as status of the system and position of the physical unit.
person detection	Detects number of people
person localization	Detects position of people
person identification	Identifies ID (name) of people
face detection	Detects number of human faces
face localization	Detects position of human faces
sound detection	Detects number of sound sources
sound localization	Detects position of sound sources
speech recognition	Recognizes person’s speech
gesture recognition	Recognizes person’s gesture
speech synthesis	Generates robot speech
reaction	Performs specified reaction
navigation	Moves to specified target location
follow	Follows a specified target object
move	Moves to specified distance or curve

Interoperability between UPOS RCSD and RoIs

Rleationsihp between UPOS RCSD and RoIS

OMG's Robotics standard provides a lower level control layer to manage Robot Device with finer granularity and higher accuracy to accommodate a wide range of industry applications.

On the other hand, the UPOS RCSD specification focuses on the functioning of robotic equipment within the retail store environment. In the UPOS RCSD specification robots are treated as peripheral equipment of the latest POS system. Therefore, the UPOS RCSD specification focuses on the definition of the interface between the POS and the robotic device.

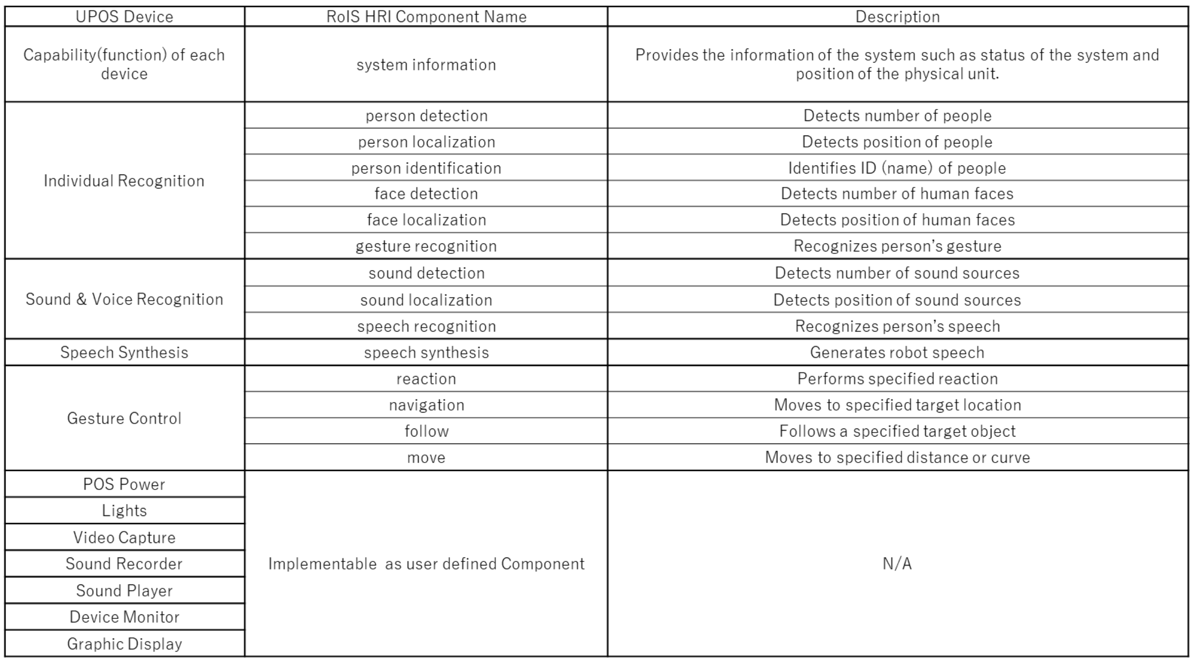
RoIS is already existing as OMG standard and it defined a component frame service that was intended for robotic communication services with people.

Therefore, ROIS developed a general robot service framework, which is different from UPOS RCSD, but it is possible to describe the function of UPOS RCSD.

To confirm the compatibility and interoperability of the RCSD functions of RoIS and UPOS, both DTFs created and confirmed the function mapping table.

