

# Swidget Z-Wave Power Control Insert Technical Notes

## 1. PURPOSE

This document provides details for the behavior of the Swidget Z-Wave Power Control Insert in a Z-Wave network.

The following notes apply to Cat. No.ZW000RWA.

## 2. REFERENCES / DOCUMENTS

N/A

## 3. COMMAND CLASS BEHAVIORS

The Swidget Z-Wave Power Control Insert can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All non-battery-operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network. The Swidget Z-Wave insert is mains powered, and therefore will act as a repeater when mains power is available.

### 3.1 Supported Command Classes

When the Swidget Z-Wave Plus Insert is included into an S2 capable Z-Wave network, it will request to join as an S2 unauthenticated device.

This device must be used in conjunction with an S2 Security Enabled Z-Wave Controller to fully utilize all implemented security functions. If included by a non-S2 enabled Z-Wave controller, the device will still provide access to all functionality not involved in providing S2 Security support.



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The following table (Table 1) lists all the command classes found in the Node Info Frame (NIF) when included in a Non-Secure Network:

**Table 1: NIF Contents when Included in Non-Secure Network**

| Command Class                 | Command Class Byte | Version |
|-------------------------------|--------------------|---------|
| Z-Wave Plus Info              | 0x5E               | 2       |
| Version                       | 0x86               | 2       |
| Association                   | 0x85               | 2       |
| Association Group Information | 0x59               | 1       |
| Manufacturer Specific         | 0x72               | 2       |
| Binary Switch                 | 0x25               | 1       |
| Powerlevel                    | 0x73               | 1       |
| Meter                         | 0x32               | 2       |
| Security 2                    | 0x9F               | 2       |
| Transport Service             | 0x55               | 2       |
| Supervision                   | 0x6C               | 1       |
| CRC-16 Encapsulation          | 0x56               | 1       |
| Application Status            | 0x22               | 1       |
| Device Reset Locally          | 0x5A               | 1       |
| Multi-Channel                 | 0x60               | 4       |
| Multi-Channel Association     | 0x8E               | 3       |

The following table (Table 2) lists all the command classes found in the Node Info Frame (NIF) when included in a Secure Network:

**Table 2: NIF Contents when Included in Secure S2 Network**

| Command Class     | Command Class Byte | Version |
|-------------------|--------------------|---------|
| Z-Wave Plus Info  | 0x5E               | 2       |
| Security 2        | 0x9F               | 2       |
| Transport Service | 0x55               | 2       |
| Supervision       | 0x6C               | 1       |



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The following table (Table 3) lists all the command classes reported in the Security S2 Commands Supported Report:

**Table 3: Command Classes Included in Security S2 Commands Supported Report**

| Command Class                 | Command Class Byte | Version |
|-------------------------------|--------------------|---------|
| Version                       | 0x86               | 2       |
| Association                   | 0x85               | 2       |
| Association Group Information | 0x59               | 1       |
| Manufacturer Specific         | 0x72               | 2       |
| Binary Switch                 | 0x25               | 1       |
| Powerlevel                    | 0x73               | 1       |
| Meter                         | 0x32               | 2       |
| CRC-16 Encapsulation          | 0x56               | 1       |
| Application Status            | 0x22               | 1       |
| Device Reset Locally          | 0x5A               | 1       |
| Multi-Channel                 | 0x60               | 4       |
| Multi-Channel Association     | 0x8E               | 3       |

**3.2 Multi-Channel Command Class Support**

The Swidget Z-Wave Plus Insert root device is a GENERIC\_TYPE\_SWITCH\_BINARY / SPECIFIC\_TYPE\_POWER\_SWITCH\_BINARY device and supports all the command classes listed in section 3.1.

Endpoint 1 must be identical to the root node with respect to device functionality, and so it also appears as a GENERIC\_TYPE\_SWITCH\_BINARY / SPECIFIC\_TYPE\_POWER\_SWITCH\_BINARY device, and supports the following subset of command classes:

| Endpoint 1 Command Class      | Version | Required Security Class        |
|-------------------------------|---------|--------------------------------|
| Z-Wave Plus Info              | 2       | None                           |
| Association                   | 2       | Highest Granted Security Class |
| Association Group Information | 1       | Highest Granted Security Class |
| Multi-Channel Association     | 3       | Highest Granted Security Class |
| Binary Switch                 | 1       | Highest Granted Security Class |
| Basic                         | 1       | Highest Granted Security Class |
| Meter                         | 2       | Highest Granted Security Class |
| Security 2                    | 2       | None                           |
| Supervision                   | 1       | None                           |



