Aeon Labs Z-Stick Gen5

(Z-Wave USB Adapter)

Change history

Revision	Date	Change Description
1	03/02/2015	Initial draft.

Aeon Labs Z-Stick Gen5
Engineering Specifications and Advanced Functions for Developers
(V1.00)

Aeon Labs Z-Stick Gen5 is a self-powered Z-Wave USB adapter with remote network creation capabilities (independent from external power and host microprocessor). By being able to remotely include/remove Z-Wave devices, this greatly simplifies Z-Wave network installation. When connected to a host controller (via USB), it enables the host controller to take part in the Z-Wave Network.
It can be included and operated in any Z-wave network with other Z-wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

1. Library and Command Classes

1.1 SDK: 6.51.02

1.2 Library

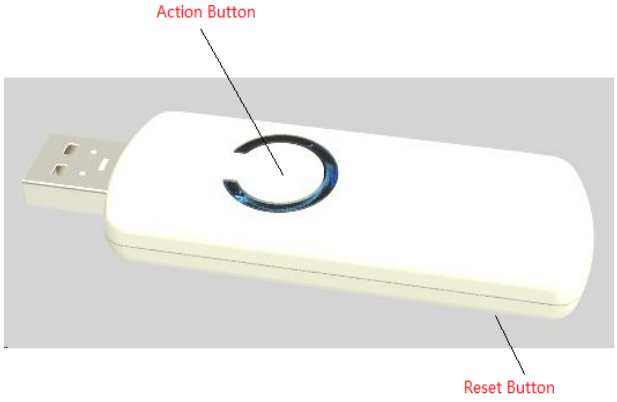
- Basic Device Class: BASIC_TYPE_STATIC_CONTROLLER
- Generic Device Class: GENERIC_TYPE_STATIC_CONTROLLER
- Specific Device Class: SPECIFIC_TYPE_PC_CONTROLLER

2. Technical Specifications

Operating Distance: Up to 500 feet/150 metres outdoors in normal mode or 1310 feet/400 metres outdoors in PA mode.

3. Familiarize Yourself with Your Z-Stick

3.1 Interface



4. Independence Mode and Serial API-Mode Functions

4.1 Independence Mode function of Action Button

Button action	Description
Click one time	**Adding/Including Z-Wave Device into the Z-Wave network:** 1. Unplug the Z-Stick from the USB connector and then tap the Action Button. (The blue LED will blink slowly.) 2. To include a new Z-Wave device into the network, simply go to the device with the Z-

	Stick and press the button on the device you wish to include. (The blue LED on the Z-Stick will blink fast during a network neighbour discovery and stay solid for 2 seconds to indicate successful inclusion of the device into the network.) 3. The blue LED will then return to blinking slowly, indicating readiness for further device inclusions. Repeat step 2 for each device as you wish to include. 4. Tap the Z-Stick's Action Button to turn it off or it will automatically exit the removal mode after 30 seconds.
Press and hold 2 seconds and releasing	**Removing/Excluding Z-Wave Devices from the Z-Wave Network:** 1. Unplug the Z-Stick from the USB connector. Then press and hold the Action Button for approximately 2 seconds. (The orange LED will blinking fast.) 2. To remove a Z-Wave device from the network, simply go to the device with the Z-Stick and press the Action Button on the device you wish to remove. (The LED on the Z-Stick will become blue and Immediately stay solid for 2 seconds to indicate successful removal from the network.) 3. The orange LED will then return to blinking fast, indicating readiness for further device exclusions. Repeat step 1 for each device as you wish to exclude.
Press and hold 20 seconds	**Reset Z-Stick to factory Default:** 1. Unplug the Z-Stick from the USB connector. 2. Press and hold the Action Button for 20 seconds. 3. If holding time more than one second, the LED will become red, then blink faster and faster. If holding time more than 20 seconds, the LED will become blue and stay solid for 2 seconds, it indicates reset success, otherwise please repeat step 2. Note: Reset Z-Stick to factory default Settings will: exclude the Z-Stick from the Z-Wave network; restore the configuration settings to the default.

