Z-WAVE>ME
BUILDS THE SMART HOME

Z-WAY CIT

CERTIFIED INSTALLER TOOLKIT

USER MANUAL

Version 1, Basis: v3.0.6, June 5, 2020

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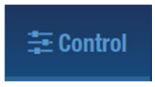
Control 

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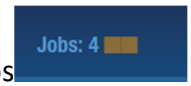
Jobs 

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INTRODUCTION

Developed by the Z-Wave Alliance as a Diagnostics & Repair Tool for Z-Wave Networks; the

Z-Way CIT Certified Installer Toolkit is a powerful, versatile tool for every installer:

- Comprehensive network diagnostics & device management, accessible from anywhere in the world
- Rapidly identifies potential problems
- Spectrum analyser shows noise in the Z-Wave channels
- Routing table displays which nodes are neighbours
- Network map graphically displays how nodes are connected to each other
- Z-Wave network sniffer (ZNiffer) will show what is actually sent by nodes and identify the type of message
- Displays advanced node information such as device version, battery level, Z-Wave library version, and more
- Access to Z-Wave device product information including manuals and technical data
- The CIT may be left at a site for long-term testing allowing you to connect to it remotely
- The CIT is Z-Wave Plus certified as a controller
- As a fully capable controller it can set configuration parameters and communicate with all nodes on the network, including those using Z-Wave S0 security
- The CIT is currently available in North American, European and Australia/New Zealand radio frequency

KNOWN LIMITATIONS

As most of the diagnostic features used by the Z-Way CIT are available to controllers, use the **Z-Way CIT** when the manufacturer of your customer's gateway controller does not have diagnostic tools embedded into it, or when the diagnostic tools are a smaller subset of what the Z-Way CIT offers.

The* Z-Way CIT *cannot get information from the nodes of a Z-Wave network where Silicon Labs has not provided a mechanism to do so.

This is an important note because: The Z-Way CIT will present information such as a neighbor table, but the neighbor table was obtained from the Z-Way CIT itself; it is not possible to get the ***actual*** neighbor table from the customer's primary controller because there currently is no mechanism to get this information. If the Z-Way CIT is placed physically near the customer's

primary controller or the node being examined, then the Z-Way CIT will present a good approximation of what the customer's controller or device should also be experiencing. Z-Way CIT will present as much information as it can, but in a network made up of a mix of newer Z-Wave nodes and those from several years ago, features that do not exist in the older nodes may prevent useful information from being able to be retrieved or measured.

User Guide

Please refer to the quick start guide that came with your Z-Way CIT to get connected to the Z-Way CIT's user interface (UI). This section discusses getting started using the Z-Way CIT after you have successfully connected to the user interface.

Initialization

Z-Way CIT is a multi-platform server for managing and diagnosing smart home systems built on Z-Wave, in this manual we will consider the use of Raspberry Pi 3 Model B+ with a radio module board Z-Wave RaZberry. Instructions for downloading and installing the server on Raspberry Pi and other platforms are available at: https://z-wave.me/z-way/download-z-way/

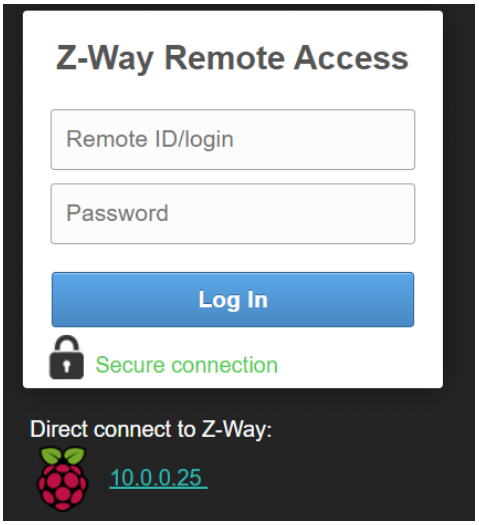
First Connection

Please connect your CIT tool to your LAN with DHCP server via Ethernet. Power up the CIT via micro USB port. Wait about two minutes for the CIT to boot-up.

On a computer operating in the same LAN network, go to the following URL in your browser:

https://find.z-wave.me/zboxweb/en/

This tool will help you to find a local IP address of your new CIT unit. You should see similar screen as the screenshot on the right. Click on IP hyperlink for Direct connect to Z-Way.

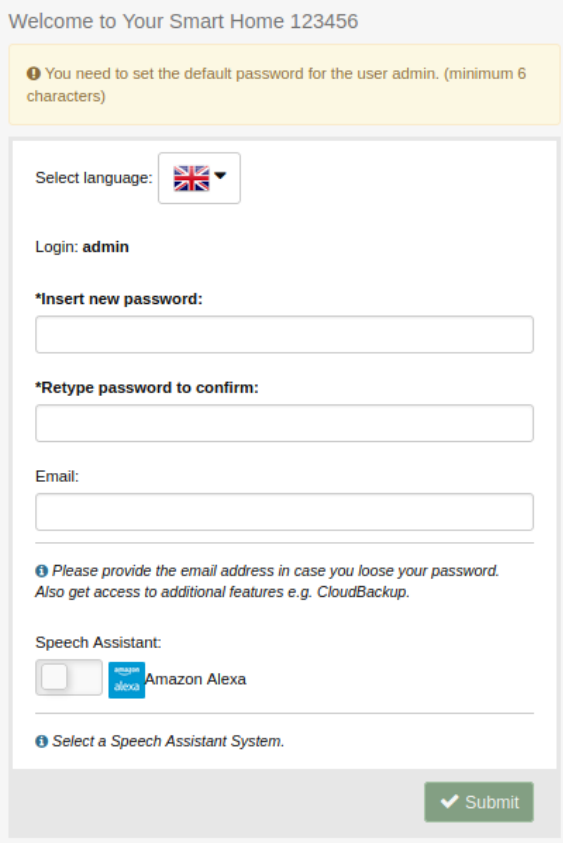


Alternatively, check on your router the local IP address assigned to the CIT. Then, in your browser on a computer in the same LAN network connect to the CIT using this URL:

http://*your_CIT_IP:8083*

where ***your_CIT_IP*** is a local IP address of your CIT.

When the Z-Way CIT is activated, it requires that you initialize it and assign it to the person who will be using it. The Z-Way CIT registration screen appears and looks like this:



- When you first turn on Z-Way CIT will try to get the remote access ID, it will be indicated at the top of the registration window.
- Your default login in Z-Way CIT is 'admin'
- Set the administrator password, the password must not match the login.
- To use CloudBackup and receive notifications, enter your e-mail.

Complete the registration process by clicking

at the bottom of the page. If there are any issues with the registration, a message will be displayed.

