Scene Controller Keypad Z-Wave Specification
Product: SCG5 (NX1000)
Baseline FW
Z-Wave:
SCG5 core:

History

Date	Rev	FW Version	Description
3/4/15	F		
2/20/15	E		Misc. Updates
2/10/15	D		500 Series Migration Changed GENERIC/SPECIFIC Types Added ZW+ specific CCs
12/5/14	C		Misc. updates
7/8/2014	B	0.0.2	Changed Generic Type to GENERIC_TYPE_GENERIC_CONTROLLER
10/7/13	A	0.0.01	First Draft

Functional Overview

The SCG5 Keypad is a multi-use device that can act as a central scene controller or as a traditional stand-alone Scene Controller. Upon the pressing of a button, a Central Scene, Scene Activate, BasicSet or other Command will be sent out to the nodes predefined in a group's association list.

The SCG5 contains 15 button "items" organized in 3 pages of screens, each page containing 5 menu items. The screens are navigated by using the swipe/button area below the LCD.

The SCG5 is OTA capable.

SCG5 Operation

The 5 buttons and navigation button area are capacitive touch. When the backlight is off (timed-out), the first button press will "wake up" the keypad and illuminate the backlight and slight illumination of the button surround. The WAKEUP CC is sent upon wakeup (1st button press).

Pressing a button while awake (2nd button press) will send that buttons CENTRAL SCENE CC and momentarily flash the button surround indicating a button press.

The backlight times-out 10 seconds after the initial touch/swipe wakeup (if no 2nd button press), and 5 seconds after a second button press and subsequent button press.

If a menu page has not had any of its buttons programmed, it will not become visible during the swiping.

There will be a visual indicator on the bottom of the LCD to indicate which page is being displayed.

LCD Screen

The LCD screen will show the following:

- Button Labels
- Page indicator
- Battery level indicator
- Z-Wave icon (TBD)

Z-Wave

The SCG5 keypads will be configured as a "Device" in the Z-Wave environment.

The Z-Wave Node Info frame is used to notify a network management device. If the SCG5 has not been included into a network, pressing any of the buttons will cause the Node Info frame to be sent out and go into a "learn" mode to be included into a network. If the SCG5 is part of a network, removing it from a network will involve accessing the Installer screen.

Installer Screen

The Installer Screen is accessed by pressing and holding the middle navigation button for 5 seconds.

The Installer Screen will display:

- Z-Wave
    - Node ID
    - Home ID
    - Z-Wave Version
    - Add/Remove button

- Screen
- Status
    - FW ver
    - Battery level
    - Factory Reset
- Done

Will default to Installer Screen if not enrolled in network

Factory Reset

To restore the SCG5 to Factory Default Settings:

1. Navigate to the Installer Screen by pressing and holding the middle navigation button (below lcd) for 5 seconds until the Installer Screen appears.
2. Select **Status**
3. Select **Factory Reset**
4. SCG5 will restore to Factory Default Settings

Z-Wave® Installation

Z-Wave controllers from various manufacturers support the Z-Wave process of adding or removing a device from a network. The SCG5 is a Z-Wave Controller and can only act as a secondary controller, and that another Z-Wave controller is required as the primary controller to setup and maintain the network.

A Z-Wave® network is a collection of Z-Wave® modules in a mesh type of network. Each Z-Wave® module, regardless of manufacturer, communicates with other modules within range to route and repeat the signals from one device to the next, this creates a highly reliable and robust transmission throughout the home. In addition, the network becomes stronger as more modules are added.

The following procedure will allow the SCG5 to be included or removed from a Z-Wave network.

Inclusion: Including the keypad into an Existing Network:

1. **Set your primary controller to <u>Include</u> mode**, to add the keypad as a node on your network (see your controller's user manual for detailed instructions).

2. **Hold down the middle navigation button (below lcd) until the Installer Screen is displayed**

3. **Select "Z-Wave", "Install or Remove". The controller will indicate the keypad has been removed from the network.**

Your controller will indicate the keypad was successfully added to its network (see your controller's user manual for details). Also you can check if the keypad was successfully added to the network by checking the ZHID (Home ID) and ZNID (Node ID) located in the **Z-Wave Info** screen. . ***Inclusion and exclusion are always done at normal transmit power mode.***

If your controller supports NWI, then you can optionally set the primary to NWI include mode. Please note that NWI inclusion mode does not end when you have included a new node. This allows multiple nodes to be included without having to physically go back to the controller to initiate the next inclusion. Therefore you must manually terminate NWI inclusion mode at the controller when you

have finished including any new nodes to the network. Since intermediate included nodes will assist the inclusion process by routing messages, we recommend that nodes close to the primary controller be installed first, proceeding out in consecutive rings from the controller.