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Endpoint 2 appears as a GENERIC\_TYPE\_METER / SPECIFIC\_TYPE\_SIMPLE\_METER device, and supports the following command classes:

| Endpoint 2 Command Class      | Version | Required Security Class        |
|-------------------------------|---------|--------------------------------|
| Z-Wave Plus Info              | 2       | None                           |
| Association                   | 2       | Highest Granted Security Class |
| Association Group Information | 1       | Highest Granted Security Class |
| Multi-Channel Association     | 3       | Highest Granted Security Class |
| Meter                         | 2       | Highest Granted Security Class |
| Security 2                    | 2       | None                           |
| Supervision                   | 1       | None                           |

### 3.3 Basic Command Class Support

In a non-multi-channel environment, the Basic Command Class functions are mapped to the Binary Switch Command Class functions.

In a multi-channel environment, the Basic Command Class functions are mapped to the Binary Switch Command Class functions for Endpoint 1 (the Root node).

For Endpoint 2, no mappings exist for the Basic Command Class, so any Basic Commands received by Endpoint 2 will be ignored, and no report will be generated.

### 3.4 Application Status Behaviour

The Swidget outlet has a built-in hardware power-switching safety feature that limits the toggling of the switch to a maximum frequency of approximately 1 state change per second.

If consecutive BINARY\_SWITCH\_SET or BASIC\_SET Commands are received at a rate faster than 1 per second (approx.), the module will return an APPLICATION\_STATUS: BUSY report to the requesting node, and the SET operation will be ignored.

The user can initiate a power monitoring synchronization and calibration operation using the button on the insert. When the device is performing this operation, the switch capabilities will be unavailable for network control for approximately 1 to 2 minutes. If BINARY\_SWITCH\_SET or BASIC\_SET Commands are received during this synchronization/calibration period, the module will return an APPLICATION\_STATUS: BUSY report to the requesting node, and the SET operation will be ignored.

### 3.4 Meter information

The Swidget Z-Wave Power Control Insert supports two separate METER\_V2 devices. One meter is associated with the controlled outlet, and is accessible through the root, and through Endpoint 1 via Multi-Channel operations. The second meter is associated with the always-on, unswitched outlet, and is accessible only through Endpoint 2 Multi-Channel operations.



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Both meters have identical capabilities. When queried with a METER\_SUPPORTED\_GET command, either will return the following information in the METER\_SUPPORTED\_REPORT:

| Report Field    | Value | Description            |
|-----------------|-------|------------------------|
| Meter Reset     | 0     | Reset is NOT supported |
| Meter Type      | 1     | Electric meter         |
| Scale Supported | 4     | Watts                  |

Both meters generate the same type of METER\_REPORT\_V2 reports:

| Report Field             | Value | Description                             |
|--------------------------|-------|---|
| Rate Type                | 0x01  | Import (consumed)                       |
| Meter Type               | 0x01  | Electric meter                          |
| Precision                | 0x02  | Number of decimal places in meter value |
| Scale                    | 0x02  | Watts                                   |
| Size                     | 0x04  | 4-byte report                           |
| Meter Value Byte 1 (MSB) | 0xXX  | MSB of 32-bit meter value               |
| Meter Value Byte 2       | 0xXX  | Meter value data                        |
| Meter Value Byte 3       | 0xXX  | Meter value data                        |
| Meter Value Byte 4 (LSB) | 0xXX  | LSB of 32-bit meter value               |
| Delta Time 1             | 0x00  | No previous meter data included         |
| Delta Time 2             | 0x00  | No previous meter data included         |

NOTE: Optional "Previous Meter Value" field data is not used, and not included in the meter reports.

### 3.6 Association Information

The Swidget Z-Wave Power Control Insert supports Group 1 ("Lifeline") associations. One Lifeline association is supported.

The root device will send a DEVICE RESET LOCALLY report to the lifeline in response to a user-initiated local reset of the device prior to performing the local reset activities.

Creating a regular (non-Multi-Channel) Association with the Lifeline will cause the device to send an un-encapsulated METER\_V2 REPORT from the root device to the Lifeline every minute.

Creating a Multi-Channel Association with the Lifeline will cause the device to send *two* Multi-Channel encapsulated METER\_V2 REPORTs to the Lifeline every minute. One will be sent from Endpoint 1 (the controlled outlet), and one will be sent from Endpoint 2 (the always-on outlet).