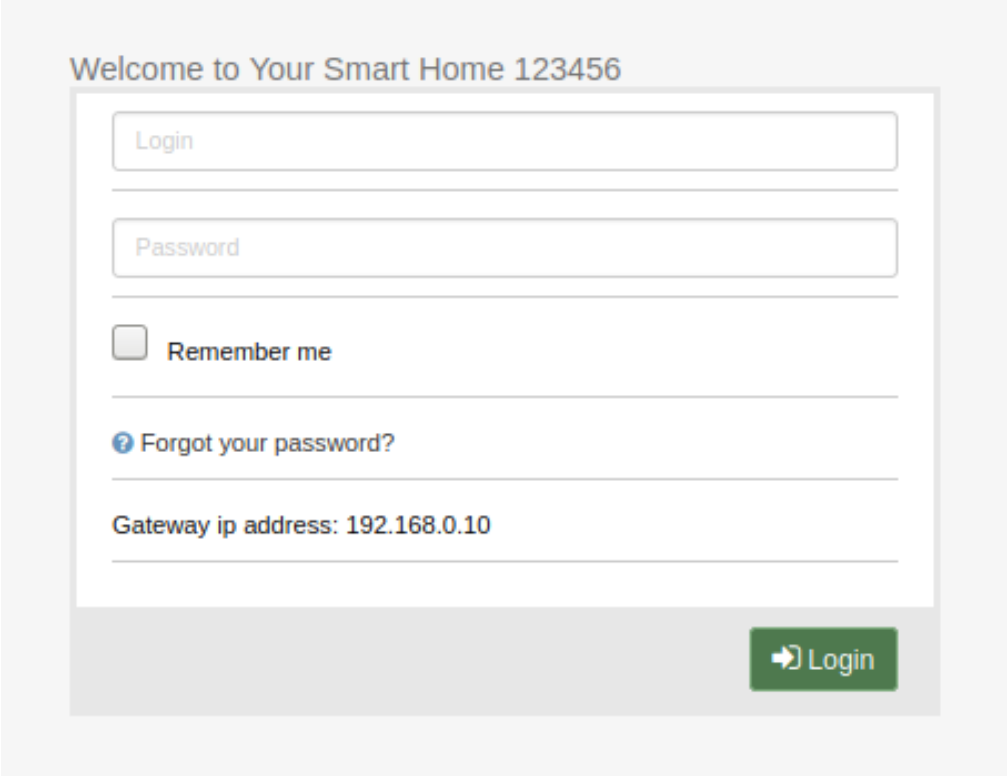
LOGIN

If the Z-Way CIT has already been registered, then connecting to the Z-Way CIT interface will lead to being prompted for your login credentials. The login screen looks similar to this:

Here at the login screen, the remote ID.

- Enter your Username and Password – the same ones used to register the Z-Way CIT – to log on to the Z-Way CIT.

To complete the login, click the Login button.



USING THE Z-WAY CIT

As described in the menu section below, the Z-Way CIT has a menu bar which divides the features of the Z-Way CIT into functional areas. This section describes each of those functional areas and the capabilities within each area.

Z-Way CIT has 2 user interfaces:

Smart Home UI and Expert UI. The smart home UI is the ultimate solution for the average user.

Expert UI allows you to diagnose, configure devices and associations.

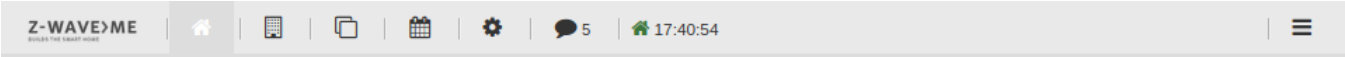
In this manual, the Expert UI will be considered primarily. After you have logged in, the Smart Home UI will open by default, in order to switch to Expert mode, add after the address of your controller /expert

Example: 192.168.1.10:8083/expert

You can also get into the expert interface in this way:

MENU

Smart Home UI:

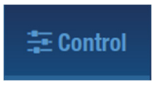


Expert UI:

The main menu (shown above) is always visible. The main menu provides direct access to the functional categories and common information about the Z-Way CIT. The menu features are as follows:

- The **Home icon**, which looks like a house, takes you to the home screen of the Z-Way CIT where you can see network information.

- In the **Control** section, you can monitor devices, view sensors and meters, control switches, dimmers, thermostats and locks.



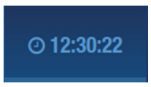
- The **Device menu** item provides access to device related sub-menus of Status, Type info, Battery and Active associations.

- In the **Configuration** section, there is a list of all connected Z-Wave devices, in this section you can see detailed information about the device, set configuration parameters, configure associations, check communications, use command classes and update firmware.

- The **Network menu** item provides access to Z-Wave network related sub-menu of Control, Neighbors, Reorganization, Timing Info, Route map, Link Status and Controller Info.

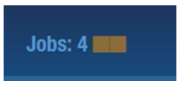
- The **Analytics menu** item provides access to the analytical sub-menu of Zniffer, Background Noise, Noise Meter, Zniffer History and Statistics.

- The **time** is displayed in the menu according to the display format chosen in the System settings. The time can be set to be set automatically if there is an Internet connection available, or manually through the System settings when an Internet connection is not available. If the time is set to automatic and no Internet connection is available to the Z-Way CIT, the time display will not be correct.



- The **Gear (Setup) icon** item provides access to the system setup page and the setup functions which include Language, System settings and Report Problem.

- The **Jobs display and link** shows the current number of active jobs in the job queue of the Z-Way CIT. Clicking on the word Jobs will open a new window in your browser and display the Jobs queue with detailed information about the jobs currently active or jobs waiting to be completed.



Setup

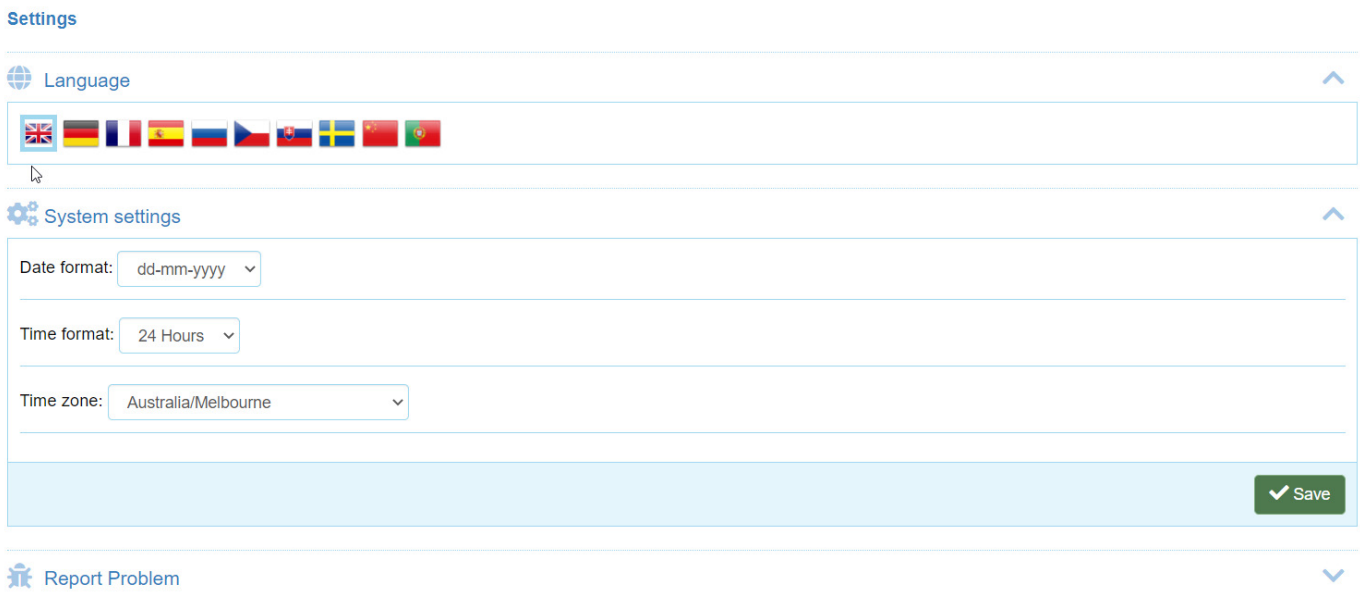
Click on the 'gear' icon to access the Z-Way CIT setup.

