Certified Capability List

This Capability List is based on a certification session performed by the *TALQ Certification Tool (v2.5.0-update.2) on 2023-04-11 11:36:21.851 +0200.*

The Capability List is a consolidated list of TALQ features which are implemented in a product.

The tool has succesfully performed *113 tests*.

Product details

Product Name	SmartLinx
Company	LED Roadway Lighting
Type	CMS
URL	http://localhost:8080/reports/api/talq_tct
Notes	
Generated on	2023-04-11 11:36:21.851 +0200
Supported profiles	• Environmental Monitoring • Lighting • Lighting Asset Management • Smart Parking • Smart Traffic • Waste Management
API version certified:	2.5.0
Certification performed by app version:	2.5.0-update.2

Capability list

Security

Enabled ✔

Functions

Basic

The Basic function describes the properties related to the physical asset to which the logical device is associated, such as identification (assetId) and location information.

Attributes

#	Attribute	Description
✔	displayName	Display name of the asset.
✔	assetId	Customer identifier of the asset. If multiple devices have the same assetId it means they belong to the same asset.
✔	serial	Serial number of the device.
✔	hwType	Hardware type of the device.
✔	hwVersion	Hardware revision of the device.
✔	swType	Software type of device. This attribute may be useful if the same hardware supports multiple firmware versions with different functions.
✔	swVersion	Software version installed on the device.
✔	installationDate	The installation date of Physical Device.
✔	location	Latitude, Longitude and Altitude. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new LocationSensorFunction.location instead.]
✔	deviceReset	The physical device containing the logical device was reset.
✔	softwareUpdating	Indicates software updating is in progress.
✔	hardwareUpdating	Indicates that hardware associated with this logical device has been updated. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new hardwareUpdated instead.]
✔	hardwareUpdated	Indicates that hardware associated with this logical device has been updated.
✔	batteryMode	Device operating in battery mode.
✔	installationMode	Device is being installed.
✔	maintenanceMode	Device is undergoing maintenance, where maintenance may include hardware or software related maintenance actions.

✔	cabinetDoorOpen	Cabinet door is open. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new SegmentMonitor.cabinetDoorOpen instead.]
✔	batteryShutdown	Indicates the device has shut down due to battery discharge.
✔	locationUpdated	Indicates the location of a device has changed, but detecting the change is outside the scope of the TALQ Specification. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new LocationSensorFunction.locationChanged instead.]
✔	timeZone	Time zone of the device. Time zone may be expressed in two formats. <timezone> where <timezone> is a time zone as defined in the zone.tab of the IANA timezone database [IANA]; and stdoffset[dst[offset][,start[/time],en d[/time]]] as defined by the Open Group for posix systems [POSIX]. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TimeFunction.timeZone instead.]
✔	ntpServers	List of NTP servers to use for time synchronization (Hostname or IP address). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TimeFunction.ntpServers instead.]
✔	ntpSynchPeriod	Number of hours between two time synchronization updates. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TimeFunction.ntpSynchPeriod instead.]
✔	currentTime	Current time of the device defined as local time with time zone designator. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TimeFunction.currentTime instead.]
✔	commandConfirmation	Allows the CMS to reboot, factory reset or configuration reset of the device. Before rebooting or resetting the device this attribute has to be true. Default value = false
✔	reboot	Reboot the device. This operational attribute requires the commandConfirmation attribute value to be set to true.
✔	factoryReset	Reset the device to factory settings. This operational attribute requires the commandConfirmation attribute value to be set to true.
✔	configurationReset	Reset the device configuration settings. This operational attribute requires the commandConfirmation attribute value to be set to true.
✔	operatingHours	Number of operating hours of the device.

Events

#	Event type	Description
✔	deviceReset	The physical device containing the logical device was reset
✔	softwareUpdating	Indicates software updating is in progress

✔	hardwareUpdated	Indicates that hardware associated with this logical device has been updated
✔	batteryMode	Device operating in battery mode
✔	installationMode	Device is being installed
✔	maintenanceMode	Device is undergoing maintenance
✔	cabinetDoorOpen	Cabinet door is open. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new SegmentMonitor.cabinetDoorOpen instead.]
✔	batteryShutdown	Indicates the device has shut down due to battery discharge
✔	locationUpdated	Indicates the location of a device has changed.

Communication

The Communication Function contains attributes related to the communication within the ODN, and between ODN devices and Gateways. Although communication within the ODN is outside the scope of the TALQ Smart City Protocol, this Function enables access to a minimum set of configuration and state information of the ODN communication interface in order to facilitate system management from the CMS.

Attributes

#	Attribute	Description
✔	communicationType	Type of communication technology implemented by the ODN (e.g. power line, wireless).
✔	logicalAddress	Logical address for communication within the ODN scope (IP address, Short Address, ...).
✔	altLogicalAddress	Additional logical address used for communication within the ODN, for instance, group communication address (not a TALQ group address).
✔	physicalAddress	Physical address of the device. For example, IEEE MAC address. This attribute can be used to map between logical and physical devices. The format is specific to the ODN implementation.
✔	parentAddress	TALQ Address of the parent device, e.g. gateway. It shall point to a specific communication function.
✔	timeToLive	Number of times a packet can be forwarded within the ODN.
✔	repeatingEnabled	Describes whether repeating functionality is enabled at the device.
✔	transmitPower	Transmit power used by the device within the ODN.
✔	numberOfHops	Number of hops between the gateway and the ODN device represented by the device including this function.
✔	communicationQuality	Indicator of the quality of the communication with the device. 100% means good quality.
✔	communicationFailure	This attribute is updated by the ODN when the communication function is not operating as expected.

✔	applicationType	Application Type of the communication function depending on the use case. E.g.: PL Communication Monitor

Events

#	Event type	Description
✔	communicationFailure	This event is generated by the ODN when the communication function is not operating as expected

Gateway

The Gateway function includes the necessary attributes to enable the communication between the CMS and the Gateway according to the TALQ Specification.

Attributes

#	Attribute	Description
✔	cmsUri	Base URI for TALQ communication that allows the Gateway to access the CMS. Must be an absolute URI. Other URI's for accessing CMS can be relative to this base.
✔	cmsAddress	CMS UUID address
✔	gatewayUri	Base URI for TALQ communication that allows the CMS to access the Gateway. Must be an absolute URI. Other URI's for accessing Gateway can be relative to this base.
✔	gatewayAddress	Gateway UUID address
✔	retryPeriod	Time duration before the Gateway retransmits a message for which expected response has not been received. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new GatewayFunction.gatewayRetryPeriod instead.]
✔	gatewayRetryPeriod	Time duration before the Gateway retransmits a message for which the expected response has not been received. This attribute can be used by the CMS to avoid requests overload. Although this attribute will be mandatory for Gateway in future MAJOR versions, to keep backward compatibility it is considered optional for the existing profiles.
✔	cmsRetryPeriod	Time duration before the CMS retransmits a message for which the expected response has not been received. This attribute can be used by the Gateway to avoid requests overload. Although this attribute will be mandatory for CMS in future MAJOR versions, to keep backward compatibility it is considered optional for the existing profiles.

✔	gatewayNumberOfRetries	Maximum number of retries for a failed request sent by the Gateway for which expected response has not been received. Default value shall be 3. This attribute can be used by the CMS to avoid requests overload. Although this attribute will be mandatory for Gateway in future MAJOR versions, to keep backward compatibility it is considered optional for the existing profiles.
✔	cmsNumberOfRetries	Maximum number of retries for a failed request sent by the CMS for which expected response has not been received. Default value shall be 3. This attribute can be used by the Gateway to avoid requests overload. Although this attribute will be mandatory for CMS in future MAJOR versions, to keep backward compatibility it is considered optional for the existing profiles.
✔	crlUrn	URI where the Gateway can obtain the Certification Revocation List (CRL).
✔	vendor	Vendor identification.
✔	pkgUrl	URL pointing at location packages can be downloaded. This is used in the data package service.
✔	currentReleaseId	Release ID of currently deployed release. This is used in the data package service.
✔	newCmsAttached	This attribute is updated if, prior to the current bootstrap, one or more other CMS were already attached. Support for more than one CMS is optional.

Lamp Actuator

The Lamp Actuator function includes attributes related to lighting control and it represents the smallest unit for control purposes. In practice, however, a Lamp Actuator function can control combinations of several lamps and control gear but all in the same way, as if they are all one individual unit.

Attributes

#	Attribute	Description
✔	lampTypeId	TALQ Address of an existing lampType.
✔	outputPort	Identifier of the output port that is controlled by the lamp actuator.
✔	standbyMode	Defines the behavior of the lamp actuator when output level is set to zero. If OFF, light output level is zero with no power to the lamp control gear. If ON, light output level is zero but power is delivered to the lamp control gear (standby mode).
✔	cloEnabled	Determines whether a Constant Light Output (CLO) correction factor is used. CLO is used to compensate for lumen output degradation over the life time of the lamp. If CLO is enabled, lamps are dimmed part of the lampType.

✔ defaultLightState	Sets the default light output for the lamp actuator. This shall be applicable if no other command is active. This attribute shall be set to 100% as default value.
✔ targetLightCommand	Latest command for the lamp actuator.
✔ feedbackLightCommand	This attribute reflects the command in effect and it might deviate from the actualLightState due to propagation time or due to internal ODN specific mechanisms to handle the priority of the requests.
✔ actualLightState	This attribute should reflect the physical state of the light source as much as possible, including factors such as CLO. It may be calculated or measured, depending on the specific ODN implementation, which is outside the scope of this specification.
✔ maintenanceFactorEnabled	Indicates whether maintenance compensation is enabled. A maintenance factor can be added in addition to the CLO correction factor to account effects of maintenance (e.g. cleaning) of the luminaire on the lumen output.
✔ maintenancePeriod	Period (Hours) after which maintenance factor is 100%. The assumption is that the maintenance correction factor vs. time curve is linear.
✔ maintenanceFactor	Initial correction factor applied when the luminaire is cleaned.
✔ lastMaintenanceDate	Date when the luminaire was last cleaned (used to reset the maintenance factor).
✔ calendarID	TALQ Address of the calendar controlling this lamp actuator. If this attribute is empty, the behavior shall be determined by the ODN. If the attribute is invalid, the ODN shall trigger a generic invalid address event and the behavior shall be determined by the ODN.
✔ invalidCalendar	The lamp actuator function has been allocated a calendar that it cannot implement.
✔ invalidProgram	The lamp actuator function has been allocated a control program that it cannot implement.
✔ lightStateChange	Light state has changed.
✔ targetLightCommandChange	The targetLightCommand operational attribute has changed.
✔ programChange	The control program applicable to the lamp actuator has changed (these are the points at which the calendar changes the program).
✔ calendarChange	The calendar applicable to the lamp actuator has changed.
✔ invalidLampType	Indicates that the lamp type referred cannot be applied.
✔ applicationType	Application Type of the lamp actuator depending on the use case. E.g.: Lamp actuator, Cabinet actuator

Events

#	Event type	Description
✔	lightStateChange	Light state has changed
✔	invalidCalendar	The lamp actuator function has been allocated a calendar that it cannot implement
✔	invalidProgram	The lamp actuator function has been allocated a control program that it cannot implement
✔	targetLightCommandChange	The targetLightCommand operational attribute has changed
✔	programChange	The control program applicable to the lamp actuator has changed
✔	calendarChange	The calendar applicable to the lamp actuator has changed
✔	invalidLampType	Indicates that the lamp type referred cannot be applied.

Lamp Monitor

The Lamp Monitor function enables monitoring of lamp parameters. A Lamp Monitor function should be associated with a specific lamp/control gear combination. Multiple lamp monitor functions may be implemented by a single device.

Attributes

#	Attribute	Description
✔	supplyType	Supply type of the lamp. Accepted values are: AC, DC.
✔	monitoringReference	Name of the entity (or physical device) being monitored by this function.
✔	numberOfLamps	Number of lamps being monitored by the lamp monitor function.
✔	switchOnCounter	Cumulative number of ON/OFF cycles since installation of the lamp. The wrap around value is 2e32 - 1.
✔	operatingHours	Number of hours the lamp is on. This is the value used in CLO and may be set by the CMS.
✔	temperature	Temperature of the device implementing this function. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperature instead.]
✔	supplyVoltage	RMS supply volts when supplyType is AC, supply voltage (V) when supplyType is DC.
✔	supplyCurrent	RMS supply current (A) when supplyType is AC, supply current (A) when supplyType is DC.
✔	activePower	Active power.
✔	reactivePower	Reactive power.