Note: Before adding the keypad to a Z-Wave Network, check that it does not already belong to one by viewing the Home and Zone ID's located in the **Z-Wave Info** screen. An un-configured keypad should show a Node ID of 1 and a random Home ID. Consult your controller's user manual for details on removing a device from a Z-Wave network.

Exclusion: Removing the keypad from a Network:

4. **Set your primary controller to <u>Remove</u> mode**, to remove the keypad as a node on your network (see your controller's user manual for detailed instructions).

5. **Hold down the middle navigation button (below lcd) until the Installer Screen is displayed**

6. **Select "Z-Wave", "Install or Remove". The controller will indicate the keypad has been removed from the network.**

COMMAND CLASSES

Introduction

This document is for the advanced user who has knowledge of the Z-Wave™ Command Classes and is able to initiate Z-Wave commands programmatically. When the SCG5 sends a Node Info Report, it reports itself as:

GENERIC_TYPE_WALL_CONTROLLER
SPECIFIC_TYPE_BASIC_WALL_CONTROLLER

In addition to the mandatory command classes, it also supports:

- COMMAND_CLASS_ZWAVEPLUS_INFO
- COMMAND_CLASS_VERSION_V2
- COMMAND_CLASS_MANUFACTURER_SPECIFIC
- COMMAND_CLASS_DEVICE_RESET_LOCALLY
- COMMAND_CLASS_ASSOCIATION_V2
- COMMAND_CLASS_ASSOCIATION_GRP_INFO
- COMMAND_CLASS_CONFIGURATION
- COMMAND_CLASS_SCREEN_ATTRIBUTES
- COMMAND_CLASS_SCREEN_MD
- COMMAND_CLASS_POWERLEVEL
- COMMAND_CLASS_WAKE_UP_V2
- COMMAND_CLASS_BATTERY
- COMMAND_CLASS_CENTRAL_SCENE
- COMMAND_CLASS_FIRMWARE_UPDATE_MD_V2
- COMMAND_CLASS_MULTI_CMD

COMMAND_ZWAVEPLUS_INFO

ZWAVE PLUS INFO REPORT

7	6	5	4	3	2	1	0
COMMAND_CLASS_ZWAVEPLUS_INFO							
ZWAVEPLUS_INFO_REPORT							
Z-Wave Plus Version 1							
Role Type ROLE_TYPE_SLAVE_SLEEPING_REPORTING							
Node Type NODE_TYPE_ZWAVEPLUS_NODE							
Installer Icon Type MSB ICON_TYPE_GENERIC_WALL_CONTROLLER (0x16)							
Installer Icon Type LSB ICON_TYPE_GENERIC_WALL_CONTROLLER (0x00)							
User Icon Type MSB ICON_TYPE_GENERIC_WALL_CONTROLLER (0x16)							
User Icon Type LSB ICON_TYPE_GENERIC_WALL_CONTROLLER (0x00)							

COMMAND_DEVICE_RESET_LOCALLY

supported

COMMAND_CLASS_ASSOCIATION_GRP_INFO

supported

COMMAND_CLASS_ASSOCIATION V2

The SCG5 supports 16 group and 5 associations in each group.

Group	Description
1	LIFELINE CC_BATTERY - BATTERY_REPORT CC_ CENTRAL_SCENE - CENTRAL_SCENE_NOTIFICATION CC_DEVICE_RESET_LOCALLY-DEVICE_RESET_LOCALLY_NOTIFICATION
2	Button 1
3	Button 2
4	Button 3
5	Button 4
6	Button 5
7	Button 6
8	Button 7
9	Button 8
10	Button 9
11	Button 10
12	Button 11
13	Button 12
14	Button 13
15	Button 14
16	Button 15

COMMAND_CLASS_CONFIGURATION

Configuration parameters accessible via the COMMAND_CLASS_CONFIGURATION.