Language

By clicking icon Language will take you to the language setting for the user interface of the Z-Way CIT. Select your language by clicking on the flag

System Settings

Clicking on System settings will open them up or close them depending upon their current state. When opened, you will see settings as shown here:



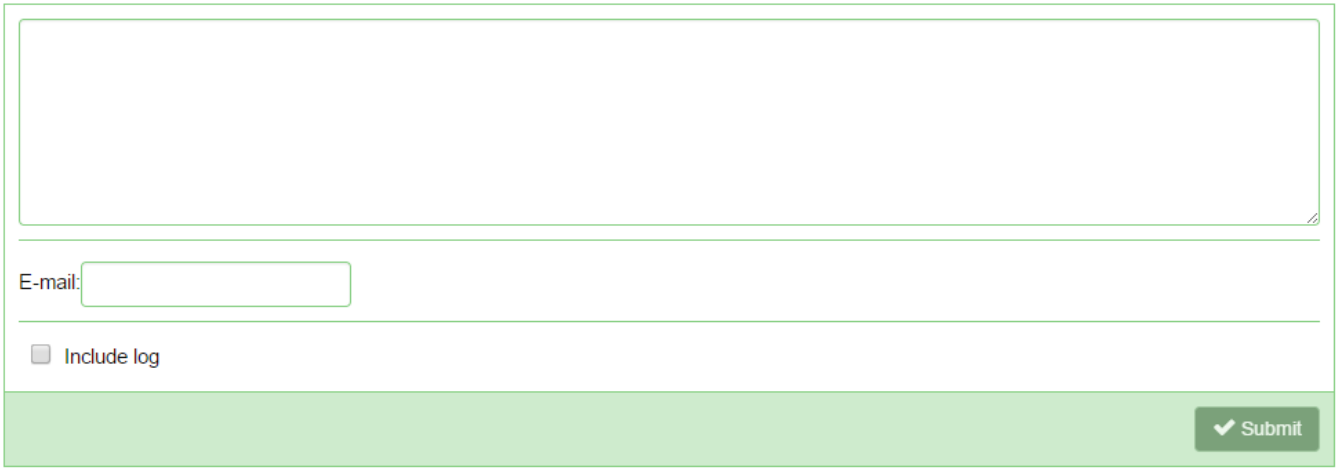
- **Date format** – Choose the date format that you desire for the date to be shown in the top menu bar of the Z-Way CIT user interface.
- **Time format** – Choose the time format that you desire for the time to be shown in the top menu bar of the Z-Way CIT user interface.
- **Time zone** – The time zone setting is only enabled if the Automatic Time Synchronization is turned on. Use this to set the time zone to the desired time zone that the Z-Way CIT operates in. Changing this setting will force a restart of the Z-Way CIT.

Click the 'Save' button at the bottom of the System settings when you are done changing the settings. Some setting changes may force a restart of the Z-Way CIT.

Report Problem

Click

to open the problem report submission form. This should be used to report a problem that could not be solved by the local distributor of Z-Way CIT. Problem reports are sent to the manufacturer of the Z-Way CIT. The problem report submission form:



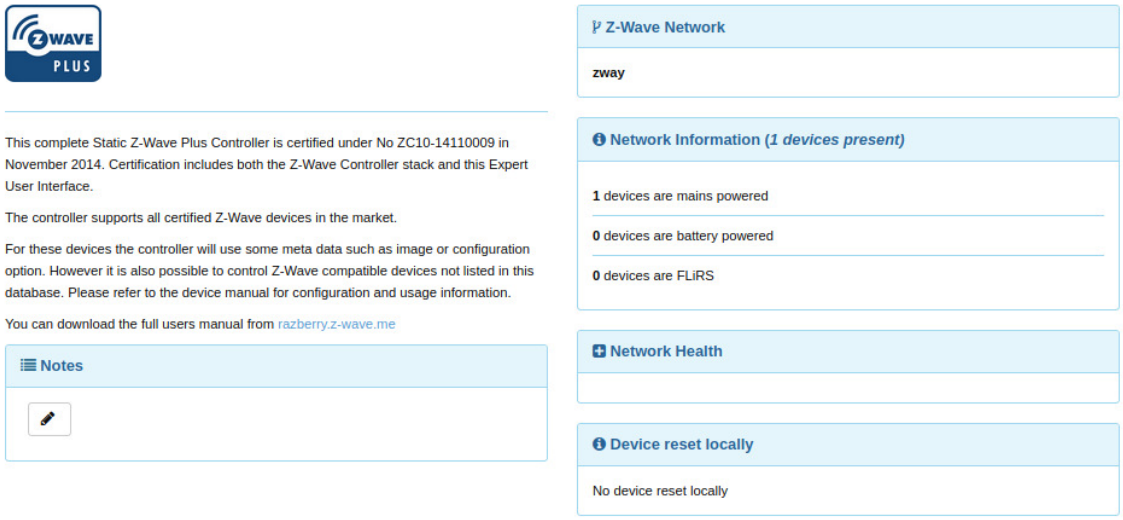
To complete a problem report:

- Enter text in the large box that explains the problem, the steps you have taken that led to the problem, and whether you are able to reproduce the problem. If you have specifics regarding the controllers or devices that you were working with at the time of the problem, please include that information as well. This information is required in order to be able to submit a problem report.
- Enter your e-mail address in the e-mail box. The Submit button at the bottom will not enable until a valid email address has been entered.
- Check the "Include log" checkbox by clicking on it, to have a portion of the Z-Way CIT internal log included with the problem report submission. This log is often the key to allowing the factory to diagnose what went wrong. Z-Wave network keys are not included in the log.
- Click the button at the bottom right to complete the problem report submission – you must have Internet access for the Z-Way CIT to submit a problem report.

Home

The house icon represents the home screen, which is where you will get a summary of the network that the Z-Way CIT is a part of (if it is included into a network) assign a name to the network, take notes.

Here is what the Home screen looks like for a Z-Way CIT that has not been included into a Z-Wave network:

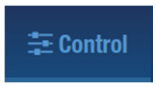


- Clicking on the edit button under the **Notes** heading will allow you to set or change notes to be kept along with this network when the Z-Way CIT is backed up or restored. To add or edit notes, click the edit button, enter the text you wish into the large input box that will be shown, then click the 'Save' button

- The **Network Information** area tells you about the network when the Z-Way CIT has been included into a network being examined. When the Z-Way CIT is the only node and it has

not been added to a network, it will only report the 1 node which is the Z-Way CIT itself. After Network Information in the title, the total number of devices in the network is shown in parenthesis: **Network Information (*147 devices present*)**

- The next line shows you how many devices are "mains powered" – mains powered device is one that always has power that does not come from batteries; mains powered devices are the only devices in a Z-Wave network that participate in routing and can help the mesh network.
- The next row shows you the number of "battery powered" devices. These are battery powered devices that "go to sleep" which is different from the type described next. Battery devices cannot be communicated with until they "wake up" at programmed intervals or when they wake themselves up to transmit a signal to another device or central controller.
- The last row under Network Information is the number of FLiRS devices. FLiRS stands for **F**requently **Li**stening **R**outing **S**lave. This type of battery operated device, typically door locks for example, gets Z-Wave messages delivered to it from a nearby mains device that holds onto the message until the FLiRS device wakes up its radio to listen for a "beam" signal from the device holding a message for it. As FLiRS devices are battery powered, they still do not participate in routing or help with the mesh network.