✔ apparentPower	Apparent Power.
✔ powerFactor	Active power/Apparent power.
✔ powerFactorSense	Phase sense of power factor.
✔ activeEnergy	Cumulative active energy (since installation or counter reset).
✔ supplyLossCount	Incrementing count of supply losses. The wrap around value is 2e32 - 1.
✔ lampPowerTooHigh	Lamp power is greater than expected lamp power + lampPowerTolerance.
✔ lampPowerTooLow	Lamp power is smaller than expected lamp power - lampPowerTolerance
✔ lampVoltageTooHigh	Level of lamp voltage (not supply voltage) is greater than highLampVoltageThreshold.
✔ lampVoltageTooLow	Level of lamp voltage (not supply voltage) is smaller than lowLampVoltageThreshold.
✔ lampFailure	The lamp is not operating as it is supposed to (e.g. the lamp is broken). This event shall be used to detect a situation where the lamp (or LED module(s)) should be lit, but produce no light. This could be detected by the current flowing or power consumed.
✔ dimmingFailure	The lamp is not dimming as it is supposed to (e.g. the driver is not connected properly). This event shall be used to detect a situation where the lamp (or LED module(s)) is lighting at a dimming level which is different from the expected dimming level, taking into account the programmed (or manual) level as well any correction (e.g. virtual power, constant light output).
✔ currentTooHigh	Supply current is above the highCurrentThreshold defined in the lamp type.
✔ currentTooLow	Supply current is below the lowCurrentThreshold defined in the lamp type.
✔ powerFactorTooLow	The power factor is below powerFactorThreshold.
✔ highTemperature	Indicates temperature is above the high threshold [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooHigh instead.]
✔ relayFailure	Set in case of internal relay is failing (e.g. it may be stuck in either on or off position). Typically if contactor error isused as well.

✔	absolutLampPowerTooHigh	Indicates the power is above the lampPowerHighThreshold in the lamp type. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new absoluteLampPowerTooHigh instead.]
✔	absolutLampPowerTooLow	Indicates the power is below the lampPowerLowThreshold in the lamp type. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new absoluteLampPowerTooLow instead.]
✔	absoluteLampPowerTooHigh	Indicates the power is above the lampPowerHighThreshold in the lamp type
✔	absoluteLampPowerTooLow	Indicates the power is below the lampPowerLowThreshold in the lamp type
✔	controlGearCommFailure	Indicates failure of the control gear.
✔	cyclingFailure	Indicates the lamp is constantly switching ON and OFF in an unexpected manner. This event shall be used to indicate a lamp which cycles while it should be on. The actual detection algorithm is outside the scope of this specification.
✔	supplyLoss	Indicates loss of mains power.
✔	contactorError	Indicates error in contactor
✔	lampUnexpectedOn	Indicates lamp is unexpectedly on.
✔	leakageDetected	Indicates that an earth leakage fault has been detected.
✔	supplyVoltageTooHigh	Level of supply voltage is above the highLampVoltageThreshold.
✔	supplyVoltageTooLow	Level of supply voltage is below the lowSupplyVoltageThreshold.
✔	highSupplyVoltageThreshold	Supply voltage above which the supplyVoltageTooHigh event is triggered.
✔	lowSupplyVoltageThreshold	Supply voltage below which the supplyVoltageTooLow event is triggered.
✔	applicationType	Application Type of the lamp monitor depending on the use case. E.g.: LED Monitor

Events

#	Event type	Description
✔	lampPowerTooHigh	Lamp power is greater than expected lamp power + lampPowerTolerance
✔	lampPowerTooLow	Lamp power is smaller than expected lamp power - lampPowerTolerance

✔ lampVoltageTooHigh	Level of lamp voltage (not supply voltage) is greater than highLampVoltageThreshold.
✔ lampVoltageTooLow	Level of lamp voltage (not supply voltage) is smaller than lowLampVoltageThreshold.
✔ currentTooHigh	Supply current is above the highCurrentThreshold defined in the lamp type
✔ currentTooLow	Supply current is below the lowCurrentThreshold defined in the lamp type
✔ powerFactorTooLow	The power factor is below powerFactorThreshold
✔ lampFailure	The lamp is not operating as it is supposed to (e.g. the lamp is broken). This event shall be used to detect a situation where the lamp (or LED module(s)) should be lit, but produce no light. This could be detected by the current flowing or power consumed.
✔ dimmingFailure	The lamp is not dimming as it is supposed to (e.g. the driver is not connected properly). This event shall be used to detect a situation where the lamp (or LED module(s)) is lighting at a dimming level which is different from the expected dimming level, taking into account the programmed (or manual) level as well any correction (e.g. virtual power, constant light output).
✔ highTemperature	Indicates temperature is above the high threshold
✔ relayFailure	Set in case of internal relay is failing
✔ absoluteLampPowerTooHigh	Indicates the power is above the lampPowerHighThreshold in the lamp type
✔ absoluteLampPowerTooLow	Indicates the power is below the lampPowerLowThreshold in the lamp type
✔ controlGearCommFailure	Indicates failure of the control gear
✔ cyclingFailure	Indicates the lamp is constantly switching ON and OFF in an unexpected manner
✔ supplyLoss	Indicates loss of mains power
✔ contactorError	Indicates error in contactor
✔ lampUnexpectedOn	Indicates lamp is unexpectedly on
✔ leakageDetected	Indicates that an earth leakage fault has been detected
✔ supplyVoltageTooHigh	Level of supply voltage is above the highLampVoltageThreshold.
✔ supplyVoltageTooLow	Level of supply voltage is below the lowSupplyVoltageThreshold.

Electrical Meter

The electrical meter function supports electrical metering capabilities including measurements of voltage, current, power, energy, and power factor. This function may be associated with Luminaire Controllers, Cabinet Controllers or electrical meters installed in switch boxes. ODNs may implement both single phase and three phase meters. Typically meters within a control device will be single phase and stand-alone meters. A street side cabinet may have single phase or three phase meters.

Attributes

#	Attribute	Description
✔	totalPowerHighThreshold	Power above which the totalPowerTooHigh event is triggered.
✔	totalPowerLowThreshold	Power below which the totalPowerTooLow event is triggered.
✔	powerfactorThreshold	Power factor below which the powerfactorTooLow event is triggered.
✔	phase1PowerfactorLowThreshold	Phase 1 power factor below which the phase1PowerfactorTooLow event is triggered.
✔	phase2PowerfactorLowThreshold	Phase 2 power factor below which the phase2PowerfactorTooLow event is triggered.
✔	phase3PowerfactorLowThreshold	Phase 3 power factor below which the phase3PowerfactorTooLow event is triggered.
✔	supplyVoltageHighThreshold	Supply voltage above which the supplyVoltageTooHigh event is triggered.
✔	supplyVoltageLowThreshold	Supply voltage below which the supplyVoltageTooLow event is triggered.
✔	phase1VoltageHighThreshold	RMS voltage above which the phase1VoltageTooHigh event is triggered.
✔	phase1VoltageLowThreshold	RMS voltage below which the phase1VoltageTooLow event is triggered.
✔	phase2VoltageHighThreshold	RMS voltage above which the phase2VoltageTooHigh event is triggered.
✔	phase2VoltageLowThreshold	RMS voltage below which the phase2VoltageTooLow event is triggered.
✔	phase3VoltageHighThreshold	RMS voltage above which the phase3VoltageTooHigh event is triggered.
✔	phase3VoltageLowThreshold	RMS voltage below which the phase3VoltageTooLow event is triggered.
✔	totalCurrentHighThreshold	RMS current above which the currentTooHigh event is triggered.
✔	totalCurrentLowThreshold	RMS current below which the currentTooLow event is triggered.
✔	neutralCurrentHighThreshold	RMS current above which the neutralCurrentTooHigh event is triggered.

✔ phase1CurrentHighThreshold	RMS current above which the phase1CurrentTooHigh event is triggered.
✔ phase1CurrentLowThreshold	RMS current below which the phase1CurrentTooLow event is triggered.
✔ phase2CurrentHighThreshold	RMS current above which the phase2CurrentTooHigh event is triggered.
✔ phase2CurrentLowThreshold	RMS current below which the phase2CurrentTooLow event is triggered.
✔ phase3CurrentHighThreshold	RMS current above which the phase3CurrentTooHigh event is triggered.
✔ phase3CurrentLowThreshold	RMS current below which the phase3CurrentTooLow event is triggered.
✔ phase1ActivePowerHighThreshold	Power above which the phase1ActivePowerTooHigh event is triggered.
✔ phase1ActivePowerLowThreshold	Power below which the phase1ActivePowerTooLow event is triggered.
✔ phase2ActivePowerHighThreshold	Power above which the phase2ActivePowerTooHigh event is triggered.
✔ phase2ActivePowerLowThreshold	Power below which the phase2ActivePowerTooLow event is triggered.
✔ phase3ActivePowerHighThreshold	Power above which the phase3ActivePowerTooHigh event is triggered.
✔ phase3ActivePowerLowThreshold	Power below which the phase3ActivePowerTooLow event is triggered.
✔ totalPower	Sum of the active power consumed on phase 1, 2 and 3, or just the power for a single phase meter.
✔ totalVA	Sum of the apparent power consumed on phase 1, 2 and 3, or just the apparent power for a single phase meter.
✔ totalVAR	Sum of the reactive power consumed on phase 1, 2 and 3, or just the reactive power for a single phase meter.
✔ maxDemandPower	Maximum peak power consumption.
✔ totalActiveEnergy	Total cumulative kWh measured by the meter since installation date (or counter reset).
✔ totalReactiveEnergy	Total cumulative kVArh measured by the meter since installation date (or counter reset).
✔ totalApparentEnergy	Total cumulative kVAh measured by the meter since installation date (or counter reset).
✔ frequency	Frequency on the line.
✔ totalPowerFactor	Total active power divided by total apparent power.

✔ totalPowerFactorSense	Sense of power factor (lead or lag).
✔ phase1PowerFactor	Power factor on phase 1.
✔ phase1PowerFactorSense	Sense of power factor (lead or lag).
✔ phase2PowerFactor	Power factor on phase 2.
✔ phase2PowerFactorSense	Sense of power factor (lead or lag).
✔ phase3PowerFactor	Power factor on phase 3.
✔ phase3PowerFactorSense	Sense of power factor (lead or lag).
✔ supplyVoltage	Average between Phase1 RMS Voltage, Phase2 RMS Voltage and Phase3 RMS Voltage, or in the case of a single phase meter just the RMS supply voltage.
✔ phase1Voltage	RMS Voltage between phase 1 and neutral.
✔ phase2Voltage	RMS Voltage between phase 2 and neutral.
✔ phase3Voltage	RMS Voltage between phase 3 and neutral.
✔ voltagePhase1Phase2	RMS Voltage between phase 1 and phase 2.
✔ voltagePhase2Phase3	RMS Voltage between phase 2 and phase 3.
✔ voltagePhase3Phase1	RMS Voltage between phase 3 and phase 1.
✔ totalCurrent	Sum of the RMS currents on phase 1, 2 and 3.
✔ averageCurrent	Average RMS current on phase 1, 2 and 3.
✔ neutralCurrent	RMS current on neutral.
✔ phase1Current	RMS current on phase 1.
✔ phase2Current	RMS current on phase 2.
✔ phase3Current	RMS current on phase 3.
✔ phase1ActivePower	Active Power on phase 1.
✔ phase2ActivePower	Active Power on phase 2.
✔ phase3ActivePower	Active Power on phase 3.
✔ phase1ApparentPower	Apparent Power on phase 1.
✔ phase2ApparentPower	Apparent Power on phase 2.
✔ phase3ApparentPower	Apparent Power on phase 3.
✔ phase1ReactivePower	Reactive Power on phase 1.
✔ phase2ReactivePower	Reactive Power on phase 2.
✔ phase3ReactivePower	Reactive Power on phase 3.
✔ phase1ActiveEnergy	Cumulative active energy on phase 1.
✔ phase2ActiveEnergy	Cumulative active energy on phase 2.
✔ phase3ActiveEnergy	Cumulative active energy on phase 3.