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## 4. User-Initiated Device and Network Activities

### 4.1 Manual Outlet On/Off Functionality

If the device is included in a Z-Wave network, the LED will operate to reflect the status of the controllable outlet. If the controllable outlet is enabled (switched 'ON'), the LED will be illuminated solid green. If the controllable outlet is disabled (switched 'OFF'), the LED will not be illuminated green.

When in the network-connected state, the user may change the state of the local output with a momentary press of the Swidget push button. Lightly press the push button on the Swidget Z-Wave Insert and hold for at least 1 second, but not longer than 5 seconds. When the button press is accepted, the state of the switched outlet will change, and the LED green state will change to match it.

A press of less than one full second or of longer than 5 seconds will be ignored by the Swidget insert, and no action will be taken.

**Note: When connected to the network, a press of 10 seconds or more will initiate a Network Remove operation (see section 4.3). If the user exceeds the momentary press period by 10 seconds or more, they may continue to hold the push button until the device passes through the network remove AND device reset periods (approximately 30 seconds), after which no action will be taken when the button is released.**

**Note: Immediately following a network add, after indicating the operation success with a solid blue LED, the switch outlet will be placed in its default 'ON' state, and the LED will be solid green to reflect the outlet state. During this period, momentary button presses will have NO EFFECT on the outlet switch or the LED state.**

### 4.2 Z-Wave Network Add

**NOTE: Before beginning the network add procedure, ensure there are no devices plugged into either receptacle outlet. After the device has been successfully added to the network, DO NOT plug anything into either receptacle outlet for at least 2 minutes to allow the module time to synchronize with the outlet metering hardware, otherwise the accuracy of your meter readings may be adversely affected.**

1. Follow network ADD steps for your Z-Wave controller/hub to prepare the network to accept a device addition.
2. Lightly press the push button on the Swidget Z-Wave Insert and hold for 10-15 seconds until the LED illuminates solid blue, then release the button. The LED will flash blue to indicate ADD mode is enabled. No manual or external Z-Wave operations are possible during this activity.
3. The Swidget Z-Wave Insert will remain in ADD mode for up to 60 seconds. If the device is successfully added to the Z-Wave network, the LED will be solid blue for 5 seconds then return to the normal operational state; LED will be solid green if switch is ON (default), LED will not be illuminated if switch is OFF. If the device fails to be successfully added to the network after 60 seconds, the red LED will begin to flash. If necessary, consult your Z-Wave controller/hub manual and re-try.
4. Please see section 4.4 on how to perform a local device reset if multiple remove attempts fail.



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### 4.3 Z-Wave Network Remove

1. Follow network REMOVE steps for your Z-Wave controller/hub.
2. Lightly press the push button on the Swidget Z-Wave Insert and hold for approximately 10 seconds until the LED illuminates solid blue, then release the button. The LED will flash blue to indicate REMOVE mode is enabled.
3. The Swidget Z-Wave Insert will remain in REMOVE mode for up to 60 seconds. If the device is successfully removed from the Z-Wave network, the LED will be solid blue for 5 seconds then return to the normal operational state. If the device fails to be successfully removed from the network after 60 seconds, the red LED will begin to flash. If necessary, consult your Z-Wave controller/hub manual and re-try.
4. Please see section 4.4 on how to perform a local device reset if multiple remove attempts fail.

### 4.4 Factory Default Local Reset

To perform a local device reset, lightly press and hold the push button on the Swidget Z-Wave Insert for approximately 20 seconds until the LED turns SOLID RED, and then release.

- After 10 seconds the LED will illuminate SOLID BLUE; indicating user is passing through network add/remove period.
- After 15 seconds elapsed hold time, the LED will turn off
- After 20 seconds elapsed hold time, the LED will turn SOLID RED; indicating that the user has entered the device reset period. Releasing the button during this period triggers the Factory Default Local Reset operations.

When the Reset operation is in progress, the LED will progress from green to blue to red repeatedly until the reset process is complete, after which the LED will be turned OFF.

If the user continues to hold the button, after 25 seconds elapse, the user will leave the device reset period, the LED will turn OFF, and no actions will be taken when the button is released.

***NOTE: The local reset procedure should only be used when the original controller is inoperable or has been replaced, or if Network Add or Network Remove operations have failed after a few attempts.***

***Resetting to factory default settings will reset the Swidget Z-Wave Power Control Insert network parameters to the default removed state and delete the Lifeline Association if it exists.***



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