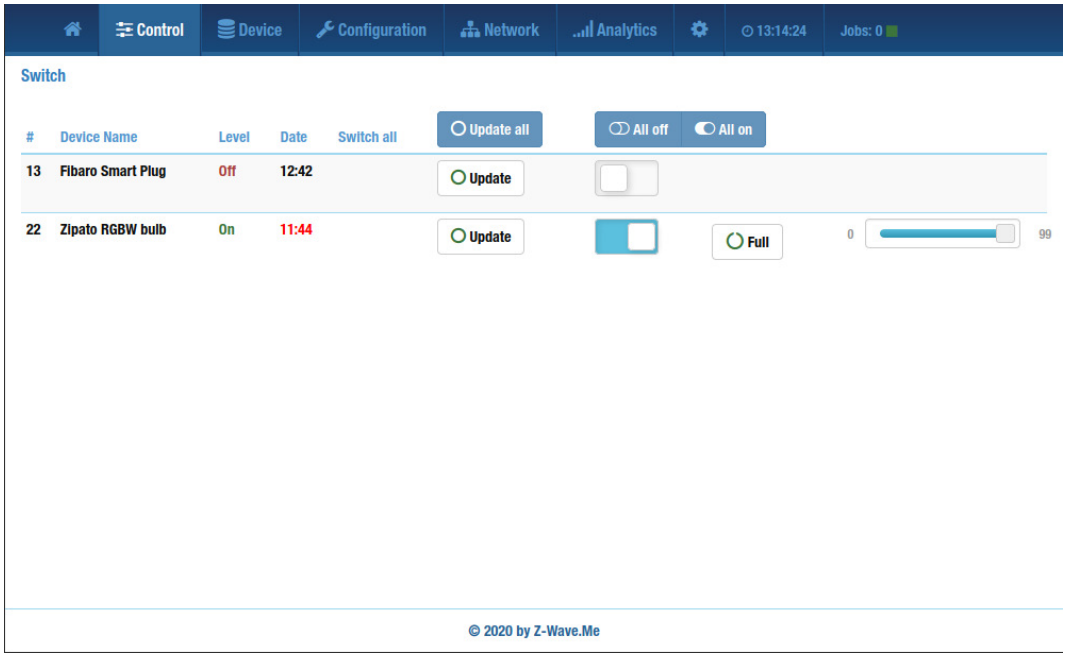
Control 

Control tab Includes 6 subsections with which you can fully control all the equipment in the Z-Wave network, watch the readings of sensors and counters, control thermostats, unlock and lock door locks and view notifications. Each of these subsections is discussed on the following pages of this manual.

Switch
Sensors
Meters
Thermostat
Locks
Notification

Switch

Switch is a section that displays all devices with the SwitchBinary and SwitchMultilevel command classes. In this section you can turn on/off devices and also change their level if



possible.

- **Node number (#)** – this is the Z-Wave node number of this device on the network.
- **Device name** – By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number
- **Level** – This column shows the status of the switch or dimmer, for binary switches it is always On / Off. Dimmers can also be displayed as a value from 0 to 99, if the dimmer position is 0 interface will show Off status, else On .
- **Date** – The date column shows the date of the last successful communication with the device.

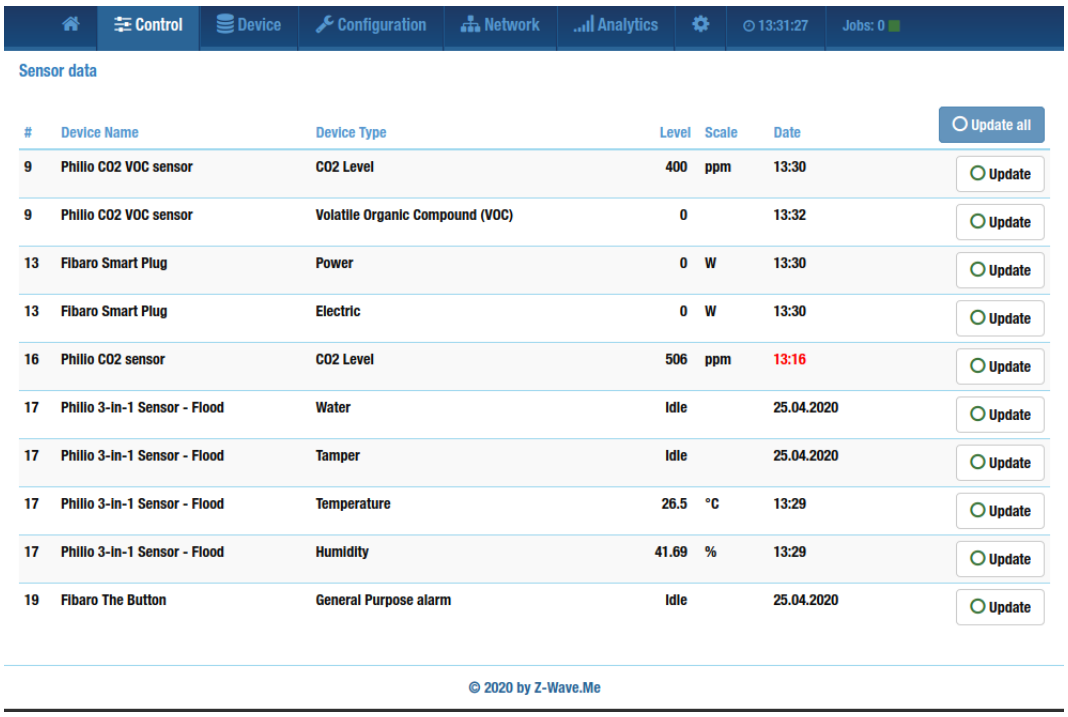
- **Switch All** – indicates whether the device is grouped and whether it is in a group using the SwitchAll command class.

There are also Update and Update all buttons, when you click on the Update, the controller will poll the device and update its status (if it was changed, while the controller did not receive a report about the change). When the Update all button is pressed, the controller will poll all the devices in this list, if the device does not respond, then the last polling time will be shown in red in the Date column and the device will be considered dead until the controller contacts it. With a successful update, Date will also be updated. It is also possible to simultaneously turn on and off all devices using the All off All on buttons.

[Back to Control]

Sensors

Sensors section provides information on all sensors on the network.



#	Device Name	Device Type	Level	Scale	Date	
9	Philio CO2 VOC sensor	CO2 Level	400	ppm	13:30	Update
9	Philio CO2 VOC sensor	Volatile Organic Compound (VOC)	0		13:32	Update
13	Fibaro Smart Plug	Power	0	W	13:30	Update
13	Fibaro Smart Plug	Electric	0	W	13:30	Update
16	Philio CO2 sensor	CO2 Level	506	ppm	13:16	Update
17	Philio 3-in-1 Sensor - Flood	Water	Idle		25.04.2020	Update
17	Philio 3-in-1 Sensor - Flood	Tamper	Idle		25.04.2020	Update
17	Philio 3-in-1 Sensor - Flood	Temperature	26.5	°C	13:29	Update
17	Philio 3-in-1 Sensor - Flood	Humidity	41.69	%	13:29	Update
19	Fibaro The Button	General Purpose alarm	Idle		25.04.2020	Update

- **Node number (#)** – this is the Z-Wave node number of this device on the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the

device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number.