✔ worstCurrentTHD	Worst value for Total Harmonic Distortion on current (all 3 phases).
✔ phase1CurrentTHD	Total Harmonic Distortion on current for phase 1.
✔ phase2CurrentTHD	Total Harmonic Distortion on current for phase 2.
✔ phase3CurrentTHD	Total Harmonic Distortion on current for phase 3.
✔ worstVoltageTHD	Worst Total Harmonic Distortion on voltage (all 3 phases).
✔ averageVoltageTHD	Average value of Total Harmonic Distortion on voltage.
✔ phase1VoltageTHD	Total Harmonic Distortion on voltage for phase 1.
✔ phase2VoltageTHD	Total Harmonic Distortion on voltage for phase 2.
✔ phase3VoltageTHD	Total Harmonic Distortion on voltage for phase 3.
✔ phase1_2VoltageTHD	Total Harmonic Distortion on voltage between phase 1 and phase 2.
✔ phase2_3VoltageTHD	Total Harmonic Distortion on voltage between phase 2 and phase 3.
✔ phase3_1VoltageTHD	Total Harmonic Distortion on voltage between phase 3 and phase 1.
✔ supplyLossCount	Incrementing count of supply losses. In the case of 3 phases the count of losses on all three phases together. The wrap around value is 2e32 - 1.
✔ phase1SupplyLossCount	Incrementing count of supply losses on Phase 1. The wrap around value is 2e32 - 1.
✔ phase2SupplyLossCount	Incrementing count of supply losses on Phase 2. The wrap around value is 2e32 - 1.
✔ phase3SupplyLossCount	Incrementing count of supply losses on Phase 3. The wrap around value is 2e32 - 1.
✔ totalPowerTooHigh	Indicates total power is above the totalPowerHighThreshold.
✔ totalPowerTooLow	Indicates total power is below the totalPowerLowThreshold.
✔ powerfactorTooLow	Indicates the power factor is below the powerfactorThreshold.
✔ phase1PowerfactorTooLow	Indicates the phase 1 power factor is below the phase1PowerfactorLowThreshold.
✔ phase2PowerfactorTooLow	Indicates the phase 2 power factor is below the phase2PowerfactorLowThreshold
✔ phase3PowerfactorTooLow	Indicates the phase 3 power factor is below the phase3PowerfactorLowThreshold

✔ supplyVoltageTooHigh	Indicates supply voltage is above the supplyVoltageHighThreshold.
✔ supplyVoltageTooLow	Indicates supply voltage is below the supplyVoltageLowThreshold.
✔ phase1VoltageTooHigh	Indicates phase 1 supply voltage is above the phase1VoltageHighThreshold.
✔ phase1VoltageTooLow	Indicates phase 1 supply voltage is below the phase1VoltageLowThreshold.
✔ phase2VoltageTooHigh	Indicates phase 2 supply voltage is above the phase2VoltageHighThreshold.
✔ phase2VoltageTooLow	Indicates phase 2 supply voltage is below the phase2VoltageLowThreshold.
✔ phase3VoltageTooHigh	Indicates phase 3 supply voltage is above the phase3VoltageHighThreshold.
✔ phase3VoltageTooLow	Indicates phase 3 supply voltage is below the phase3VoltageLowThreshold.
✔ totalCurrentTooHigh	Indicates the current is above the totalCurrentHighThreshold.
✔ totalCurrentTooLow	Indicates the current is below the totalCurrentLowThreshold.
✔ neutralCurrentTooHigh	Indicates the neutral current is above the neutralCurrentHighThreshold.
✔ phase1CurrentTooHigh	Indicates the phase 1 current is above the phase1CurrentHighThreshold.
✔ phase1CurrentTooLow	Indicates the phase 1 current is below the phase1CurrentLowThreshold.
✔ phase2CurrentTooHigh	Indicates the phase 2 current is above the phase2CurrentHighThreshold.
✔ phase2CurrentTooLow	Indicates the phase 2 current is below the phase2CurrentLowThreshold.
✔ phase3CurrentTooHigh	Indicates the phase 3 current is above the phase3CurrentHighThreshold.
✔ phase3CurrentTooLow	Indicates the phase 3 current is below the phase3CurrentLowThreshold.
✔ phase1ActivePowerTooHigh	Indicates the phase 1 active power is above the phase1ActivePowerHighThreshold.
✔ phase1ActivePowerTooLow	Indicates the phase 1 active power is below the phase1ActivePowerLowThreshold.
✔ phase2ActivePowerTooHigh	Indicates the phase 2 active power is above the phase2ActivePowerHighThreshold.

✔	phase2ActivePowerTooLow	Indicates the phase 2 active power is below the phase2ActivePowerLowThreshold.
✔	phase3ActivePowerTooHigh	Indicates the phase 3 active power is above the phase3ActivePowerHighThreshold.
✔	phase3ActivePowerTooLow	Indicates the phase 3 active power is below the phase3ActivePowerLowThreshold.
✔	applicationType	Application Type of the electrical meter depending on the use case. E.g.: Lamp Electrical Meter, Segment Electrical Meter
✔	supplyLoss	Indicates loss of supply (power).

Events

#	Event type	Description
✔	totalPowerTooHigh	Indicates total power is above the totalPowerHighThreshold
✔	totalPowerTooLow	Indicates total power is below the totalPowerLowThreshold
✔	powerFactorTooLow	talq.feature.event.ElectricalMeterFunction.powerFactorTooLow.desc
✔	supplyVoltageTooHigh	Indicates supply voltage is above the supplyVoltageHighThreshold
✔	supplyVoltageTooLow	Indicates supply voltage is below the supplyVoltageLowThreshold
✔	totalCurrentTooHigh	Indicates the current is above the totalCurrentHighThreshold
✔	totalCurrentTooLow	Indicates the current is below the totalCurrentLowThreshold
✔	neutralCurrentTooHigh	Indicates the neutral current is above the neutralCurrentHighThreshold
✔	phase1PowerfactorTooLow	Indicates the phase 1 power factor is below the phase1PowerfactorLowThreshold
✔	phase1VoltageTooHigh	Indicates phase 1 supply voltage is above the phase1VoltageHighThreshold
✔	phase1VoltageTooLow	Indicates phase 1 supply voltage is below the phase1VoltageLowThreshold
✔	phase1CurrentTooHigh	Indicates the phase 1 current is above the phase1CurrentHighThreshold
✔	phase1CurrentTooLow	Indicates the phase 1 current is below the phase1CurrentLowThreshold
✔	phase1ActivePowerTooHigh	Indicates the phase 1 active power is above the phase1ActivePowerHighThreshold
✔	phase1ActivePowerTooLow	Indicates the phase 1 active power is below the phase1ActivePowerLowThreshold
✔	phase2PowerfactorTooLow	Indicates the phase 2 power factor is below the phase2PowerfactorLowThreshold

✔	phase2VoltageTooHigh	Indicates phase 2 supply voltage is above the phase2VoltageHighThreshold
✔	phase2VoltageTooLow	Indicates phase 2 supply voltage is below the phase2VoltageLowThreshold
✔	phase2CurrentTooHigh	Indicates the phase 2 current is above the phase2CurrentHighThreshold
✔	phase2CurrentTooLow	Indicates the phase 2 current is below the phase2CurrentLowThreshold
✔	phase2ActivePowerTooHigh	Indicates the phase 2 active power is above the phase2ActivePowerHighThreshold
✔	phase2ActivePowerTooLow	Indicates the phase 2 active power is below the phase2ActivePowerLowThreshold
✔	phase3PowerfactorTooLow	Indicates the phase 3 power factor is below the phase3PowerfactorLowThreshold
✔	phase3VoltageTooHigh	Indicates phase 3 supply voltage is above the phase3VoltageHighThreshold
✔	phase3VoltageTooLow	Indicates phase 3 supply voltage is below the phase3VoltageLowThreshold
✔	phase3CurrentTooHigh	Indicates the phase 3 current is above the phase3CurrentHighThreshold
✔	phase3CurrentTooLow	Indicates the phase 3 current is below the phase3CurrentLowThreshold
✔	phase3ActivePowerTooHigh	Indicates the phase 3 active power is above the phase3ActivePowerHighThreshold
✔	phase3ActivePowerTooLow	Indicates the phase 1 active power is below the phase2ActivePowerLowThreshold
✔	supplyLoss	Indicates loss of supply (power).

Photocell

A Photocell function models the capabilities of a photocell that can be used for lighting control. This function shall be supported by the CMS and optionally by the ODNs (Gateway).

Attributes

#	Attribute	Description
✔	onLevel	Illuminance level at which the photocell switches to on state.
✔	offLevel	Illuminance level at which the photocell switches to off state.
✔	photocellOutput	Output state of the photocell. Possible values are ON (means the illuminance level has fallen below the onLevel) and OFF (means the illuminance level has risen above the offLevel).
✔	photocellOutputOn	The photocell output has changed to ON.

✔	applicationType	Application Type of the photocell depending on the use case. E.g.: Presence detector

Events

#	Event type	Description
✔	photocellOutputOn	The photocell output has changed to ON

Light Sensor

A Light Sensor function models the output of light sensor. This function is optional for both CMS and Gateway, but when supported the requirements in this section shall apply.

Attributes

#	Attribute	Description
✔	levelHighThreshold	Light level above which a levelTooHigh event is triggered.
✔	levelLowThreshold	Light level below which a levelTooLow event is triggered.
✔	lightLevel	Illuminance level.
✔	levelTooHigh	Indicates the light level is above the levelHighThreshold.
✔	levelTooLow	Indicates the light level is below the levelLowThreshold.
✔	applicationType	Application Type of the light sensor depending on the use case. E.g.: Day light detector

Events

#	Event type	Description
✔	levelTooHigh	Indicates the light level is above the levelHighThreshold
✔	levelTooLow	Indicates the light level is below the levelLowThreshold

Binary Sensor

A Binary Sensor function can be used to model any sensor that provides a digital, binary output. This function is optional for both CMS and Gateway, but when supported the requirements in this section shall apply.

Attributes

#	Attribute	Description
✔	level	Sensor Output level.
✔	sensorOutputOn	Indicates the sensor output changed to ON.
✔	applicationType	Application Type of the binary sensor depending on the use case. E.g.: Door opened sensor

Events

#	Event type	Description
✔	sensorOutputOn	Indicates the sensor output changed to ON

Generic Sensor

A Generic Sensor function can be used to model any sensor that provides an analog or multilevel output. This function is optional for both CMS and Gateway, but when supported the requirements in this section shall apply.

Attributes

#	Attribute	Description
✔	levelHighThreshold	Threshold above which a levelTooHigh event is triggered.
✔	levelLowThreshold	Threshold below which a levelTooLow event is triggered.
✔	level	Sensor Output level.
✔	levelTooHigh	Indicates the sensor output level is above the levelHighThreshold.
✔	levelTooLow	Indicates the sensor output level is below the levelLowThreshold.
✔	applicationType	Application Type of the generic sensor depending on the use case. E.g.: Sound sensor

Events

#	Event type	Description
✔	levelTooHigh	Indicates the sensor output level is above the levelHighThreshold
✔	levelTooLow	Indicates the sensor output level is below the levelLowThreshold

Generic Actuator

The Generic Actuator function includes attributes related to generic control and it represents the smallest unit for control purposes.

Attributes

#	Attribute	Description
✔	defaultState	Sets the default state output for the generic actuator. This shall be applicable if no other command is active.
✔	actualState	This attribute should reflect the physical state of the source as much as possible. It may be calculated or measured, depending on the specific ODN implementation, which is outside the scope of this specification.
✔	targetCommand	Latest command for the generic actuator.
✔	feedbackCommand	This attribute reflects the command in effect and it might deviate from the actualState due to propagation time or due to internal ODN specific mechanisms to handle the priority of the requests.

✔	stateChange	The state has changed.
✔	calendarID	TALQ Address of the calendar controlling this generic actuator. If this attribute is empty, the behavior shall be determined by the ODN. If the attribute is invalid, the ODN shall trigger a generic invalid address event and the behavior shall be determined by the ODN.
✔	invalidCalendar	This event is generated when a calendar has been allocated and can not be implemented it.
✔	invalidProgram	This event is generated when a control program has been allocated and can not be implemented it.
✔	programChange	This event is generated when the control program applicable to the actuator has changed.
✔	calendarChange	This event is generated when the calendar applicable to the actuator has changed.
✔	targetCommandChange	This event is generated when the targetCommand has changed.
✔	applicationType	Application Type of the generic actuator depending on the use case. E.g.: Water valve

Events

#	Event type	Description
✔	stateChange	The state has changed.
✔	invalidCalendar	This event is generated when a calendar has been allocated and can not be implemented it.
✔	invalidProgram	This event is generated when a control program has been allocated and can not be implemented it.
✔	programChange	This event is generated when the control program applicable to the actuator has changed.
✔	calendarChange	This event is generated when the calendar applicable to the actuator has changed.
✔	targetCommandChange	This event is generated when the targetCommand has changed.

Temperature Sensor

The Temperature Sensor function allows a CMS to monitor the temperature in a device and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	temperatureHighThreshold	Threshold above which a temperatureTooHigh event is triggered.

✔	temperatureLowThreshold	Threshold below which a temperatureTooLow event is triggered.
✔	fireDetectionThreshold	Threshold above which a fireDetected event is triggered.
✔	temperature	Output temperature.
✔	temperatureTooHigh	Indicates the output temperature is above the temperatureHighThreshold.
✔	temperatureTooLow	Indicates the output temperature is below the temperatureLowThreshold.
✔	fireDetected	Indicates the output temperature is above the fireDetectionThreshold.
✔	applicationType	Application Type of the temperature depending on the use case. E.g.: Solar Battery Charger or Lamp
✔	minMeasuredTemperature	The minimum value measured by the sensor since power ON or since measuredTemperatureSince.
✔	maxMeasuredTemperature	The maximum value measured by the sensor since power ON or since measuredTemperatureSince.
✔	measuredTemperatureSince	Indicates the date and time at which measuredTemperature is reset to zero. The Gateway may change this value with the actual one depending on implementation.

Events

#	Event type	Description
✔	temperatureTooHigh	Indicates the output temperature is above the temperatureHighThreshold.
✔	temperatureTooLow	Indicates the output temperature is below the temperatureLowThreshold.
✔	fireDetected	Indicates the output temperature is above the fireDetectionThreshold.

Humidity Sensor

The Humidity Sensor function allows a CMS to monitor the humidity in a device and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	humidityLowThreshold	talq.feature.attribute.HumiditySensorFunction.humidityLowThreshold.desc
✔	humidityHighThreshold	Threshold above which a humidityTooHigh event is triggered.
✔	humidity	Output humidity.
✔	humidityTooLow	talq.feature.attribute.HumiditySensorFunction.humidityTooLow.desc
✔	humidityTooHigh	Indicates the output humidity is above the humidityHighThreshold.