Configuration Parameter #	Description	Length (bytes)	R/W capability	Default Value	Notes
1	reserved				
2	Button 1 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3] 0x04 = Thermostat [1]
3	Button 2 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
4	Button 3 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
5	Button 4 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
6	Button 5 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
7	Button 6 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
8	Button 7 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
9	Button 8 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
10	Button 9 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
11	Button 10 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
12	Button 11 Type	1	R/W	0x00	0x00 = Central Scene

Configuration Parameter #	Description	Length (bytes)	R/W capability	Default Value	Notes
					0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
13	Button 12 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
14	Button 13 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
15	Button 14 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
16	Button 15 Type	1	R/W	0x00	0x00 = Central Scene 0x01 = Scene Control momentary 0x02 = BASICSET Toggle 0x03 = Scene Control/BASICSET toggle [3]
17	reserved				
18	reserved				
19	reserved				
20	Touch Sensitivity	1	R/W	5	1-10 1 = Least Sensitive 10 = Most Sensitive
21	LCD Contrast	1	R/W	15	Range 0-15
22	reserved				
23	Button Surround Level	1	R/W	5	1-10 1=10%, 10 = 100%
24	Backlight Level	1	R/W	5	1-10 1=10%, 10 = 100%
25	1st button press Backlight Timeout	1	R/W	10	10-15 seconds Timeout if a single wakeup button press is detected, with no following button press
26	2nd button press Backlight Timeout	1	R/W	5	5-15 seconds Timeout if 2nd or more buttons pressed
27	Backlight Timeout Primary Page	1	R/W	0	Page to default to after backlight timeout 0 = no change 1 = page 1 (button 1-5) 2 = page 2 (button 6-10) 3 = page 3 (button 11-15)
28	LCD Screen Timeout	1	R/W	60	0, 1-240 0 = disabled number of minutes after the last button press the LCD will go blank (power savings)
29	reserved				
30	Battery (%) Stat Shutdown threshold	1	R/W	5	0-20
31	Battery (%)	1	R/W	10	0-40

Configuration Parameter #	Description	Length (bytes)	R/W capability	Default Value	Notes
	Radio Cutoff threshold				
32	Battery (%) LOWBATT Indicator threshold	1	R/W	20	5-50
33	Battery (%) Threshold value for Midlevel	1	R/W	50	30-80

[1] If button is configured for CENTRAL SCENE CC, will always send CENTRAL SCENE REPORTS to Association Group 1 (lifeline group)
[2] Displays the thermostat screen when pressed. The thermostat to be controlled must have its Node ID in that buttons association group (and only that stat). When pressed, the SCG5 will send a MULTI cmd to the stat asking for Temp, Setpoints, Mode, and Fan and display the populated Thermostat screen.
[3] Sends Scene command to association group when un-inverted, sends BASIC_SET OFF to association group when inverted

COMMAND_CLASS_MANUFACTURER_SPECIFIC

Send MANUFACTURER_SPECIFIC_GET. The return message will contain the following:

Manufacturer ID:	0x008B,	(Trane)
Product Type ID:	0x53 0x43	(“SC”)
Product ID:	0x47 0x35	(“G5”)

COMMAND_CLASS_VERSION_V2

Send VERSION_GET. The returned message is:

Application Version is the Z-Wave™ processor code version
Application Sub Version is the SCG5 processor code version

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COMMAND_CLASS_SCREEN_ATTRIBUTES V1

The Screen Attributes command is used to retrieve the screen attributes from the SCG5SCG51.

SET:

N/A

GET: SCG5 will send a GET upon powerup if the ***keypad type*** configuration parameter is CUSTOM METADATA (1).

REPORT

7	6	5	4	3	2	1	0
COMMAND_CLASS_SCREEN_ATTRIBUTES							
SCREEN_ATTRIBUTES_REPORT							
Reserved 000			Number of Lines 01111 (15)				
Number of Chars per line 16							
Size of line Buffer 16							
Numerical Presentation 00000001 xxxxxxx1 **Supports Ascii codes** xxxxxx1x Supports Ascii and extended codes xxxxx1xx Supports Unicode xxxx1xxx Supports Ascii and Player codes							

COMMAND_CLASS_SCREEN_META_DATA V1

The Screen Meta Data command is used to write custom text to the screen.