- **Device type** - Here is what type of sensor is in the system
- **Level** - In this column, the display with the sensor is displayed, the display can be displayed in binary value, idle or in units on the scale of the next column.
- **Scale** - The fifth column it shows on which scale the measurement is made.
- **Date** – The date column shows the date of the last successful communication with the device.

The last column contains the

and

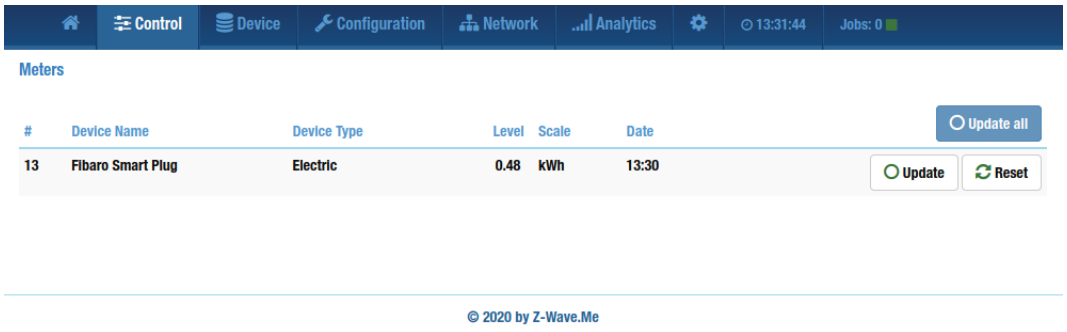
buttons, with which you can update the sensor readings.

In Z-Wave, most of the sensors are powered by batteries or accumulator and are mostly in sleep state, their values will be sent to the controller automatically at the configured interval in the device.

Back to Control

Meters

Meters section shows meters that can measure, for example, wasted energy, water and any other scales that can be counted and maintained by the device and Z-Way CIT.



- **Node Number (#)** - This is the node number of the device in the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the

device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number.

- **Device type** - Here is what type of meter is in the system
- **Level** - column shows the consumption value of units.
- **Scale** - it shows on which scale the measurement is made.
- **Date** – The date column shows the date of the last successful communication with the device.

The last column contains the

and

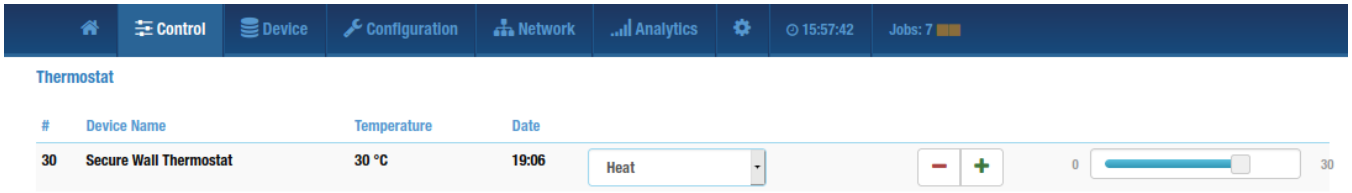
buttons, with which you can update the sensor readings. The

button also appeared with which you can reset the counter.

Back to Control

Thermostat

This section shows all thermostats.



- **Node Number (#)** - This is the node number of the device in the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number.

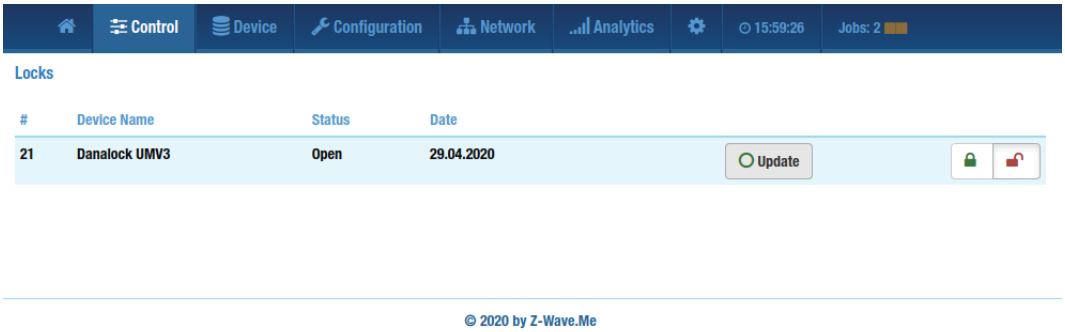
- **Temperature** - This column shows the set thermostat temperature.
- Then we meet 3 elements

, in the list you can choose the thermostat operating mode, heating or cooling. When you press the "+" button, the temperature value increases by 1 degree, when you press the "-" button, the temperature value decreases by 1 degree. On the next slider, you can set the temperature from 0 to 30 degrees.

[Back to Control]

Locks

Locks section displays a list of devices that have a DoorLock command class and are locks or other devices for access.



- **Node number** (#) – this is the Z-Wave node number of this device on the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number.
- **Status** - shows what position the lock is in.
- **Date** – The date column shows the date of the last successful communication with the device.