✔	applicationType	Application Type of the humidity sensor depending on the use case. E.g.: Air Humidity Sensor

Events

#	Event type	Description
✔	humidityTooHigh	Indicates the output humidity is above the humidityHighThreshold.

Particulate Matter Sensor

The Particulate Matter Sensor function allows a CMS to monitor the PM10, PM2.5 and PM1 in a device and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	pm1HighThreshold	Threshold (micrograms/m3) above which a pm1TooHigh event is triggered.
✔	pm2-5HighThreshold	Threshold (micrograms/m3) above which a pm2-5TooHigh event is triggered.
✔	pm10HighThreshold	Threshold (micrograms/m3) above which a pm10TooHigh event is triggered.
✔	pm1	Level of pm1 measured by the sensor. (micrograms/m3)
✔	pm2-5	Level of pm2-5 measured by the sensor. (micrograms/m3)
✔	pm10	Level of pm10 measured by the sensor. (micrograms/m3)
✔	pm1TooHigh	Indicates the output pm1 is above the pm1HighThreshold.
✔	pm2-5TooHigh	Indicates the output pm2-5 is above the pm2-5HighThreshold.
✔	pm10TooHigh	Indicates the output pm10 is above the pm10HighThreshold.
✔	applicationType	Application Type of the particulate matter sensor depending on the use case. E.g.: 'Air Quality Sensor'
✔	pm1-24hAverage	Average level of pm1 measured by the sensor during the last 24h. (micrograms/m3)
✔	pm2-5-24hAverage	Average level of pm2.5 measured by the sensor during the last 24h. (micrograms/m3)
✔	pm10-24hAverage	Average level of pm10 measured by the sensor during the last 24h. (micrograms/m3)

Events

#	Event type	Description
✔	pm1TooHigh	Indicates the output pm1 is above the pm1HighThreshold.
✔	pm2-5TooHigh	Indicates the output pm2-5 is above the pm2-5HighThreshold.

✔	pm10TooHigh	Indicates the output pm10 is above the pm10HighThreshold.

Presence Sensor

The Presence Sensor function allows a CMS to detect presence. This function may be used in Parking Place detectors as well as in dynamic outdoor lighting scenario.

Attributes

#	Attribute	Description
✔	presenceStatus	Presence status.
✔	presenceStatusChanged	Indicates the presence status changed.
✔	applicationType	Application Type of the presence sensor depending on the use case. E.g.: Presence detector

Events

#	Event type	Description
✔	presenceStatusChanged	Indicates the presence status changed.

Movement Sensor

The Movement Sensor function allows a CMS to detect movement. This function may be used in a Waste Container sensor to detect that container gets emptied or is not in the proper position, as well as in asset tracking applications.[DEPRECATED: This function has been deprecated and it will be removed in the next MAJOR release. Please use the new LocationSensorFunction instead.]

Attributes

#	Attribute	Description
✔	movementThreshold	Threshold above which a movementDetected event is triggered.
✔	movementDetected	Indicates the movement is above the movementThreshold.
✔	notInProperPosition	Indicates the sensor is not in proper position.

Events

#	Event type	Description
✔	movementDetected	Indicates the movement is above the movementThreshold.
✔	notInProperPosition	Indicates the sensor is not in proper position.

Battery Level Sensor

The Battery Level Sensor function allows to measure the charge of the battery, monitor the battery and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	powerSource	The power source of battery.
✔	batteryLevelLowThreshold	Threshold below which a batteryLevelTooLow event is triggered.
✔	batteryLevel	Battery level.
✔	batteryLevelTooLow	Indicates the battery level is below the batteryLevelLowThreshold.
✔	applicationType	Application Type of the battery level sensor depending on the use case. E.g.: Solar Battery

Events

#	Event type	Description
✔	batteryLevelTooLow	talq.feature.event.BatteryLevelSensorFunction.batteryLevelTooLow.desc

Filling Level Sensor

The Filling Level Sensor function allows to measure how full a container is and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	levelHighThreshold	Threshold (m) above which a fillingHeight event is triggered.
✔	containerHeight	Container height (m).
✔	containerVolume	Container volume (m^3).
✔	fillingHeight	Filling container height (m).
✔	fillingPercentage	Filling percentage.
✔	containerFull	Indicates the container filling height is above levelHighThreshold.
✔	contentsType	Indicates de type of contents in the container. Some technologies, such as ultrasonic sensors, need this information in order to measeure accuratelly. Possible values are: mixed waste, organic, paper, plastics, glass, liquid, clothing, electronics, metal or other. If other is selected, then contentsOtherType shall be used.
✔	contentsOtherType	Type of contents if it is not included in the Enum list of contents for contentsType.
✔	applicationType	Application Type of the filling level sensor depending on the use case. E.g.: Container Filling Level

Events

#	Event type	Description

✔	containerFull	Indicates the container filling height is above levelHighThreshold.

Solar Battery Charger*

A solar battery charger is used to charge a battery with solar energy. Typical use cases are energy demanding off-grid applications like solar lighting, solar vehicle charging (cars and bikes), public transit information, traffic control, public security (CCTV) and many more.

Attributes

#	Attribute	Description
✔	inputVoltage	Measured DC voltage of the charger input (V).
✔	inputCurrent	Measured DC current of the charger input (A).
✔	outputVoltage	Output voltage (V).
✔	outputCurrent	Output current (A).
✔	chargerTemperature	Measured temperature of the charger circuit (C). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperature with applicationType=Charger instead.]
✔	PVTemperature	Measured temperature of the attached photovoltaic module (C). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperature with applicationType=PVT instead.]
✔	accumulatedEnergy	Accumulated energy yield since accumulatedSince (Wh).
✔	startChargeInputVoltage	Configuration parameter to set input voltage thresholds at different temperatures at which the battery charger shall start charging the battery (V, C). The values are stored as a list of KVPs (Key-Value Pair), where the key is the temperature and the value is the voltage.
✔	endChargeInputVoltage	Configuration parameter to set input voltage thresholds at different temperatures at which the battery charger shall cease charging the battery (V, C). The values are stored as a list of KVPs (Key-Value Pair), where the key is the temperature and the value is the voltage.
✔	highTemperatureThreshold	Threshold above which the highTemperature event is triggered (C). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooHighThreshold instead.]

✔	lowTemperatureThreshold	Threshold above which the lowTemperature event is triggered (C). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooLowThreshold instead.]
✔	highPowerThreshold	Threshold above which the highPower event is triggered (W).
✔	accumulatedSince	Indicates the date and time at which accumulatedEnergy is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	highTemperature	Indicates the measured temperature is above the high temperature threshold. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooHigh instead.]
✔	lowTemperature	Indicates the measured temperature is below the low temperature threshold. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooLow instead.]
✔	highPower	Indicates the power exceeds highPowerThreshold.
✔	charging	Indicates whether the battery is being charged.
✔	applicationType	Application Type of the solar battery charger depending on the use case. E.g.: Lamp Battery

Events

#	Event type	Description
✔	highTemperature	Indicates the measured temperature is above the high temperature threshold.
✔	lowTemperature	Indicates the measured temperature is below the low temperature threshold.
✔	highPower	Indicates the power exceeds highPowerThreshold.
✔	charging	Indicates whether the battery is being charged.

Battery Management System*

A battery management system is used to monitor the charging and discharging of a battery and protect the battery. Typical use cases are (off-grid) applications like solar lighting, solar vehicle charging (cars and bikes), public transit information, traffic control, public security (CCTV) and many more, where the battery is charged and discharged on a regular basis.

Attributes

#	Attribute	Description

✔ batteryChemistry	Attribute to define the battery chemistry. (e.g.: Lead Acid, Lithium-Iron-Phosphate (LiFePO4), Nickel-Metal-Hydrid (NiMH), Lithium-Titanate-Oxide (LTO), ...)
✔ nominalVoltage	Attribute to set the nominal voltage of the battery in V (at room temperature). This can be used to calculate the capacity and to configure the BMS.
✔ nominalCapacity	Attribute to set the nominal capacity of the battery in Ah (at room temperature).
✔ batteryVoltage	Measurement of the battery voltage in V
✔ batteryCurrent	Measurement of the battery current in A. This value can be negative due to polarity.
✔ batteryLevel	Percentage
✔ estimatedCapacity	This attribute gives an estimated remaining capacity of the battery in Ah. This depends very much on the wear and age of the battery.
✔ temperature	Temperature at the battery in C. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperature with applicationType=Battery instead.]
✔ batteryEOCVoltageTemperatureMap	End of charge voltages (V) of the battery for various temperatures (C)
✔ batteryEODVoltageTemperatureMap	End of discharge voltages (V) of the battery for various temperatures (C)
✔ batteryFullThreshold	Level threshold to indicate that the battery is full.
✔ batteryEmptyThreshold	Level threshold to indicate that the battery is empty.
✔ overCurrentChargeThreshold	Maximum charge current threshold (A)
✔ overCurrentDischargeThreshold	Maximum discharge current threshold (A)
✔ highTemperatureThreshold	Threshold above which the highTemperature event is triggered (C). [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooHighThreshold instead.]
✔ batteryFull	Indicates that the battery is full.
✔ batteryEmpty	Indicates that the battery is empty.
✔ overCurrentCharge	Indicates that the charge current is higher than the threshold.
✔ overCurrentDischarge	Indicates that the discharge current is higher than the threshold.

✔	highTemperature	Indicates that the measured temperature is higher than the threshold. [DEPRECATED: This attribute has been deprecated and it will be removed in the next MAJOR release. Please use the new TemperatureSensorFunction.temperatureTooHigh instead.]
✔	applicationType	Application Type of the battery management system depending on the use case. E.g.: Lamp Battery

Events

#	Event type	Description
✔	batteryFull	Indicates that the battery is full.
✔	batteryEmpty	Indicates that the battery is empty.
✔	overCurrentCharge	Indicates that the charge current is higher than the threshold.
✔	overCurrentDischarge	Indicates that the discharge current is higher than the threshold.
✔	highTemperature	Indicates that the measured temperature is higher than the threshold.

Traffic Counter*

The Traffic Counter Function is used to provide statistics on the number of vehicles passing on the road. It allows to have the number of pedestrians, bicycles, cars or trucks for a certain period of time that is configurable by the CMS. It also allows to count the number of vehicles using diesel or petrol.

Attributes

#	Attribute	Description
✔	roadUserNumber	Number of road users of the specified type detected over the sampling period.
✔	accumulatedRoadUserNumber	measurement Number of road users of the specified type detected since accumulatedSince.
✔	roadUser	Type of road user (pedestrian, bicycle, motorcycle, car, truck, diesel vehicle, petrol vehicle, electric vehicle, scooter, others).
✔	accumulatedSince	Indicates the date and time at which accumulatedRoadUserNumber is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	heavyTrafficDetected	Triggered if the traffic measured over the sampling period is above heavyTrafficDetectedThreshold.
✔	heavyTrafficDetectedThreshold	Threshold above which heavyTrafficDetected is triggered.
✔	trafficSamplingPeriod	Used by heavyTrafficDetected and roadUserNumber. In seconds.

✔	averageSpeed	Average speed measured on the road users of the specified type during the last sampling period (km/h)
✔	averageDistance	Average distance between two road users of the specified type during the last sampling period (m)
✔	speedLimitThreshold	Speed limit threshold used to calculate the percentage of road users of the specified type above speed limit. (km/h)
✔	percentageAboveSpeedLimit	Percentage of road users of the specified type driving above speed limit detected over the sampling period.
✔	applicationType	Application Type of the traffic counter depending on the use case. E.g.: 'People counter; Vehicle counter'
✔	actualUserNumber	Number of road users currently identified by the device
✔	sensorType	Type of sensor (e.g: Bluetooth beacon, WIFI detector)
✔	dailyRoadUserNumber	Cumulated number of road users detected by the device since beginning of the day.
✔	minSpeed	Minimum cutoff speed under which traffic is not measured (km/h)
✔	maxSpeed	Maximum cutoff speed above which traffic is not measured (km/h)
✔	sensorSensitivity	Sensor sensitivity (%) to reduce sensor detection range. This value must be the same when multiple instances of the function are used for the same physical sensor.
✔	trafficDirection	Specifies whether the sensor measures only incoming traffic, outgoing traffic, or both. (Direction 1, Direction 2, Both)

Events

#	Event type	Description
✔	heavyTrafficDetected	Triggered if the traffic measured over the sampling period is above heavyTrafficDetectedThreshold.

Location Sensor*

The Location Sensor Function is used to indicate that an object has changed position attributes configurable by the CMS or based on internal setup of the vendor. For example, a specific location (latitude, longitude) of a device could be defined by the vendor. If the device is equipped with a GPS, it could send a specific event indicating that its position is different to the one defined by the CMS. We might also want to let the configuration to the vendor itself and simply define events notifying the CMS that the default configuration has changed. For example, a garbage bin could have its location defined based on a sensor placed on the floor. If the bin is not above this sensor, the vendor will trigger an event. In this last case, the CMS does not need to configure anything.