4.2 Function of Reset Button

Button action	Description
Click one time	Reset the USB port.

4.3 Function of SerialAPI-Mode

Plug the Z-Stick into the USB connector of the host, the Z-Stick will initiate SerialAPI-Mode, it is always listening (awake and always in RX receive mode) and acts as a Z-Wave adapter and responds to commands sent through USB by the host processor software.

5. Special Functions of Z-Stick

5.1 Factory reset

You can through one of the following ways to perform this function:

1. At some stage, you may wish to reset all of your Z-Stick's settings to their factory defaults. To do this, press and hold the Reset Button for 20 seconds and then release it. The Z-Stick will now be reset to its original settings, and the blue LED will solid for 2 seconds as confirmation.

2. The Z-Stick also can be reset to the factory defaults settings via the host software. To do this, the host software must take control of the Z-Stick USB adapter while the Z-Stick is in SerialAPI-Mode. Please consult the instruction manual of the host software to perform a network reset (i.e. factory reset on the Z-Stick).

5.2 Add Z-Stick to a pre-existing Z-Wave network

This function also must be done through the host software which takes control of the Z-Stick USB adapter while the Z-Stick is in SerialAPI-Mode. Please consult the instruction manual of the host software to add the Z-Stick to a pre-existing Z-Wave network (i.e. “Learn”, “Sync”, “Add as Secondary Controller”, etc.).

5.3 Support the functionality of SerialAPI

The list functions of SerialAPI:

Functions:
SUPPORT_GET_ROUTING_TABLE_LINE
SUPPORT_LOCK_ROUTE_RESPONSE
SUPPORT_MEMORY_GET_BUFFER
SUPPORT_MEMORY_GET_BYTE
SUPPORT_MEMORY_GET_ID
SUPPORT_MEMORY_PUT_BUFFER
SUPPORT_MEMORY_PUT_BYTE
SUPPORT_NVM_GET_ID
SUPPORT_NVM_EXT_READ_LONG_BUFFER
SUPPORT_NVM_EXT_READ_LONG_BYTE
SUPPORT_NVM_EXT_WRITE_LONG_BUFFER
SUPPORT_NVM_EXT_WRITE_LONG_BYTE
SUPPORT_PWR_CLK_PD
SUPPORT_PWR_CLK_PUP
SUPPORT_PWR_SELECT_CLK
SUPPORT_PWR_SETSTOPMODE
SUPPORT_STORE_HOMEID
SUPPORT_STORE_NODEINFO
SUPPORT_ZW_ADD_NODE_TO_NETWORK
SUPPORT_ZW_AES_ECB
SUPPORT_ZW_ARE_NODES_NEIGHBOURS
SUPPORT_ZW_ASSIGN_RETURN_ROUTE
SUPPORT_ZW_ASSIGN_SUC_RETURN_ROUTE
SUPPORT_ZW_CONTROLLER_CHANGE
SUPPORT_ZW_CREATE_NEW_PRIMARY