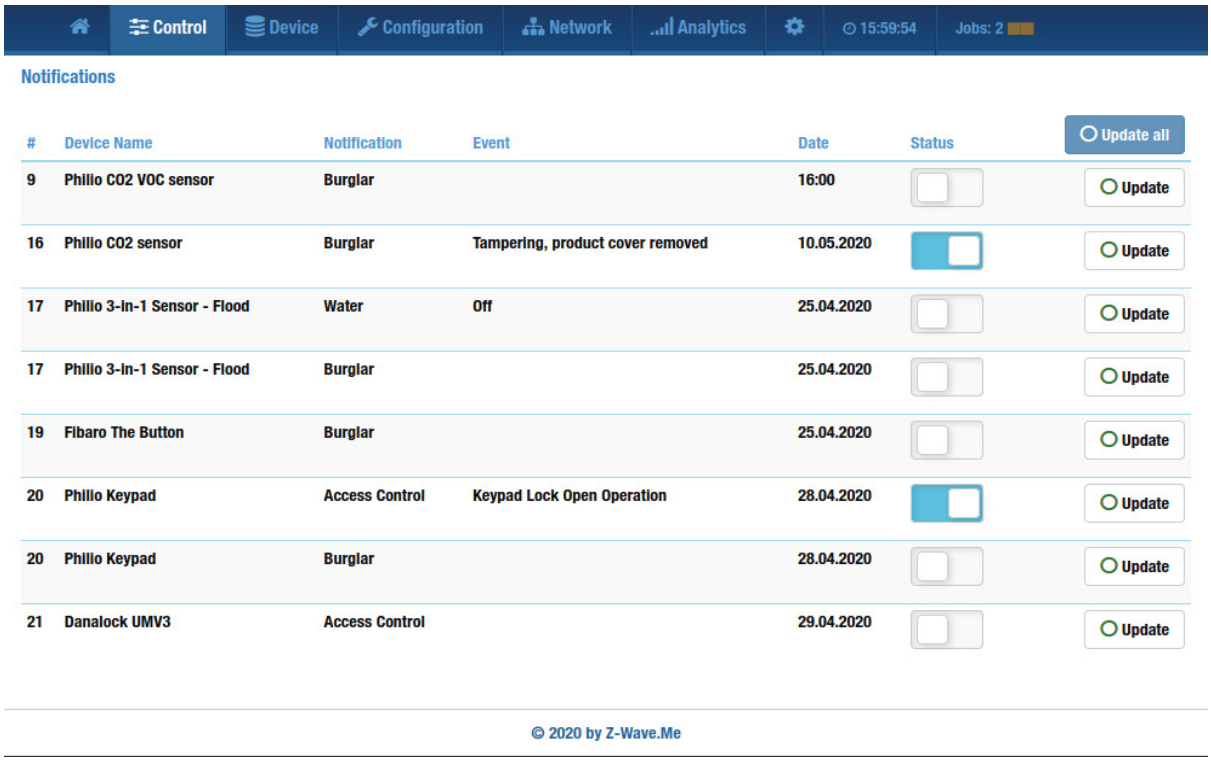
In this menu, you also have an

button and

a button to control the status of the lock. ( )

[Back to Control]

Notifications



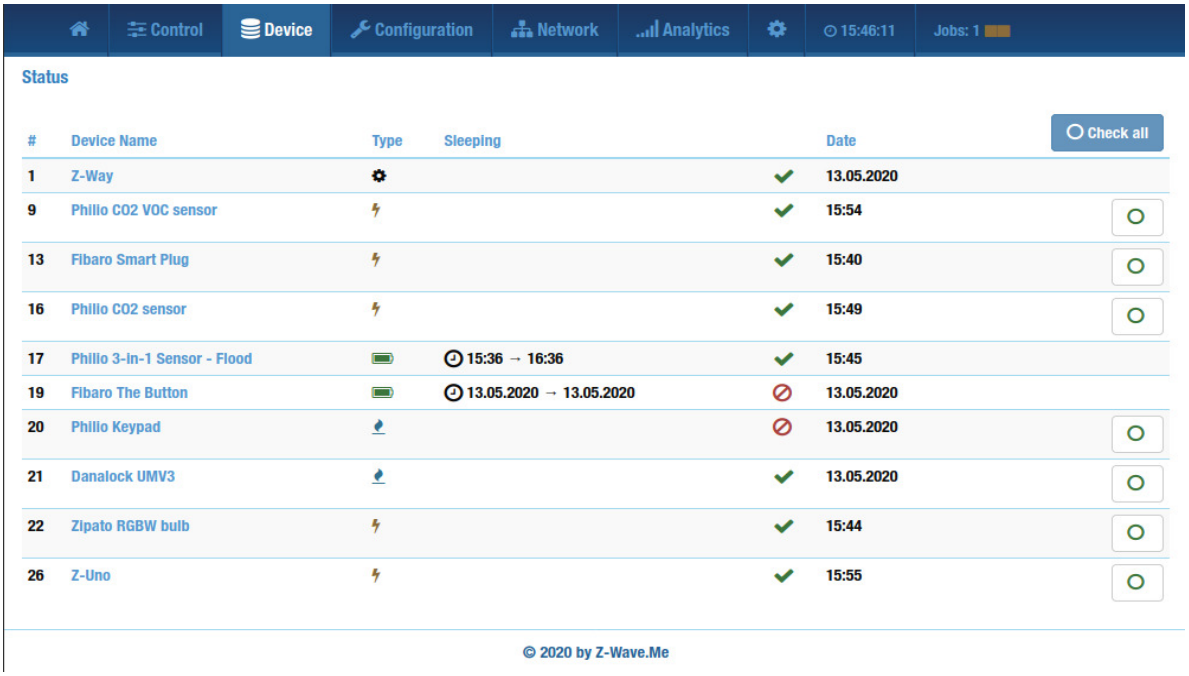
#	Device Name	Notification	Event	Date	Status	
9	Philio CO2 VOC sensor	Burglar		16:00		Update
16	Philio CO2 sensor	Burglar	Tampering, product cover removed	10.05.2020		Update
17	Philio 3-in-1 Sensor - Flood	Water	Off	25.04.2020		Update
17	Philio 3-in-1 Sensor - Flood	Burglar		25.04.2020		Update
19	Fibaro The Button	Burglar		25.04.2020		Update
20	Philio Keypad	Access Control	Keypad Lock Open Operation	28.04.2020		Update
20	Philio Keypad	Burglar		28.04.2020		Update
21	Danalock UMV3	Access Control		29.04.2020		Update

Notifications section includes all devices that can give alerts about cracker, leaks, burning, smoke, access control, tampers, etc. Also in this section it is possible to disable sending alarm messages from the device, for example, when the house security mode is disabled.

- **Node number (#)** – this is the Z-Wave node number of this device on the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device; a BatteryDevice can be a sleeping battery

device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just “Device_” and its node number.

- **Notification** - Here is what type of notification came.
- **Event** - in this column is written what event occurred or occurred



Back to Control

Device

The menu items under the device menu allow you to get information about or work with Z-Wave devices in the network. Clicking on Device in the menu does not take you to a function page, but it displays a list of menu options which you may select, and includes (click a box to be taken to the documentation for that menu option):

Status
Type info
Battery
Active Associations

The functions and features of each of these options is provided below:

Status

The status page gives you a quick status of the devices and when it was that the Z-Way CIT last heard from each device. Here is a sample of the information on the status page:

The columns of information and functions on this page from left to right are:

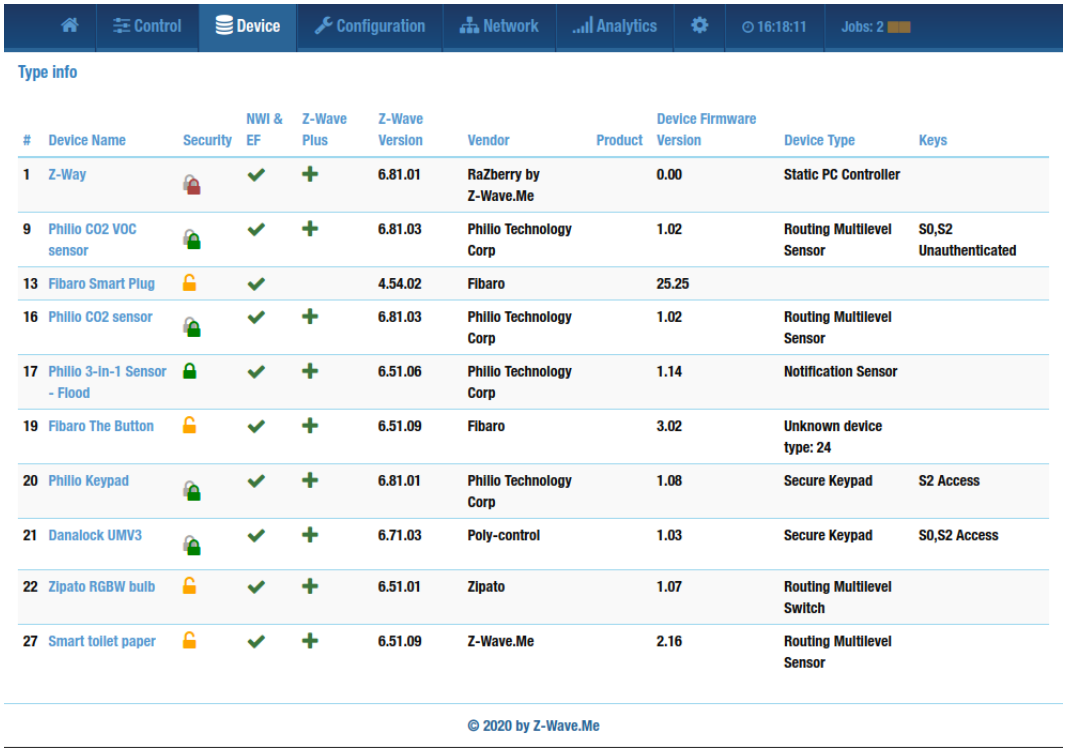
- **Node number (#)** – this is the Z-Wave node number of this device on the network.
- **Device name** - By default, Z-Wave devices do not contain name information; even if the device supports Z-Wave name and location setting, it must be programmed into the device using Z-Wave before it can be retrieved. The names of the devices are therefore made up of a device characteristic and the device's node number on the network. A MainsDevice is an always-powered device, a BatteryDevice can be a sleeping battery device or a FLiRS device. If the Z-Way CIT was unable to determine a device type for a device, then the name will be just "Device_" and its node number.
- **Type** – An icon representing the device type will help you to know the device type if you change the device name. Here are the icons and what they represent:
  - Indicates a non-portable controller
  - Indicates a portable controller
  - Represents a Battery powered (sleeping) device
  - Represents a FLiRS device
  - Is for Mains (always powered) devices
  - Is for devices whose type could not be determined (Unknown)
- **Sleeping** – this column indicates the time intervals of the device's sleep; this column is relevant for battery devices that are in a state of sleep most of the time.
- **Communication** – The next column will show one of two symbols representing whether the Z-Way CIT was able to communicate with the device:
  - Will be shown if the Z-Way CIT was able to communicate with the device.
  - Will be shown if the Z-Way CIT could not communicate with the device.
- **Date** – The date column shows the date of the last successful communication with the device.

- **Device Interview** – The presence of the button indicates that the device interview is incomplete. The device interview is not required for basic network diagnostics and repairs, but it is needed if you wish to do application layer changes such as Configuration Settings or Associations with the device. Much of the information displayed in the Type info screen is obtained through the device interview process. Clicking on the red symbol will display the device interview status where individual command class interview processes can be attempted again. More information on the device interview process is covered in the Device Configuration section.
- **Communication Check** – Clicking on the symbol will initiate an immediate test by the Z-Way CIT to see if it can communicate with the device. This is one of the first and easiest tests that can be done to start checking a Z-Wave network.
- The Check all button at the top of the Communication Check column will initiate a check of all devices in the network. You should be able to receive a response from all mains powered devices in the network.

Back to Device

Type info

The type info page goes into more detail regarding the devices in the network, showing you at a glance more information about each device. Here is an example of the Type info screen:



#	Device Name	Security	NWI & EF	Z-Wave Plus	Z-Wave Version	Vendor	Product	Device Firmware Version	Device Type	Keys
1	Z-Way		✔	+	6.81.01	RaZberry by Z-Wave.Me		0.00	Static PC Controller	
9	Philio CO2 VOC sensor		✔	+	6.81.03	Philio Technology Corp		1.02	Routing Multilevel Sensor	S0,S2 Unauthenticated
13	Fibaro Smart Plug		✔		4.54.02	Fibaro		25.25		
16	Philio CO2 sensor		✔	+	6.81.03	Philio Technology Corp		1.02	Routing Multilevel Sensor	
17	Philio 3-in-1 Sensor - Flood		✔	+	6.51.06	Philio Technology Corp		1.14	Notification Sensor	
19	Fibaro The Button		✔	+	6.51.09	Fibaro		3.02	Unknown device type: 24	
20	Philio Keypad		✔	+	6.81.01	Philio Technology Corp		1.08	Secure Keypad	S2 Access
21	Danalock UMV3		✔	+	6.71.03	Poly-control		1.03	Secure Keypad	S0,S2 Access
22	Zipato RGBW bulb		✔	+	6.51.01	Zipato		1.07	Routing Multilevel Switch	
27	Smart toilet paper		✔	+	6.51.09	Z-Wave.Me		2.16	Routing Multilevel Sensor	

The display can be sorted by each of the columns – to sort by any column, click on the column heading. To reverse the sort order of a column, click on the same column heading again. Here are the columns of information and what you can see or do with them:

- **Node Number (#)** - This is the node number of the device in the network.
- **Device name** – The device name, as mentioned in the Status screen, default to a name based upon the type of device that it is followed by the node number. Clicking on the name here will take you to the configuration screen for that device allowing you to change the name to something more friendly. (Remember to create a backup at the Home Screen so your changes are not lost when you remove the Z-Way CIT from the customer's network.)
- **Security** – In this column is an image; a yellow unlocked padlock means the device was not added securely. A green locked padlock means the device is a secure S0 device and was

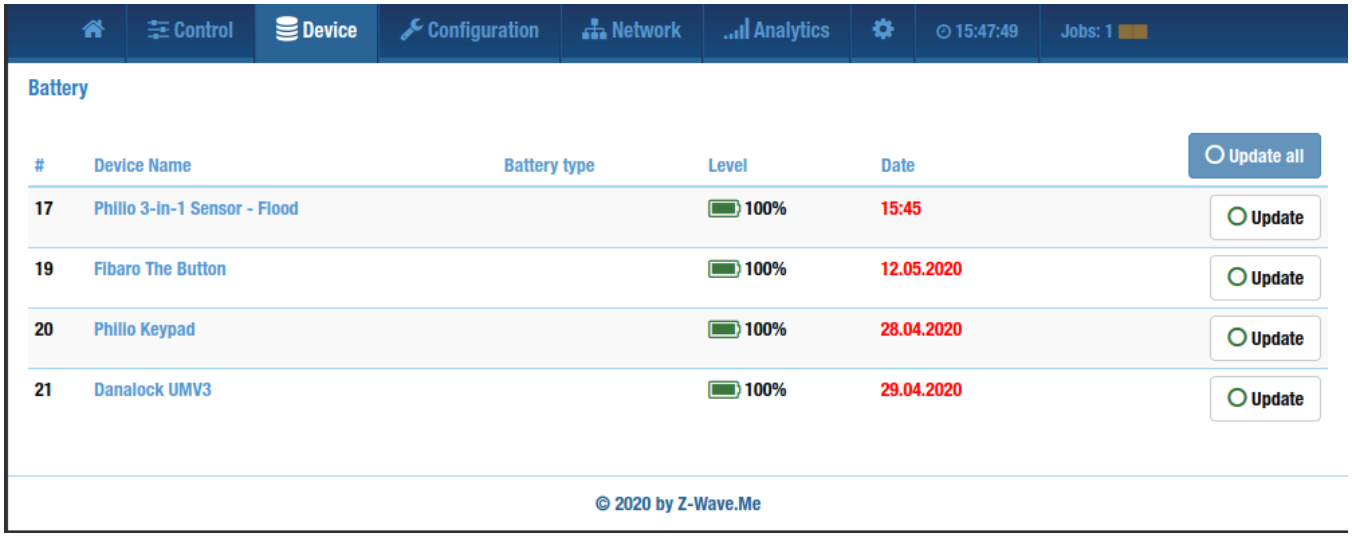
added to the network securely. A green padlock with a shadow means that the device is connected to the network with s2 encryption.