Attributes

#	Attribute	Description

✔	expectedLocation	Nominal location of the device
✔	locationChangedThreshold	Distance (meters)
✔	location	Location of the device
✔	locationChanged	Triggered when the difference between location and expectedLocation is above locationChangedThreshold
✔	uncertainty	This uncertainty indicates the radius of a circular area in meters, reported by the positioning system. The circular area is used to describe uncertainty about a point for coordinates in a two-dimensional coordinate reference systems (CRS). The center point of a circular area is specified by using the Latitude and the Longitude Resources.
✔	compassDirection	The measured compass direction. 0..360 deg.
✔	velocity	The instantaneous velocity of the device, as defined in [3GPP-TS_23.032]. The AttributeVelocity contains horizontal speed, bearing, vertical speed, direction and uncertainty.
✔	speed	The instantaneous speed is the time rate of change in position of the device without regard for direction: the scalar component of velocity in 3d. (m/s)
✔	applicationType	Application Type of the location sensor depending on the use case. E.g.: Pole Location

Events

#	Event type	Description
✔	locationChanged	Triggered when the difference between location and expectedLocation is above locationChangedThreshold

Accelerometer*

The Accelerometer Function is used to indicate that an object has had an impact with another object and to report its acceleration.

Attributes

#	Attribute	Description
✔	impactDetectedAccelerationThreshold	Threshold for acceleration above which impactDetected is triggered (g)
✔	accelerationSamplingPeriod	In seconds
✔	accelerationX	Maximum acceleration on the X axis (g) over accelerationSamplingPeriod
✔	accelerationY	Maximum acceleration on the Y axis (g) over accelerationSamplingPeriod

✔	accelerationZ	Maximum acceleration on the Z axis (g) over accelerationSamplingPeriod
✔	acceleration	Maximum acceleration of the device (g) over accelerationSamplingPeriod
✔	impactDetected	Indicates that the acceleration is above impactDetectedAccelerationThreshold
✔	applicationType	Application Type of the accelerometer depending on the use case. E.g.: Crash detector

Events

#	Event type	Description
✔	impactDetected	Indicates that the acceleration is above impactDetectedAccelerationThreshold

Orientation*

The Orientation function is used to indicate that an object has changed orientation based on attributes configurable by the CMS or based on internal setup of the vendor. The target orientation of the object could be configured by the CMS or could be handled by the vendor. In the latter case, the configuration is let to the vendor itself and events are triggered depending on internal configuration.

Attributes

#	Attribute	Description
✔	expectedOrientation	Nominal orientation of the device
✔	orientationChangedThreshold	Threshold above which orientationChanged is triggered
✔	orientation	Orientation of the device
✔	orientationChanged	Triggered when orientation differs from expectedOrientation by more than orientationChangedThreshold on any angle, or when the device determines itself that its orientation has changed.
✔	applicationType	Application Type of the orientation depending on the use case. E.g.: Orientation change detector

Events

#	Event type	Description
✔	orientationChanged	Triggered when orientation differs from expectedOrientation by more than orientationChangedThreshold on any angle, or when the device determines itself that its orientation has changed.

Fluid Level Sensor*

The Fluid Level Sensor function allows to collect data and events about fluid levels. It could be used to measure fluid levels in channels, lakes, containers, etc.

Attributes

#	Attribute	Description
✔	fluidLevelTooHighThreshold	Threshold above which fluidLevelTooHighThreshold is triggered. In meters
✔	fluidLevelTooLowThreshold	Threshold below which fluidLevelTooLowThreshold is triggered. In meters
✔	distanceSensorBottom	Distance between the sensor and the bottom of the channel, lake, container, etc. In meters
✔	fluidLevel	Fluid level in meters
✔	fluidLevelTooHigh	Triggered when fluidLevel is above fluidLevelTooHighThreshold
✔	fluidLevelTooLow	Triggered when fluidLevel is below fluidLevelTooLowThreshold
✔	applicationType	Application Type of the fluid level sensor depending on the use case. E.g.: Lake level sensor

Events

#	Event type	Description
✔	fluidLevelTooHigh	Triggered when fluidLevel is above fluidLevelTooHighThreshold
✔	fluidLevelTooLow	Triggered when fluidLevel is below fluidLevelTooLowThreshold

Waste Container*

The Waste Container function allows to log when the container is collected and send events in case the date is above a configurable thresholds. Additionlly it sends events when the contents or container are tampered.

Attributes

#	Attribute	Description
✔	lastCollectionDate	Last collection date.
✔	collectionLateThreshold	Threshold (days) since last collection date above which a collection late event is triggered.
✔	collectionLate	Indicates that the number of days occured since the lastCollectionDate is over the collectionLateThreshold.
✔	containerTampered	Indicates that the container is being tampered, or some parts are being removed.
✔	contentsTampered	Indicates that the contents are being tampered or stolen.
✔	wasteType	Indicates de type of waste in the container. Possible values are: mixed waste, organic, paper, plastics, glass, liquid, clothing, electronics, metal or other. If other is selected, then wasteOtherType shall be used.

✔	wasteOtherType	Type of waste if it is not included in the Enum list of contents for wasteType.
✔	applicationType	Application Type of the waste container depending on the use case. E.g.: Waste container

Events

#	Event type	Description
✔	containerTampered	Indicates that the container is being tampered, or some parts are being removed.
✔	contentsTampered	Indicates that the contents are being tampered or stolen.

pH Sensor*

The pH Sensor allows to measure the pH and sends events if the value is above/below the configured thresholds.

Attributes

#	Attribute	Description
✔	pH	pH value.
✔	pHHighLevelThreshold	Threshold above which a pHTooHigh (too Alkaline) event is triggered.
✔	pHLowLevelThreshold	Threshold below which a pHTooLow (too Acidic) event is triggered.
✔	pHTooHigh	Indicates the pH measure is above the pHHighLevelThreshold, that is too alkaline.
✔	pHTooLow	Indicates the pH measure is below the pHLowLevelThreshold, that is too acidic.
✔	applicationType	Application Type of the pH sensor depending on the use case. E.g.: Hazardous Waste Detector

Events

#	Event type	Description
✔	pHTooHigh	Indicates the pH measure is above the pHHighLevelThreshold, that is too alkaline.
✔	pHTooLow	Indicates the pH measure is below the pHLowLevelThreshold, that is too acidic.

Weight Sensor*

The Weight Sensor function allows a CMS to monitor the weight in a device and send events in case the value is above/below configurable thresholds.

Attributes

#	Attribute	Description
✔	weightLowThreshold	Threshold (in kg) below which a weightTooLow event is triggered.
✔	weightHighThreshold	Threshold (in kg) above which a weightTooHigh event is triggered.
✔	weight	Output weight in kg.
✔	weightTooLow	Indicates the output weight is below the weightLowThreshold.
✔	weightTooHigh	Indicates the output weight is above the weightHighThreshold.
✔	applicationType	Application Type of the weight sensor depending on the use case. E.g.: Waste Weight Detector

Events

#	Event type	Description
✔	weightTooLow	Indicates the output weight is below the weightLowThreshold.
✔	weightTooHigh	Indicates the output weight is above the weightHighThreshold.

Gas Sensor*

The Gas Sensor function allows to measure the gas concentration and sends events if the level is above the configured thresholds.

Attributes

#	Attribute	Description
✔	gasConcentration	Gas concentration (ppm)
✔	gasHighConcentrationThreshold	Threshold (ppm) above which a gasConcentrationTooHigh event is triggered.
✔	gasConcentrationTooHigh	Indicates that the gasConcentration is above the gasHighConcentrationThreshold.
✔	gasName	Type of gas: CO, CO2, O2, O3, NO, NO2, SO2, NH3, CH4, H2, H2S, HCl, HCN, PH3, ETO, Other. If Other is selected, then gasOtherName shall be used.
✔	gasOtherName	Type of gas if it is not included in the Enum list of gases for gasName
✔	applicationType	Application Type of the gas sensor depending on the use case. E.g.: 'Waste Gas Detector'
✔	gasConcentration1hAverage	Average concentration of gas measured by the sensor during the last 1 hour. (ppm)
✔	gasConcentration8hAverage	Average concentration of gas measured by the sensor during the last 8 hours. (ppm)

Events

#	Event type	Description
✔	gasConcentrationTooHigh	Indicates that the gasConcentration is above the gasHighConcentrationThreshold.

Simple Actuator

The Simple Actuator function includes attributes related to generic control and it represents the smallest unit for control purposes.

Attributes

#	Attribute	Description
✔	defaultState	Sets the default state output for the simple actuator. This shall be applicable if the actuator is not under an override control (OverrideCommand).
✔	actualState	This attribute should reflect the physical state of the source as much as possible. It may be calculated or measured, depending on the specific ODN implementation, which is outside the scope of this specification.
✔	targetCommand	Latest command for the simple actuator.
✔	feedbackCommand	This attribute reflects the command in effect and it might deviate from the actualState due to propagation time or due to internal ODN specific mechanisms to handle the priority of the requests.
✔	stateChange	The state has changed.
✔	targetCommandChange	This event is generated when the targetCommand has changed.
✔	applicationType	Application Type of the simple actuator depending on the use case. E.g.: Water valve

Events

#	Event type	Description
✔	stateChange	The state has changed.
✔	targetCommandChange	This event is generated when the targetCommand has changed.

Time*

The Time function includes attributes related to generic control and it represents the smallest unit for control purposes.

Attributes

#	Attribute	Description

✔	timeZone	Time zone of the device. Time zone may be expressed in two formats. where is a time zone as defined in the zone.tab of the IANA timezone database [IANA]; and stdoffset[dst[offset][,start[/time],en d[/time]]] as defined by the Open Group for posix systems [POSIX].
✔	ntpServers	List of NTP servers to use for time synchronization (Hostname or IP address).
✔	ntpSynchPeriod	Number of hours between two time synchronization updates.
✔	currentTime	Current time of the device defined as local time with time zone designator.
✔	lastTimeSync	Last time at which a successful time synchronization occurred.
✔	lastSyncError	Set to True in case the latest time synchronization operation failed. Set to False in case the last operation succeeded.

Events

#	Event type	Description
✔	lastSyncError	This event is generated when the latest time synchronization operation failed.

Segment Monitor*

The Segment Monitor function enables monitoring of segment parameters. Multiple segment monitor functions may be implemented by a single device.

Attributes

#	Attribute	Description
✔	applicationType	Application Type of the segment monitor depending on the use case. E.g.: "Road Lighting, Architecture Lighting"
✔	segmentReference	Reference of the segment monitor depending on the use case. E.g.: "Segment A1"
✔	numberOfLoads	Number of loads being monitored by the segment monitor function.
✔	switchingErrorOn	Indicates error in switching circuit. For instance, if a contactor or relay is used, it may be stuck in ON position.
✔	switchingErrorOff	Indicates error in switching circuit. For instance, if a contactor or relay is used, it may be stuck in OFF position.
✔	leakageDetected	Indicates that an earth leakage fault has been detected.
✔	cabinetDoorOpen	Cabinet door is open.
✔	circuitBreakerTripped	Indicates that the circuit breaker has tripped
✔	localOverride	Indicates that there is a local override (ON, OFF) or no override

Events

#	Event type	Description
✔	cabinetDoorOpen	Cabinet door is open.

✔	circuitBreakerTripped	Indicates that the circuit breaker has tripped
✔	leakageDetected	Indicates that an earth leakage fault has been detected.
✔	localOverride	Indicates that there is a local override (ON, OFF) or no override
✔	switchingErrorOff	Indicates error in switching circuit. For instance, if a contactor or relay is used, it may be stuck in OFF position.
✔	switchingErrorOn	Indicates error in switching circuit. For instance, if a contactor or relay is used, it may be stuck in ON position.

Noise Monitoring Sensor*

This sensor function enables monitoring basic noise data.

Attributes

#	Attribute	Description
✔	noiseHighThreshold	Threshold above which a noiseTooHigh event is triggered. (dB)
✔	noise	Output noise. (dB)
✔	noiseTooHigh	Indicates the output noise is above the noiseHighThreshold.
✔	applicationType	Application Type of the noise depending on the use case. E.g.: 'Street noise sensor'
✔	minMeasuredNoise	The minimum value measured by the sensor since power ON or since measuredNoiseSince. (dB)
✔	maxMeasuredNoise	The maximum value measured by the sensor since power ON or since measuredNoiseSince. (dB)
✔	measuredNoiseSince	Indicates the date and time at which measuredNoise is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	abnormalNoiseDetected	Indicates that an abnormal noise is detected
✔	typeOfNoise	Indicates the type of sound of the abnormalNoiseDetected event. E.g.: gunShot, alarm, carCrash, ..

Events

#	Event type	Description
✔	abnormalNoiseDetected	Indicates that an abnormal noise is detected
✔	noiseTooHigh	Indicates the output noise is above the noiseHighThreshold.