GET:

REPORT

7	6	5	4	3	2	1	0
COMMAND_CLASS_SCREEN_MD							
SCREEN_MD_REPORT							
More Data	Reserved 0	Screen Settings 0 – Clear 1 – Scroll Down 2 – Scroll Up 7 – Do not change content			Char. Presentation 0 – Standard Ascii Codes		
Line Settings A 0 – Chars written in std font 1 – Chars written highlighted 2 – Chars written in larger font			Clear A 0, 1	Line Number A 0 = Button Area 1 1 = Button Area 2 . . . 13 = Button Area 14 14 = Button Area 15			
Character Position A							
Number of Characters A							
Char 1, A							
…							
Char N, A							
Line Settings B 0 – Chars written in std font 1 – Chars written highlighted 2 – Chars written in larger font			Clear B 0, 1	Line Number B 0 = Button Area 1 1 = Button Area 2 . . . 13 = Button Area 14 14 = Button Area 15			
Character Position B							
Number of Characters B							
Char 1, B							
…							
Char N, B							

Notes:

1. Text is always centered within the LCD display
2. Double lines can be assigned to a given button by using the CR (0x0d) as a linefeed. It will default to the smaller font when using double lines

COMMAND_CLASS_POWER_LEVEL

POWERLEVEL_SET:

0x00=Normal Power
0x01=Minus 1dBm
0x02=Minus 2dBm
0x03=Minus 3dBm
0x04=Minus 4dBm
0x05=Minus 5dBm
0x06=Minus 6dBm
0x07=Minus 7dBm
0x08=Minus 8dBm
0x09=Minus 9dBm

POWERLEVEL_GET:

Returns the POWER_LEVEL_REPORT

POWERLEVEL_TEST_NODE_SET:

Instructs the destination node to transmit a number of test frames to the specified node with the RF power level specified.

POWERLEVEL_TEST_NODE_GET:

Returns the result of the latest Powerlevel Test Node Set Command effectuated.

COMMAND_CLASS_BATTERY

The SCG5 responds to BATTERY_GETs with a BATTERY_REPORT.

The SCG5 will also autosend a battery report to the lifeline when the battery percent level falls below a predetermined threshold. The thresholds are pre-set at 75%, 50%, 25%. The batteries are sampled every 30 minutes and will report when the value passes a threshold.
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COMMAND_CLASS_WAKE_UP_V2

The WAKEUP command class allows the SCG5 to notify remote controllers that it is awake and ready to accept update commands.

WAKE_UP_INTERVAL_SET
- Seconds 1 (MSB): Period to wake up at.
- Seconds 2
- Seconds 3 (LSB)
- NodeID: Node to send the notification to.

WAKE_UP_INTERVAL_GET
- Request a WAKE_UP_INTERVAL_REPORT

WAKE_UP_INTERVAL_REPORT
(See set command above for parameter descriptions)
- Seconds 1 (MSB):
- Seconds 2
- Seconds 3 (LSB)
- NodeID

WAKEUP_NOTIFICATION
- Scene ID Range is 1-255
- Scene value is 0x00 or 0xFF

COMMAND_CLASS_CENTRAL_SCENE

CENTRAL_SCENE_SUPPORTED_GET:
- Returns a CENTRAL_SCENE_SUPPORTED_REPORT

CENTRAL_SCENE_SUPPORTED_REPORT:
- Returns number of scenes supported – 15, 1 for each button.

CENTRAL_SCENE_NOTIFICATION:

<table>
<tr><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th>0</th></tr>
<tr><td colspan="8">COMMAND_CLASS_CENTRAL_SCENE</td></tr>
<tr><td colspan="8">CENTRAL_SCENE_NOTIFICATION</td></tr>
<tr><td colspan="8">Sequence Number</td></tr>
<tr><td colspan="4">RESERVED</td><td colspan="4">Key Attributes
0x00 = Key Pressed</td></tr>
<tr><td colspan="8">Scene Number</td></tr>
</table>

COMMAND_CLASS_MULTI_CMD

The MULTI_CMD command class allows the SCG5 to send multiple Z-Wave commands in one packet. This allows the SCG5 to send/receive update commands quickly.

MULTI_CMD_ENCAP
This command encapsulates multiple standard commands in one packet. In general there is no menu item for this command class on a Z-Wave controller. This command class is used as a background function behind the other command classes.