SUPPORT_ZW_DELETE_RETURN_ROUTE
SUPPORT_ZW_DELETE_SUC_RETURN_ROUTE
SUPPORT_ZW_ENABLE_SUC
SUPPORT_ZW_EXPLORE_REQUEST_INCLUSION
SUPPORT_ZW_GET_CONTROLLER_CAPABILITIES
SUPPORT_ZW_GET_LAST_WORKING_ROUTE
SUPPORT_ZW_SET_LAST_WORKING_ROUTE
SUPPORT_ZW_GET_NEIGHBOR_COUNT
SUPPORT_ZW_GET_NODE_PROTOCOL_INFO
SUPPORT_ZW_GET_PROTOCOL_STATUS
SUPPORT_ZW_GET_PROTOCOL_VERSION
SUPPORT_ZW_GET_RANDOM
SUPPORT_ZW_GET_ROUTING_MAX
SUPPORT_ZW_GET_SUC_NODE_ID
SUPPORT_ZW_GET_VERSION
SUPPORT_ZW_GET_VIRTUAL_NODES
SUPPORT_ZW_IS_FAILED_NODE_ID
SUPPORT_ZW_IS_NODE_WITHIN_DIRECT_RANGE
SUPPORT_ZW_IS_PRIMARY_CTRL
SUPPORT_ZW_IS_VIRTUAL_NODE
SUPPORT_ZW_IS_WUT_KICKED
SUPPORT_ZW_NEW_CONTROLLER
SUPPORT_ZW_RANDOM
SUPPORT_ZW_REDISCOVERY_NEEDED
SUPPORT_ZW_REMOVE_FAILED_NODE_ID
SUPPORT_ZW_REMOVE_NODE_FROM_NETWORK
SUPPORT_ZW_REPLACE_FAILED_NODE
SUPPORT_ZW_REPLICATION_COMMAND_COMPLETE
SUPPORT_ZW_REPLICATION_SEND_DATA
SUPPORT_ZW_REQUEST_NETWORK_UPDATE

SUPPORT_ZW_REQUEST_NEW_ROUTE_DESTINATIONS
SUPPORT_ZW_REQUEST_NODE_INFO
SUPPORT_ZW_REQUEST_NODE_NEIGHBOR_UPDATE
SUPPORT_ZW_RF_POWER_LEVEL_GET
SUPPORT_ZW_RF_POWER_LEVEL_REDISCOVERY_SET
SUPPORT_ZW_RF_POWER_LEVEL_SET
SUPPORT_ZW_SEND_DATA
SUPPORT_ZW_SEND_DATA_ABORT
SUPPORT_ZW_SEND_DATA_BRIDGE
SUPPORT_ZW_SEND_DATA_META
SUPPORT_ZW_SEND_DATA_META_BRIDGE
SUPPORT_ZW_SEND_DATA_META_MR
SUPPORT_ZW_SEND_DATA_MR
SUPPORT_ZW_SEND_DATA_MULTI
SUPPORT_ZW_SEND_DATA_MULTI_BRIDGE
SUPPORT_ZW_SEND_NODE_INFORMATION
SUPPORT_ZW_SEND_SLAVE_DATA
SUPPORT_ZW_SEND_SUC_ID
SUPPORT_ZW_SEND_TEST_FRAME
SUPPORT_ZW_SET_DEFAULT
SUPPORT_ZW_SET_EXT_INT_LEVEL
SUPPORT_ZW_SET_LEARN_MODE
SUPPORT_ZW_SET_LEARN_NODE_STATE
SUPPORT_ZW_SET_PROMISCUOUS_MODE
SUPPORT_ZW_SET_RF_RECEIVE_MODE
SUPPORT_ZW_SET_ROUTING_INFO
SUPPORT_ZW_SET_ROUTING_MAX
SUPPORT_ZW_SET_SLAVE_LEARN_MODE
SUPPORT_ZW_SET_SLEEP_MODE
SUPPORT_ZW_SET_SUC_NODE_ID

SUPPORT_ZW_SET_WUT_TIMEOUT
SUPPORT_ZW_SUPPORT9600_ONLY
SUPPORT_ZW_TYPE_LIBRARY
SUPPORT_ZW_WATCHDOG_DISABLE
SUPPORT_ZW_WATCHDOG_ENABLE
SUPPORT_ZW_WATCHDOG_KICK
SUPPORT_ZW_WATCHDOG_START
SUPPORT_ZW_WATCHDOG_STOP
SUPPORT_ZW_NVR_GET_VALUE
SUPPORT_FUNC_ID_CLEAR_TX_TIMERS
SUPPORT_FUNC_ID_GET_TX_TIMERS

5.4 Installation and Maintenance Application (IMA) feature

1. When the Z-Stick acts an independent/secondary controller that has been un-plugged from the USB host, it also can measure the network health for each device in the network. The different colour of LED on the Z-Stick indicates the communication quality between the Central Controller and devices in the network.