Atmospheric Sensor*

This sensor function enables monitoring basic atmospheric data such as barometric pressure, humidity, and temperature. This function complies with WMO standards as reported in the 'Guide to Instruments and Methods of Observation (WMO-No. 8) / Volume I - Measurement of Meteorological Variables'

Attributes

#	Attribute	Description
✔	airTemperature	Temperature (Â°C)
✔	feelsLikeTemperature	Feels like temperature, which take into account the cooling and heating effects of wind and humidity on the human body (Â°C)
✔	relativeHumidity	Relative humidity (%)
✔	dewPoint	Temperature of dew point (Â°C)
✔	atmosphericPressure	Atmospheric pressure normalized to sea level (hPa)
✔	applicationType	Application Type of the atmospheric sensor depending on the use case. E.g.: 'Weather atmospheric sensor'

Wind Sensor*

This sensor function enables monitoring wind speed and direction. This function complies with WMO standards as reported in the 'Guide to Instruments and Methods of Observation (WMO-No. 8) / Volume I - Measurement of Meteorological Variables'

Attributes

#	Attribute	Description
✔	windSpeed	Wind speed (m/s)
✔	windDirectionString	Wind direction (N, NE, E, SE, S, SW, W, NW)
✔	windDirection	Wind direction in degrees (Relative to True north)
✔	windGust	Wind gust speed (m/s)
✔	windGustDirection	Wind gust direction in degrees (Relative to True north)
✔	maxWindGust	Max wind gust speed (m/s) measured since maxWindGustSince
✔	maxWindGustSince	Indicates the date and time at which maxWindGust is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	applicationType	Application Type of the wind sensor depending on the use case. E.g.: 'Weather wind sensor'

Precipitation Sensor*

This sensor function enables monitoring precipitation, defined as the liquid or solid products of the condensation of water vapour falling from clouds, in the form of rain, drizzle, snow, snow grains, snow pellets, hail and ice pellets; or falling from clear air in the form of diamond dust. This function complies with WMO standards as reported in the 'Guide to Instruments and Methods of Observation (WMO-No. 8) / Volume I â€ Measurement of Meteorological Variables'

Attributes

#	Attribute	Description
✔	precipitationRate	Intensity of precipitation (mm/h)
✔	accumulatedPrecipitation	Accumulated precipitation since accumulatedPrecipitationSince
✔	accumulatedPrecipitationSince	Indicates the date and time at which accumulatedPrecipitation is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	applicationType	Application Type of the precipitation sensor depending on the use case. E.g.: â€ Weather precipitation sensor'

Sky Sensor*

This sensor function enables monitoring of other atmospheric phenomena. This function complies with WMO standards as reported in the 'Guide to Instruments and Methods of Observation (WMO-No. 8) / Volume I - Measurement of Meteorological Variables'

Attributes

#	Attribute	Description
✔	cloudiness	Cloud cover of the sky (%)
✔	solarDirectRadiation	Total solar irradiance (W/m2)
✔	visibility	Visibility (m)
✔	applicationType	Application Type of the sky sensor depending on the use case. E.g.: 'Weather sky sensor'

Gully Sensor*

The Gully Sensor measures properties associated with street drains or gullies.

Attributes

#	Attribute	Description
✔	overfull	Indicates that the gully is overfull
✔	levelWarning	Indicates that the water level is problematic.
✔	grillOpened	Indicates that the gully grill is opened
✔	siltLevel	Level of silt (%)
✔	applicationType	Application Type of the gully sensor depending on the use case. E.g.: 'Street Gully sensor'

Events

#	Event type	Description

✔	grillOpened	Indicates that the gully grill is opened
✔	levelWarning	Indicates that the water level is problematic.
✔	overfull	Indicates that the gully is overfull

Water Flow Sensor*

The water flow sensor function measures the water flow rate.

Attributes

#	Attribute	Description
✔	flowRate	Rate of water flow (m3/s)
✔	flowRateTooHighThreshold	Threshold above which a flowRateTooHigh event is triggered (m3/s).
✔	flowRateTooLowThreshold	Threshold below which a flowRateTooLow event is triggered (m3/s).
✔	flowRateTooHigh	Indicates the flowRate measure is above the flowRateTooHighThreshold.
✔	flowRateTooLow	Indicates the flowRate measure is below the flowRateTooLowThreshold.
✔	maxFlowRate	Max flow rate value since flowRateSince (m3/s).
✔	minFlowRate	Min flow rate value since flowRateSince (m3/s).
✔	flowRateSince	Sets the date and time at which max and min flow rates are reset to zero
✔	applicationType	Application Type of the water flow sensor depending on the use case. E.g.: 'Street water flow sensor'

Events

#	Event type	Description
✔	flowRateTooHigh	Indicates the flowRate measure is above the flowRateTooHighThreshold.
✔	flowRateTooLow	Indicates the flowRate measure is below the flowRateTooLowThreshold.

Water Quality Sensor*

The water quality sensor function measures the quality of the water in the drinkable water distribution network, in water tanks or in lakes and rivers.

Attributes

#	Attribute	Description
✔	pH	Current or last value of the pH measured by the sensor.

✔ chlorine	Current or last value of the chlorine measured by the sensor (ppm)
✔ orp	Current or last value of the oxidation reduction potential (ORP) measured by the sensor (V)
✔ totalDissolvedGas	Current or last value of the dissolved gas (TDG) measured by the sensor (ppm).
✔ dissolvedOxygen	Current or last value of the dissolved oxygen measured by the sensor (ppm).
✔ turbidity	Current or last value of the turbidity measured by the sensor using the Nephelometric Turbidity Unit (NTU).
✔ conductivity	Current or last value of the conductivity measured by the sensor (S/m).
✔ conductance	Current or last value of the conductance measured by the sensor (S/m).
✔ totalSuspendedSolids	Current or last value of the TSS measured by the sensor (mg/l).
✔ totalDissolvedSolids	Current or last value of the TDS measured by the sensor (mg/l).
✔ salinity	Current or last value of the salinity measured by the sensor (ppt).
✔ NO3	Current or last value of NO3 measured by the sensor (mg/l).
✔ NH3	Current or last value of NH3 measured by the sensor (mg/l).
✔ NH4	Current or last value of NH4 measured by the sensor (mg/l).
✔ pHTooHigh	Indicates the pH measure is above the phTooHighThreshold.
✔ pHTooLow	Indicates the pH measure is below the phTooLowThreshold.
✔ pHTooHighThreshold	Threshold above which a pHTooHigh event is triggered.
✔ pHTooLowThreshold	Threshold below which a pHTooLow event is triggered.
✔ chlorineTooHigh	Indicates the chlorine measure is above the chlorineTooHighThreshold.
✔ chlorineTooHighThreshold	Threshold above which a chlorineTooHigh event is triggered. (ppm)

✔ orpTooLow	Indicates the orp measure is below the orpTooLowThreshold.
✔ orpTooLowThreshold	Threshold below which a orpTooLow event is triggered. (V)
✔ totalDissolvedGasTooHigh	Indicates the totalDissolvedGas measure is above the totalDissolvedGasTooHighThreshold.
✔ totalDissolvedGasTooLow	Indicates the totalDissolvedGas measure is below the totalDissolvedGasTooLowThreshold.
✔ totalDissolvedGasTooHighThreshold	Threshold above which a totalDissolvedGasTooHigh event is triggered.
✔ totalDissolvedGasTooLowThreshold	Threshold below which a totalDissolvedGasTooLow event is triggered.
✔ dissolvedOxygenTooLow	Indicates the dissolvedOxygen measure is below the dissolvedOxygenTooLowThreshold.
✔ dissolvedOxygenTooLowThreshold	Threshold below which a dissolvedOxygenTooLow event is triggered.
✔ turbidityTooHigh	Indicates the turbidity measure is above the turbidityTooHighThreshold.
✔ turbidityTooHighThreshold	Threshold above which a turbidityTooHigh event is triggered. (NTU)
✔ conductivityTooHigh	Indicates the conductivity measure is above the conductivityTooHighThreshold.
✔ conductivityTooHighThreshold	Threshold above which a conductivityTooHigh event is triggered. (S/m)
✔ conductanceTooHigh	Indicates the conductance measure is above the conductanceTooHighThreshold.
✔ conductanceTooHighThreshold	Threshold above which a conductanceTooHigh event is triggered. (S/m)
✔ totalSuspendedSolidsTooHigh	Indicates the totalSuspendedSolids measure is above the totalSuspendedSolidsTooHighThreshold.
✔ totalSuspendedSolidsTooHighThreshold	Threshold below which a totalSuspendedSolidsTooHigh event is triggered. (mg/l)
✔ totalDissolvedSolidsTooHigh	Indicates the totalDissolvedSolids measure is above the totalDissolvedSolidsTooHighThreshold.
✔ totalDissolvedSolidsTooHighThreshold	Threshold below which a totalDissolvedSolidsTooHigh event is triggered. (mg/l)
✔ salinityTooHigh	Indicates the salinity measure is above the salinityTooHighThreshold.

✔	salinityTooLow	Indicates the salinity measure is below the salinityTooLowThreshold.
✔	salinityTooHighThreshold	Threshold above which a salinityTooHigh event is triggered.
✔	salinityTooLowThreshold	Threshold below which a salinityTooLow event is triggered.
✔	NO3TooHigh	Indicates the NO3 measure is above the NO3TooHighThreshold.
✔	NO3TooHighThreshold	Threshold above which a NO3TooHigh event is triggered. (mg/l)
✔	NH3TooHigh	Indicates the NH3 measure is above the NH3TooHighThreshold.
✔	NH3TooHighThreshold	Threshold above which a NO3TooHigh event is triggered. (mg/l)
✔	NH4TooHigh	Indicates the NH4 measure is above the NH4TooHighThreshold.
✔	NH4TooHighThreshold	Threshold above which a NH4TooHigh event is triggered. (mg/l)
✔	applicationType	Application Type of the water quality sensor depending on the use case. E.g.: 'River water quality sensor'

Events

#	Event type	Description
✔	chlorineTooHigh	Indicates the chlorine measure is above the chlorineTooHighThreshold.
✔	conductanceTooHigh	Indicates the conductance measure is above the conductanceTooHighThreshold.
✔	conductivityTooHigh	Indicates the conductivity measure is above the conductivityTooHighThreshold.
✔	dissolvedOxygenTooLow	Indicates the dissolvedOxygen measure is below the dissolvedOxygenTooLowThreshold.
✔	NH3TooHigh	Indicates the NH3 measure is above the NH3TooHighThreshold.
✔	NH4TooHigh	Indicates the NH4 measure is above the NH4TooHighThreshold.
✔	NO3TooHigh	Indicates the NO3 measure is above the NO3TooHighThreshold.
✔	orpTooLow	Indicates the orp measure is below the orpTooLowThreshold.
✔	pHTooHigh	Indicates the pH measure is above the phTooHighThreshold.

✔	pHTooLow	Indicates the pH measure is below the phTooLowThreshold.
✔	salinityTooHigh	Indicates the salinity measure is above the salinityTooHighThreshold.
✔	salinityTooLow	Indicates the salinity measure is below the salinityTooLowThreshold.
✔	totalDissolvedGasTooHigh	Indicates the totalDissolvedGas measure is above the totalDissolvedGasTooHighThreshold.
✔	totalDissolvedGasTooLow	Indicates the totalDissolvedGas measure is below the totalDissolvedGasTooLowThreshold.
✔	totalDissolvedSolidsTooHigh	Indicates the totalDissolvedSolids measure is above the totalDissolvedSolidsTooHighThreshold.
✔	totalSuspendedSolidsTooHigh	Indicates the totalSuspendedSolids measure is above the totalSuspendedSolidsTooHighThreshold.
✔	turbidityTooHigh	Indicates the turbidity measure is above the turbidityTooHighThreshold.

Text Display Actuator*

The Text Display Actuator is used to send text to a text-only or text mode graphics display within a PositionedTextState (text, xPos, yPos). Writing a string of text to the text resource causes it to be displayed at the selected X and Y locations on the display. If X or Y are set to a value greater than the size of the display, the position "wraps around" to the modulus of the setting and the display size. Likewise, if the text string overflows the display size, the text "wraps around" and displays on the next line down or, if the last line has been written, wraps around to the top of the display. Brightness and Contrast controls are provided to allow control of various display types including STN and DSTN type LCD character displays. Setting the clearDisplay to true causes the display to be erased.

Attributes

#	Attribute	Description
✔	defaultState	Sets the default state output for the text display actuator. This shall be applicable if the actuator is not under any scheduled (calendarID) or override control (OverrideCommand).
✔	actualState	This attribute should reflect the physical state of the source as much as possible. It may be calculated or measured, depending on the specific ODN implementation, which is outside the scope of this specification.
✔	targetCommand	Latest command for the text display actuator.
✔	feedbackCommand	This attribute reflects the command in effect and it might deviate from the actualState due to propagation time, due to scheduler specific or due to internal ODN specific mechanisms to handle the priority of the requests or response time.
✔	stateChange	This attribute reflects that the state has changed

✔	calendarID	TALQ Address of the calendar controlling this text display actuator. If this attribute is empty, the behavior shall be determined by the ODN. If the attribute is invalid, the ODN shall trigger a generic invalid address event and the behavior shall be determined by the ODN.
✔	invalidCalendar	This attribute reflects that a calendar has been allocated and can not be implemented it.
✔	invalidProgram	This attribute reflects that a control program has been allocated and can not be implemented it
✔	programChange	This attribute reflects that the control program applicable to the actuator has changed.
✔	calendarChange	This attribute reflects that the calendar applicable to the actuator has changed.
✔	targetCommandChange	This attribute reflects that the targetCommand has changed.
✔	applicationType	Application Type of the text display actuator depending on the use case. E.g.: â€ Traffic Panelâ€
✔	maxXCoordinate	The highest X coordinate the display supports before wrapping to the next line
✔	maxYCoordinate	The highest Y coordinate the display supports before wrapping to the next line
✔	level	Used to represent a level control such as audio volume, integer value between 0 and 100 as percentage
✔	contrast	Proportional control, integer value between 0 and 100 as percentage
✔	clearDisplay	Command to clear the display

Events

#	Event type	Description
✔	calendarChange	This attribute reflects that the calendar applicable to the actuator has changed.
✔	invalidCalendar	This attribute reflects that a calendar has been allocated and can not be implemented it.
✔	invalidProgram	This attribute reflects that a control program has been allocated and can not be implemented it
✔	programChange	This attribute reflects that the control program applicable to the actuator has changed.
✔	stateChange	This attribute reflects that the state has changed
✔	targetCommandChange	This attribute reflects that the targetCommand has changed.