For this purpose, we use the general RoIS HRI component defined in the RoIS 1.2

UPOS RCSD Device and HRI Components Mapping Check Result



UPOS Device	RoIS HRI Component Name	Description
Capability(function) of each device	system information	Provides the information of the system such as status of the system and position of the physical unit.
Individual Recognition	person detection	Detects number of people
	person localization	Detects position of people
	person identification	Identifies ID (name) of people
	face detection	Detects number of human faces
	face localization	Detects position of human faces
	gesture recognition	Recognizes person's gesture
Sound & Voice Recognition	sound detection	Detects number of sound sources
	sound localization	Detects position of sound sources
	speech recognition	Recognizes person's speech
Speech Synthesis	speech synthesis	Generates robot speech
Gesture Control	reaction	Performs specified reaction
	navigation	Moves to specified target location
	follow	Follows a specified target object
	move	Moves to specified distance or curve
POS Power	Implementable as user defined Component	N/A
Lights		
Video Capture		
Sound Recorder		
Sound Player		
Device Monitor		
Graphic Display		

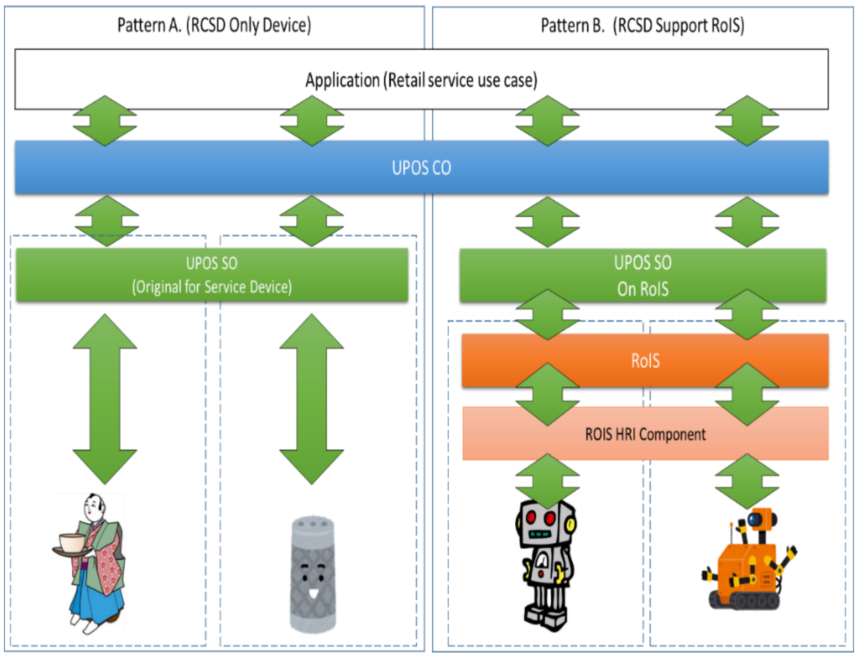
specification.

The two teams continue to collaborate between the part of their separate RFP's and standards that will be established.

For that purpose, it is very necessary to understand the common vocabulary of the robot service and the needs of the ontology.

If each team's specification satisfies the above mapping table, it is confirmed that the standard can be maintained independently.

In addition, the figure below shows a typical scenario where RCSD and RoIS work independently or in conjunction.


Pattern A. (RCSD Only Device)
Pattern B. (RCSD Support RoIS)
Application (Retail service use case)
UPOS CO
UPOS SO
(Original for Service Device)
UPOS SO
On RoIS
RoIS
ROIS HRI Component

Document History

Version History

Ver	Date	Sections	Description of Change
1.0	2019-2-18		Initial Version – additions and updates to UPOS v1.15
1.1	2019-7-09		Revised for the issues and additions from the Review
1.2	2020-2-21		Issues, Updates are added version from the Review
1.3	2020-7-16		Issues, Updates are added version from the Review
1.4	2021-08-10		Issues, Updates are added version from the Review

Glossary

Term	Definition
EVRW	Electronic Value Reader Writer
CAT	Credit Authorization Terminal