   Short press the Action Button 5 times, if the colour of LED is changed to purple and then it follows with fast blink, which means it goes into the IMA feature. The colour of LED will be changed according to the network health level. If the colour of LED is changed to green, which means the current communication quality is more than 95% on -7dBm. If the colour of LED is changed to yellow, which means the current communication quality is more than 95% on 0dBm. If the colour of LED is changed to purple, which means the current communication quality is less than 95% on 0dBm. If the colour of LED is changed to red, which means the current communication has failed.

   Short press the Action Button 5 times again, the Z-Stick will automatically exit the IMA feature.

2. When the Z-Stick is in Serial API-Mode and acts a primary controller, it can measure the network health for each device in the network. The different colour of LED indicates the communication quality between the Z-Stick Controller and devices in the network.

   Install the IMA tool software first (note: the IMA tool can be downloaded from here: http://www.aeotec.com/support). Select the node device and then click the IMA test button to start the IMA test between the Central Controller and the node devices. Your IMA tool client will receive the test result and use different colour of LED icon to indicate the network health level, its colour will be changed follow with the change of network health level.

Network health is good

Network health is acceptable but latency can occur

Network health is insufficient

Network health is critical because node is not responding

5.5 Configuration

5.5.1 Set Command

The Set Command used to set the value of configuration parameter(s), command format:

Serial API: (refer to the below form)
HOST->ZW: REQ | 0xf2 | Parameter Number | size | Value
ZW->HOST: RES | 0xf2 | RetVal

REQUEST:

7	6	5	4	3	2	1	0
Command = 0xF2							
Parameter Number							
Default	Size						
Value 1(MSB)							
Value 2							
……							
Value n(LSB)							

Parameter Number (8 bits)

The parameter number field specifies which configuration parameter is being set. The parameter numbers refer to the form at the end of the document.

Default (1 bit)

If the default bit is set to 1 the device is set to default factory setting and the configuration values is ignored. If the default bit is set to 0 then the configuration values is used.

Size (7 bits)

The size field indicates the number of bytes used for the configuration value.

Value 1 … Value N (variable)

The value is a unsigned field. The field can be 16 bytes in size. Please refer to the form at the end of the document.

RESPONSE:

RetVal :

If the set is successful will return TRUE, otherwise it returns FALSE

5.5.2 Get Command

This Get Command used to get the values of some configuration parameters.

Serial API:
HOST->ZW: REQ | 0xf3 | Parameter Number 1 | **……** | Parameter Number N
ZW->HOST: RES | 0xf3 | Parameter Number 1 | size 1 | Value | **……** | Parameter Number N | size N | Value

REQUEST:

Parameter Number 1 ... Parameter Number N (variable)

The parameter number field specifies which configuration parameter is being requested. The parameter numbers refer to the form at the end of the document.

RESPONSE:

Refer to explanation under the Set Command Request.

Parameter Number Definitions (8 bit):

Parameter Number (Hex / Decimal)	Description	Default Value	Size
0x51 (81)	When the USB power supply, the LED indicator light configuration (0 =disable, 1 = enable, other= ignore)	1	1
0xF2 (242)	Security network enabled (0 =disable, 1 = enable, other= ignore)	0	1
0xF3 (243)	Security network key	N/A	16
0xDC (220)	Configuration of the RF power level 1~10, other= ignore. A total of 10 levels, level 1 as the weak output power, and so on, 10 for most output power level.	10	1
0xFC (252)	Enable/disable Lock Configuration (0 =disable, 1 = enable, other= ignore).	0	1
0xFF (255)	Value=0、Default=1、Size=1 Reset to factory default setting	N/A	1