Parking Sensor

The parking sensor provides actual and accumulated occupancy duration as well as forbidden parking detection.

Attributes

#	Attribute	Description
✔	occupancy	Status of the parking spot from the point of view of occupancy. Enum:'closed, vacant, occupied, partially occupied, unknown'
✔	duration	Number of seconds sinde the parking place is occupied. If not occupied, duration shows the duration of the last occupation.
✔	accumulatedDuration	Accumulated occupation time since accumulatedSince. In seconds.
✔	accumulatedSince	Indicates the date and time at which accumulatedDuration is reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	forbiddenParkingDetected	Indicates if the vehicle present on the parking place is not authorized. Set to false if the place is free or if the vehicle is authorized.
✔	applicationType	Application Type of the parking sensor depending on the use case. E.g.: â€ Street parkingâ€
✔	sensorType	Type of sensor (e.g.: IR, PIR, AIR, MR)
✔	occupancyChangeToVacant	Indicates that the occupancy has changed to vancant
✔	occupancyChangeToOccupied	Indicates that the occupancy has changed to occupied
✔	overstayDetected	Indicates if the occupancy duration is over the maxDuration
✔	maxDuration	Max number of seconds for a parking session.

Events

#	Event type	Description
✔	forbiddenParkingDetected	Indicates if the vehicle present on the parking place is not authorized. Set to false if the place is free or if the vehicle is authorized.
✔	occupancyChangeToOccupied	Indicates that the occupancy has changed to occupied
✔	occupancyChangeToVacant	Indicates that the occupancy has changed to vancant
✔	overstayDetected	Indicates if the occupancy duration is over the maxDuration

Parking Camera Sensor

The Parking Camera Sensor provides information about the parking slots that only computer vision can provide.

Attributes

#	Attribute	Description
✔	totalSlots	Total number of slots monitored by the device.
✔	slotsData	Data of each slot.
✔	freeSlots	Number of free slots on the monitored area.
✔	freeSlotIDs	Ids of the free slots
✔	averageDuration	Average occupation time per vehicle since accumulatedSince.
✔	accumulatedParkingSessions	Number of parking sessions since accumulatedSince
✔	accumulatedSince	Indicates the date and time at which accumulatedParkingSessions and averageDuration are reset to zero. The Gateway may change this value with the actual one depending on implementation.
✔	forbiddenVehicleDetected	Indicates if there is a vehicle present on the parking slots which is not authorized. Set to false if all the places are free or all the vehicles are authorized.
✔	blockingVehicleDetected	Indicates if a vehicle is blocking other
✔	badParkingDetected	Indicates if a vehicle is badly parked (i.e: ocuppying two slots).
✔	applicationType	Application Type of the parking camera sensor depending on the use case. E.g.: â€ Parking Cameraâ€
✔	zoneReference	Reference of the zone monitored depending on the use case. E.g.: "Zone A1"

Events

#	Event type	Description
✔	badParkingDetected	Indicates if a vehicle is badly parked (i.e: ocuppying two slots).
✔	blockingVehicleDetected	Indicates if a vehicle is blocking other
✔	forbiddenVehicleDetected	Indicates if there is a vehicle present on the parking slots which is not authorized. Set to false if all the places are free or all the vehicles are authorized.

Luminaire Asset

This entity contains the managed and tracked attributes of a specific Luminaire, excluding the concept of Controller and Driver.

Attributes

#	Attribute	Description
✔	luminaireTypeAddress	Address of the Luminaire Type
✔	bracketTypeAddress	Address of the Bracket Type
✔	serial	Serial number of the Luminaire
✔	projectID	Name of the Project / Tender
✔	luminousFluxConfiguration	Programmed light output of the luminaire
✔	paintingColor	Painting color of the luminaire expressed as a color system-color value, (e.g: RAL-7035)
✔	virtualPowerOutput	Percentage of nominal power at which the light source should be set when the Command is set to 100%.
✔	installationTimestamp	Installation date and time of luminaire
✔	identification	Luminaire identification. (e.g: as per DiiA/D4i specification part 251 (MB1 extension)).
✔	identificationNumber	Luminaire identification number. (e.g: as per DiiA/D4i specification part 251 (MB1 extension))
✔	mountingOption	Installed direction of the luminaire to the support
✔	warrantyExpirationDate	Warranty expiration date. It can be reset
✔	manufactureYear	Year of manufacture of the luminaire.
✔	manufactureWeek	Week of manufacture of the luminaire.
✔	warrantyYears	Number of years for warranty
✔	applicationType	Application Type of the luminaire asset depending on the use case.

Driver Asset

This entity contains the managed and tracked attributes of a specific driver

Attributes

#	Attribute	Description
✔	driverTypeAddress	Address of the Driver Type
✔	serial	Serial number of the driver
✔	projectID	Name of the Project / Tender
✔	firmwareVersion	Version of the driver hardware firmware
✔	installationTimestamp	Installation date and time of driver
✔	manufactureYear	Year of manufacture of the driver
✔	manufactureWeek	Week of manufacture of the driver.
✔	warrantyExpirationDate	Warranty expiration date. It can be reset

✔	applicationType	Application Type of the driver asset depending on the use case.

Controller Asset

This entity contains the managed and tracked attributes of a specific controller

Attributes

#	Attribute	Description
✔	controllerTypeAddress	Address of the Controller Type
✔	serial	Serial number of the Controller
✔	firmwareVersion	Version of the controller hardware firmware
✔	installationTimestamp	Installation date and time of OLC
✔	registrationTimestamp	Registration date and time of OLC
✔	projectID	Name of the Project / Tender
✔	controllerColor	Painting color of the controller expressed as a color system-color value, (e.g: RAL-7035)
✔	connectionType	Type of the connection to the luminaire
✔	warrantyExpirationDate	Warranty expiration date. It can be reset
✔	manufactureYear	Year of manufacture of the controller
✔	manufactureWeek	Week of manufacture of the controller
✔	applicationType	Application Type of the controller asset depending on the use case.

Services

Configuration Service

The TALQ Configuration Service enables discovery and configuration of devices and services

Options

#	Option	Value	Description
✔	commissioningSupported*		This ODN can support commissioning from the CMS side.
✔	devicesPaginationSupported*		This ODN can support pagination of devices.

Control Service

The Control service describes the mechanisms to operate the actuator functions in order to enable schedule based and override control

Options

#	Option	Value	Description
✔	supportedTypes	• AbsoluteActivePeriod • AstroClockActivePeriod • AstroClockTimeControl* • DynamicControl* • SensorActivePeriod* • AstroAndSensorActivePeriod* • ExternalControlEffect* • FixedControlEffect* • ccDate* • ccDay*	Control Program and calendar options supported are defined by announcing support for the given modes
✔	ccDateSupport		Indicates the ccDate options supported
✔	ccDaySupport		Indicates the ccDay options supported
✔	effectOperationsSupport	• set • min • max • add • sub • mul	Indicates the dynamic control effect operations supported
✔	programSecondsSupported*		Indicates whether the field of seconds is supported in programs.

Events

#	Event Type	Description
✔	invalidCalendar	An invalid calendar has been provided by the CMS to the ODN
✔	invalidProgram	A control program has been provided by the CMS, which cannot be implemented by the ODN

Data Collection Service

The TALQ Data Collection Service is a provision to configure how ODN measurements, status information and events are logged, and when or under what conditions the logged data is transferred to the CMS

Options

#	Option	Value	Description

✔	supportedModes	• EventRecordingMode • PeriodicRecordingMode • VendorRecordingMode • ImmediateReportingMode • ScheduledReportingMode	Recording and Reporting modes supported
✔	samplingPeriodSupported		Indicates whether the ODN supports periodic sampling for a data logger in periodic recording mode

Events

#	Event Type	Description
✔	invalidLoggerConfig	The CMS has provided a data logger configuration that cannot be implemented by the ODN

On Demand Data Request Service

This service provides the mechanism to access attributes in the logical devices by requesting attribute values from the ODN

Group Management Service

This service provides the mechanisms to define and manage groups

Options

#	Option	Value	Description

Data Package Transfer Service*

This service provides a mechanism to transfer data packages containing ODN vendor specific information to the Gateway via the CMS

Events

#	Event Type	Description
✔	releaseMismatch	The release indicated as expected does not match the actual release of the Gateway.
✔	changeReleaseFailure	Change release failed. Operation is rolled back.
✔	packageChangeFailure	A Package change operation failed. Operation is rolled back.
✔	changingRelease	Indicates the Gateway is in the process of changing release.
✔	packageDownloaded	Indicate the Gateway has downloaded a package.

Asset Management Service

The TALQ Asset Management Service provides a mechanism to transfer the types needed by the asset management functions

Test Service

This service provides a mechanism to reduce the human intervention during the certification tests, enabling the certification tests to maximise automation

Objects

Luminaire Type

The LuminaireType consists of a set of attributes that together characterize, i.e.: are generic for, a given luminaire, excluding the concept of Controller, Driver and Bracket.

Properties

#	Property	Description
✔	address	TALQ address of the Luminaire Type
✔	name	Descriptive name of the LuminaireType
✔	gtin	Global Trade Item Number of luminaire
✔	manufacturerName	Name of manufacturer
✔	productFamily	Product family name of luminaire
✔	model	Product model of luminaire
✔	hardwareVersion	Hardware version
✔	maximumLuminousFluxOutput	Maximum Light Output luminous flux output
✔	minimumLuminousFluxOutput	Minimum Light Output of the luminaire
✔	lightSourceType	Light source type.
✔	lightDistributionType	Enumeration of possible light distribution type, using the Zhaga D4i enumeration. Please refer to ZD4i standard for more details.
✔	lcsRating	Defines the distribution of light within in three primary solid angles. (LCS: Luminaire Classification System for outdoor luminaires for TM 15 - 11 standard.). E.g: F6-33-19-1, B6-26-10-1, U0-0.
✔	lightPhotometry	Reference to the photometry of the manufacturer. IES LDT file (e.g. DN08)

✔ driverReplaceable	Informs if the driver is replaceable with values: On site, Workshop, No replaceable
✔ lightSourceReplaceable	Informs if the light source is replaceable with values: On site, Workshop and No replaceable
✔ corrosionClass	Extra protection layer against corrosition environment. To use standard ISO 9223 C1 to C5 (https://www.iso.org/standard/53499.html)
✔ maximumPower	Maximum power that the Luminaire can operate at
✔ powerAtMinimumDimLevel	Power at minimum dim level for the luminaire.
✔ weight	Weight of the luminaire
✔ aerodinamicResistance	Equivalent surface area of the luminaire that is exposed to the wind at 0 degrees inclination.
✔ materialEnclosure	Material of enclousure of the body of the luminaire
✔ materialLlightCover	Material of light cover
✔ lightCoverShape	Shape of the luminaire cover
✔ luminaireEfficacy	Efficacy of the luminaire
✔ socketTypes	List of socket pairs types/receptacles and positions of the luminaire. E.g: [NEMA at top, Zhaga at underside and Other at remote]
✔ controlVoltMax	DC voltage that gives the maximum light output in a 1-10V control type.
✔ controlVoltMin	DC voltage that gives the minimum light output in a 1-10V control type.
✔ minLightOutput	Sets the minimum light output under which the lamp actuator will not perform the command.
✔ virtualLightOutput	Sets the light output that the lamp actuator shall consider to be equal to 100%. This scaling factor shall be applied before applying the required control voltage. The light command output shall be scaled using this factors, so that 100% in the light command corresponds to this value before applying CLO and maintenance factors.
✔ daliLedLinear	If set to True indicates the dimming curve is linear for DALI control type (some lamp control gear only use linear).
✔ warmUpTime	Sets the delay after a Switch ON command during which the lamp actuator shall not perform any dimming command.
✔ coolDownTime	Sets the delay after a Switch OFF command during which the lamp actuator shall not perform any Switch ON command.(seconds)

✔ lowCurrentThreshold	Level of the luminaire supply current under which the ODN shall detect a currentTooLow event.
✔ highCurrentThreshold	Level of the luminaire supply current above which the ODN shall detect a currentTooHigh event.
✔ highTemperatureThreshold	Temperature above which the temperatureTooHigh event is triggered
✔ maxOperatingHours	Maximum number of operating hours that the lamp is supposed to live with a given specification. This attribute can be used to set the old lamp attributes when the lamp reaches its expected useful life.
✔ powerLightGradient	The ratio of change of light level divided by change in power level, which is the slope of the Light level vs.Â Power curve. It is assumed that 100% power refers to 100% light output. If this attribute is not specified, the attribute shall be set to 1 as default.
✔ lampPowerTolerance	The number of watts by which the actual lamp power can be in error from the expected lamp power (as defined by the dimming curve and the current dimming level) before a lamp power event (lampPowerTooHigh or lampPowerTooLow) is triggered.
✔ lampPowerHighThreshold	The absolute number of watts above which the absolutLampPowerTooHigh event is triggered
✔ lampPowerLowThreshold	The absolute number of watts below which the absolutLampPowerTooLow event is triggered
✔ powerFactorThreshold	The threshold below which powerFactorTooLow event is triggered
✔ lumenDepreciationCurve	Ordered set of entries (cumulative operating hours, correction factor in %) that form a piece wise linear approximation of the lumen depreciation correction factor curve. The first cumulative hours should be 0 and the last correction factor should be 100%. E.g.: 0 h, 80%; 5000 h, 85%; 10000 h, 90%; 15000 h, 95%; 20000 h, 100%.
✔ cloType	Determines where CLO (Constant Lumen Output) is implemented in the lamp control gear or in the ODN (e.g. control device). This CLO profile is needed even when CLO is implemented by the driver in order to obtain the expected lamp power.