COMMAND_CLASS_FIRMWARE_UPDATE_MD V2

The Firmware update command class allows updating firmware in both the MSP430 micro and Z-Wave micro.

The firmware OTA process will only work if the battery capacity is > 50%.

Refer to the SCG5 Z-Wave Over the Air Update Spec for details.

Appendix

Meta Data Command Examples

The following command will set Button 1 to “All On” and Button 5 to “All Off”. It will not change any of the other button text, but will clear the text on both Button 1 and Button 5. It will not offset the text so it will be centered on the screen.

Byte 1 – 0x92 Command Class
Byte 2 – 0x03 Command
Byte 3 – 0x38 Do not change rest of the screen, use standard ASCII
Byte 4 – 0x10 Standard Font, Clear any existing text for this button, Button 1
Byte 5 – 0x00 Do not offset the text so it will be centered on LCD
Byte 6 – 0x06 Number of characters (including space) of text
Byte 7 – 0x41 ‘A’
Byte 8 – 0x6C ‘l’
Byte 9 – 0x6C ‘l’
Byte 10 – 0x20 Space
Byte 11 – 0x4F ‘O’
Byte 12 – 0x6E ‘n’
Byte 13 – 0x14 Standard Font, Clear any existing text for this button, Button 5
Byte 14 – 0x00 Do not offset the text so it will be centered on LCD
Byte 15 – 0x07 Number of characters (including space) of text
Byte 16 – 0x41 ‘A’
Byte 17 – 0x6C ‘l’
Byte 18 – 0x6C ‘l’
Byte 19 – 0x20 Space
Byte 20 – 0x4F ‘O’
Byte 21 – 0x66 ‘f’
Byte 22 – 0x66 ‘f’

The following command will write Living Room to Button 3. Since Living Room will not fit on one line, it will use the 2 line feature for a button.

Byte 1 – 0x92 Command Class
Byte 2 – 0x03 Command
Byte 3 – 0x38 Do not change rest of the screen, use standard ASCII
Byte 4 – 0x12 Standard Font, Clear any existing text for this button, Button 3
Byte 5 – 0x00 Do not offset the text so it will be centered on LCD
Byte 6 – 0x0B Number of characters (including Carriage Return) of text
Byte 7 – 0x4C ‘L’
Byte 8 – 0x69 ‘i’
Byte 9 – 0x76 ‘v’
Byte 10 – 0x69 ‘i’
Byte 11 – 0x6E ‘n’
Byte 12 – 0x67 ‘g’
Byte 13 – 0x0D Carriage Return
Byte 14 – 0x52 ‘R’
Byte 15 – 0x6F ‘o’
Byte 16 – 0x6F ‘o’
Byte 17 – 0x6D ‘m’

The following command will write MOOD to Button 2 using the Large font instead of the standard font. It will also clear the entire LCD screen (erasing all button text) before writing the text to Button 2.

Byte 1 – 0x92 Command Class
Byte 2 – 0x03 Command
Byte 3 – 0x00 Clear the rest of the screen, use standard ASCII
Byte 4 – 0x41 Larger Font, Button 2
Byte 5 – 0x00 Do not offset the text so it will be centered on LCD
Byte 6 – 0x04 Number of characters of text
Byte 7 – 0x4D 'M'
Byte 8 – 0x4F 'O'
Byte 9 – 0x4F 'O'
Byte 10 – 0x44 'D'

The following command will write 3-way Entry to Button 4. Since 3-way Entry will not fit on one line, it will use the 2 line feature for a button. It will also offset the text to be closer to the button for more of a right justified feel.

Byte 1 – 0x92 Command Class
Byte 2 – 0x03 Command
Byte 3 – 0x38 Do not change rest of the screen, use standard ASCII
Byte 4 – 0x13 Standard Font, Clear any existing text for this button, Button 4
Byte 5 – 0x06 Offset the text by 6 pixels
Byte 6 – 0x0B Number of characters of text
Byte 7 – 0x33 '3'
Byte 8 – 0x2D '-'
Byte 9 – 0x77 'w'
Byte 10 – 0x61 'a'
Byte 11 – 0x79 'y'
Byte 12 – 0x0D Carriage Return
Byte 13 – 0x45 'E'
Byte 14 – 0x6E 'n'
Byte 15 – 0x74 't'
Byte 16 – 0x72 'r'
Byte 17 – 0x79 'y'