✔	powerFactorThresholdDimmingCurve	Ordered set of entries (power factor threshold, dim level in %) that form a linear approximation of the power factor threshold vs dimming curve. The first dimming should be 0% and the last 100%. E.g.: 0.65 , 0%; 0.60, 10%; 0.70, 20%; 0.75, 30%; 0.80, 40%; 0.85, 50%; 0.87, 60%; 0.89, 70%; 0.90, 80%; 0.95, 90%; 0.98, 100%.
✔	warrantyYears	Number of years for warranty
✔	lightSourceLedCurrent	LED board current
✔	lightSourceLedVoltage	LED board voltage
✔	lightSourceLedNumber	Number of LEDs
✔	lightSourceGtin	Global Trade Item Number of light source
✔	lightSourceManufacturerName	Name of light source manufacturer
✔	lightSourceProductFamily	Product family name
✔	lightSourceModel	Light source model
✔	lightSourceLedEficacy	Efficacy of the LED
✔	minimumOperatingTemperature	Minimum environment temperature in which the luminaire can operate
✔	maximumOperatingTemperature	Maximum environment temperature in which the luminaire can operate
✔	commonModeOverVoltageProtection	Common mode over voltage protection
✔	diferentialModeOverVoltageProtection	Diferential mode over voltage protection
✔	electricalIsolationClass	Electrical Isolation class.

Bracket Type

The BracketType consists of a set of attributes that together characterize, i.e: are generic for, a given Bracket.

Properties

#	Property	Description
✔	address	TALQ address of the Bracket Type
✔	name	Descriptive name of the Bracket Type
✔	gtin	Global Trade Item Number of bracket
✔	manufacturerName	Name of manufacturer
✔	productFamily	Product family name of bracket
✔	model	Product model of bracket
✔	mountingOptions	Different options to mount the luminaire to the support
✔	mountMinDiameter	Mount minimum diameter of the bracket

✔	mountMaxDiameter	Mount maximum diameter of the bracket
✔	tiltMinimum	Minimum horizontal inclination of the bracket (positive and negative value). 0 degree means that it is parallel to the LED board
✔	tiltMaximum	Maximum horizontal inclination of the bracket (only positive value). 0 degree means that it is parallel to the LED board
✔	weight	Weight of the bracket
✔	aerodinamicResistance	Equivalent surface area of the bracket that is exposed to the wind.

Driver Type

The DriverType consists of a set of attributes that together characterize, i.e. are generic for, a given Driver.

Properties

#	Property	Description
✔	address	TALQ address of the Driver Type
✔	name	Descriptive name of the Driver Type
✔	controlElectricalInterfaceTypes	The control electrical interface type of the connector of the driver
✔	controlInterfaceProtocolTypes	The control interface protocol type of the connector of the driver.
✔	programInterfaceType	Program interface of the driver
✔	nominalAcMainsVoltage	Nominal AC mains voltage for the luminaire to operate.
✔	maxAcMainsVoltage	Max AC mains voltage for the luminaire to operate.
✔	minAcMainsVoltage	Nominal Min AC mains voltage for the luminaire to operate.
✔	nominalDcMainsVoltage	Nominal DC mains voltage for the luminaire to operate.
✔	maxDcMainsVoltage	Max DC mains voltage for the luminaire to operate.
✔	minDcMainsVoltage	Nominal Min DC mains voltage for the luminaire to operate.
✔	gtin	Global Trade Item Number of driver
✔	manufacturerName	Name of driveer manufacturer
✔	productFamily	Product family name
✔	model	Driver model
✔	hardwareVersion	talq.feature.property.DriverType.hardwareVersion.desc
✔	minOutputCurrent	Min output current
✔	maxOutputCurrent	Max output current
✔	minOutputVoltage	Min output voltage
✔	maxOutputVoltage	Max output voltage
✔	controlOutputType	Constant voltage or constant current regulated

✔	dimmingOutputType	Dimming output type
✔	dimmingOutputs	Number of dimming outputs
✔	driverNominalCurrent	The pre-programmed current in the driver, determined also by the LED board
✔	driverNominalVoltage	The pre-programmed voltage in the driver, determined also by the LED board
✔	ratedLifeTime	Rated life time of the driver at the maximum operating temperature of the luminaire.
✔	warrantyYears	Number of years for warranty

Controller Type

The ControllerType consists of a set of attributes that together characterize, i.e. are generic for, a given Controller.

Properties

#	Property	Description
✔	address	TALQ address of the Controller Type
✔	name	Descriptive name of the Controller Type
✔	gtin	Global Trade Item Number of the controller
✔	powerConsumption	Expected Power consumption of the controller
✔	locationPrecision	Accuracy of the location determination
✔	manufacturerName	Name of manufacturer
✔	productFamily	Product family name of the controller
✔	model	Model of the Controller
✔	warrantyYears	Number of years for warranty
✔	mechanicalInterfaces	Type of mechanical connection or socket
✔	electricalInterfaces	The control interface protocol type of the connector of the driver.
✔	protocols	Type of digital communication of the controller

Lamp type

The lamp type consists of a set of attributes that together characterize a given lamp and control gear combination. When modelling a Lighting ODN with many luminaires, there are attributes' values that are the same for many lamps, e.g.: the expected consumed power of the lamp and control gear (wattage) would be the same for many lamp monitors. The concept of LampType is created to avoid including the same attributes' values in every lamp monitor and actuator of the same type, for this reason a reference to a lamp type is included in the lamp actuator and lamp monitor functions, as these attributes are required for proper operation of these functions. Thus, the definition of lamp types enables the CMS to efficiently set attributes in many lamp actuators/monitors by just setting the address of the 'lampType' attribute in each function. Lamp types can be

created by both CMS and TALQ Gateway as separate entities. The TALQ Gateway shall announce any lamp type it has to the CMS as part of the initial configuration. In addition to the initial configuration, the TALQ Gateway shall also announce the lamp type whenever it changes. The CMS may also send lamp types to the TALQ Gateway.

Properties

#	Property	Description
✔	name	Descriptive name of the lamp type
✔	address	TALQ Address of the lamp type
✔	wattage	Expected consumed power of the lamp and control gear
✔	controlType	Type of control/dimming interface between the lamp actuator function and the control gear or within the control gear in case lamp actuator is embedded in the control gear
✔	controlVoltMax	DC voltage that gives the maximum light output in a 1-10V control type
✔	controlVoltMin	DC voltage that gives the minimum light output in a 1-10V control type
✔	minLightOutput	Sets the minimum light output under which the lamp actuator will not perform the command
✔	virtualLightOutput	Sets the light output that the lamp actuator shall consider to be equal to 100%
✔	daliLedLinear	If set to true indicates the dimming curve is linear for DALI control type
✔	warmUpTime	talq.feature.property.LampType.warmUpTime.desc
✔	coolDownTime	Sets the delay after a switch OFF command during which the lamp actuator shall not perform any switch ON command
✔	lowCurrentThreshold	Level of the luminaire RMS supply current under which the ODN shall detect a currentTooLow event
✔	highCurrentThreshold	Level of the luminaire RMS supply current above which the ODN shall detect a currentTooHigh event
✔	lowLampVoltageThreshold	Level of lamp voltage (not supply voltage) under which the ODN shall detect a voltageTooLow event. [WARNING: Don't use this attribute as a low supply voltage threshold, use the new LampMonitor.lowSupplyVoltageThreshold introduced by TALQ 2.3.0.]

✔	highLampVoltageThreshold	Level of lamp voltage (not supply voltage) under which the ODN shall detect a voltageTooLow event. [WARNING: Don't use this attribute as a high supply voltage threshold, use the new LampMonitor.highSupplyVoltageThreshold introduced by TALQ 2.3.0.]
✔	highTemperatureThreshold	Temperature above which the temperatureTooHigh event is triggered
✔	maxOperatingHours	Maximum number of operating hours that the lamp is supposed to live with a given specification
✔	powerLightGradient	The ratio of change of light level divided by change in power level
✔	lampPowerTolerance	The number of watts by which the actual lamp power can be in error from the expected lamp power
✔	lampPowerHighThreshold	The absolute number of watts above which the absolutLampPowerTooHigh event is triggered
✔	lampPowerLowThreshold	The absolute number of watts below which the absolutLampPowerTooLow event is triggered
✔	powerFactorThreshold	The threshold below which powerFactorTooLow event is triggered
✔	lumenDepreciationCurve	Set of entries (operating hours, correction factor in %) that form a piece wise linear approximation of the lumen depreciation correction factor curve
✔	cloType	Determines where CLO is implemented in the lamp control gear or in the ODN (e.g. control device)
✔	powerFactorThresholdDimmingCurve	Ordered set of entries (power factor threshold, dim level in %) that form a linear approximation of the power factor threshold vs dimming curve. The first dimming should be 0% and the last 100%. E.g.: 0.65 , 0%; 0.60, 10%; 0.70, 20%; 0.75, 30%; 0.80, 40%; 0.85, 50%; 0.87, 60%; 0.89, 70%; 0.90, 80%; 0.95, 90%; 0.98, 100%.

Event log data

Event log data contains a single event, with eventType and value, in each single log entry. It also includes information about whether the log denotes the start or end of the event. Furthermore additional information can be added with the info attribute.

Properties

#	Property	Description
✔	eventType	Identifier of event reported
✔	srcAddress	Address of Logical device or function within a logical device which is the source of the event or to which this event applies

✔	startEndFlag	If the event denotes either the start or end of a ‘special’ period, this flag shall be included
✔	info	a string providing more information on the event
✔	attributes	A sequence of attribute values logged together with the event

Command

A command defines a type of control action that can be applied to a function. Commands can be generated by a manual override action or by a control program.

Properties

#	Property	Description
✔	state	Light state to be applied to the lamp actuator
✔	reason	Indicates the command was triggered by override, sensor or control program
✔	cmsRefId	CMS reference, which can be used for data logging. The cmsRefId in a Command is a free text to be used by the CMS for any purpose, e.g: to differentiate contexts. It is a token that allows the CMS to match client requests to the original notification.
✔	refAddress	Reference to the source of the command, e.g. sensor or control program
✔	start	Time when the control action resulting from command shall start. This attribute is used only with override commands to set a time to start an override action. If not specified, the override command starts immediately.
✔	expiration	Time when the control action resulting from command shall be terminated. This attribute is used only with override commands to set a time to stop an override action. After the expiration of an override command, the system should go back to the state defined by the active control program. If not specified, there is no expiration for the override command.
✔	rampToLevelTime*	The time (in seconds) taken for the value to ramp to the specified level. The change will be finished rampToLevelTime seconds after: the scheduled time if the change comes from a control program; the reception of the request, or the command.start time attribute, if the change comes from an override command, or; the sensor event is raised if the control is sensor-based. If actions related to one command remain to be completed when a subsequent command is received, the subsequent command shall take precedence.

✔	rampFromLevelTime*	The time (in seconds) taken for the value to ramp to the specified level. The change will be finished rampFromLevelTime seconds after: the scheduled time if the change comes from a control program; the reception of the request if the change comes from an override command; expiry of the related command, or; the sensor event is lowered and the hold time subsequently expires if the control is sensor-based. If actions related to one command remain to be completed when a subsequent command is received, the subsequent command shall take precedence.

Group

A group is set of entities that can be addressed by the same group address. Devices and functions within devices can be assigned to a group. A group may also include other groups as members.

Properties

#	Property	Description
✔	address	Group address
✔	members	TALQ Addresses of members of the group
✔	purpose	Main purpose of the group

*: The Certification Test Tool is designed to provide a high level of confidence that complementary systems can communicate successfully. As both the protocol and the test tool evolve, all mandatory and other core tests are confirmed by comparison with real-life scenarios (plug-fest or similar). Some tests of optional and more peripheral features may not yet have been confirmed in this way; such features are identified with an asterisk (*).

This Capability List is based on a certification session performed by the TALQ Certification Tool (v2.5.0-update.2) on 2023-04-11 11:36:21.851 +0200.