- **NWI & EF** – These letters stand for Network Wide Inclusion and Explorer Frame. Although all Z-Wave Plus devices will always have these, there are some Z-Wave devices that had these features before Z-Wave Plus mandated them. Network Wide Inclusion (NWI) allows devices to be added or removed from the network without having to be physically near the primary controller at the time of inclusion or exclusion. (This only works in a network where most or all of the devices support NWI.) The Explorer Frame (EF) is a network "self-healing" capability whereby a node will use a special type of signal to locate a node it wants to communicate with when the normal path is not working. If there is a ✔ (green checkmark) symbol in this column, then the device has these two features.
- **Z-Wave Plus** – If this column has a ✚ (green plus sign) symbol in this column, then the device is a Z-Wave Plus device.
- **Z-Wave Version** – The Z-Wave Library version number is shown in this column if the device interview was able to communicate with the device. If the value here is a number shown in parenthesis, then the library version is the SDK version because it is unknown and could not be decoded into an official Z-Wave Library version.
- **Vendor** – The name of the vendor who created or marketed the device is shown here in this column. This value is obtained through the device interview process.
- **Product** – The Z-Way CIT has a library of known devices. If the device interview process was able to obtain enough information to find the device in the library of devices, then it will display the device information here.
- **Device Firmware Version** – The manufacturer's firmware version for the device is shown here. If the device supports having its firmware being updated, and that update process takes place using Z-Wave Over-The-Air (OTA) then the firmware update function in the device configuration area will allow you to specify a firmware file to be applied to the device.
- **Device type** – The Z-Wave device type or Z-Wave Plus role type is shown in this column. The type shown here is the base upon which the device's core architecture is based.

Back to Device

Battery

This section presents all devices running on batteries, here you can view the charge status, for example, this section:



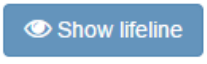
Back to Device

Active associations

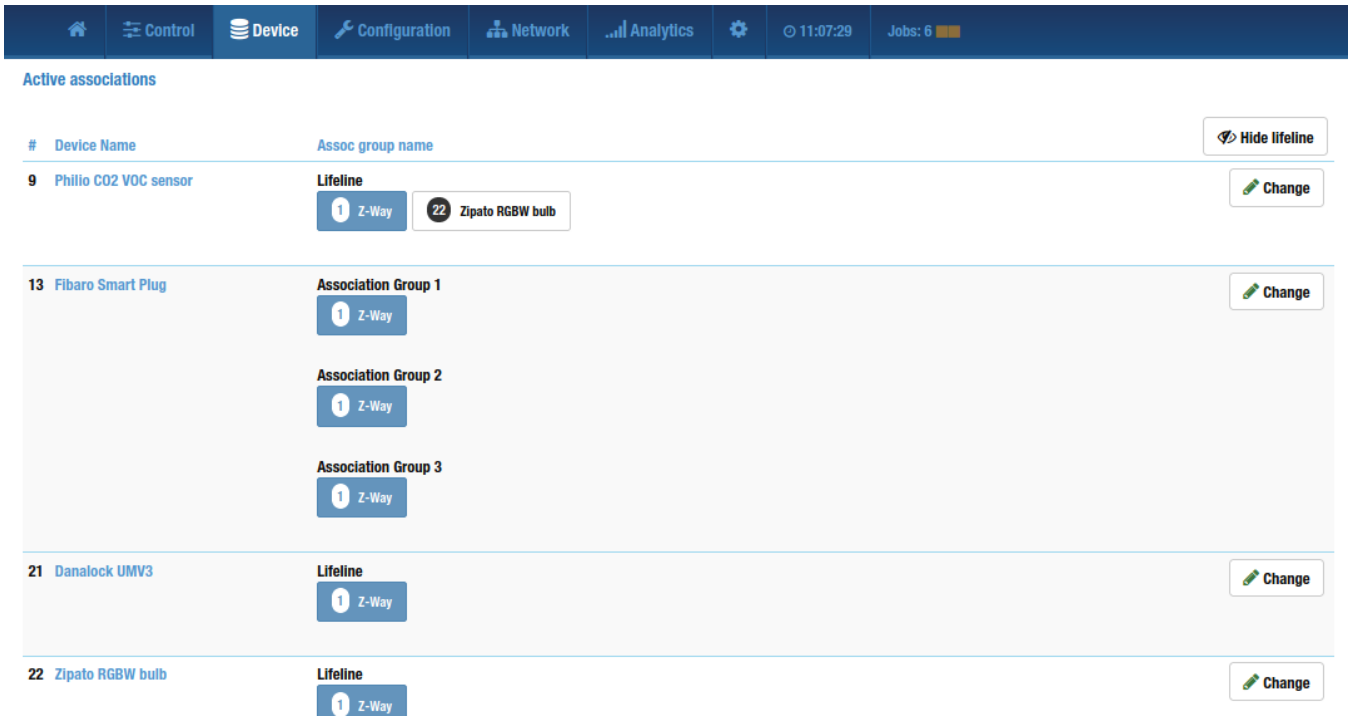
The Active associations page provides one place to list all of the associations that have been retrieved from the nodes in the network during the interview process. On this page a comprehensive view of all of the associations can be seen. If all of the associations have been retrieved from the nodes in the network, then this screen is a good diagnostic tool for finding orphaned nodes.

> *Example: Let's say node 51 has an association set up to node 20. At some point, the device at node 20 is upgraded to a newer device that has more features, and the new node number is now 60. Removing a node from the network does not update associations. Therefore, each time the event occurs at node 51 that causes it to send a Z-Wave signal to the nodes in one of its association groups, it will attempt to communicate with node 20 which no longer exists. This communication could cause node 51 to use the Explorer Frame, which has a large network overhead and will cause a significant and noticeable delay before node 51 moves on to the next node in the list and sends the command to that node.*

Here is what the Active Associations page looks like:

- The first column (#) and the second column (**Device name**) show the node number and device name respectively.
- The next column, titled "**Assoc group name**" lists the name of the association group if it is a Z-Wave Plus device, or it will list "Association Group" followed by the association group number. If there is more than one node in the first association group (Group 1) then this group will be shown, but normally in this mode, the Lifeline group (Group 1) associations are not shown. They are filtered out of the screen to make it easier to view OTHER associations because in most cases, a device supporting association will have an association on group 1 to the primary controller. Under the name of the association group is the list of nodes – along with their device name – which are associated to the node shown at the beginning of the row on the indicated association group.
- The last column is headed by the 

Show lifeline button. If this button is clicked, it will toggle the functionality of hiding the Lifeline group associations and it will list all associations. Here is a sample:



As you can see, nodes 9 and 21 which were not previously shown now appear, because the only association they had on their Lifeline (Group 1) association group was with the primary controller at Node 1. To return to filtering out the lifeline associations, click the Hide lifeline **Hide lifeline** button which now appears where the Show lifeline button used to be. Clicking on any of the Change **Change** buttons will lead the UI to the Device Configuration screen for the node, Associations tab, where the associations can be changed.

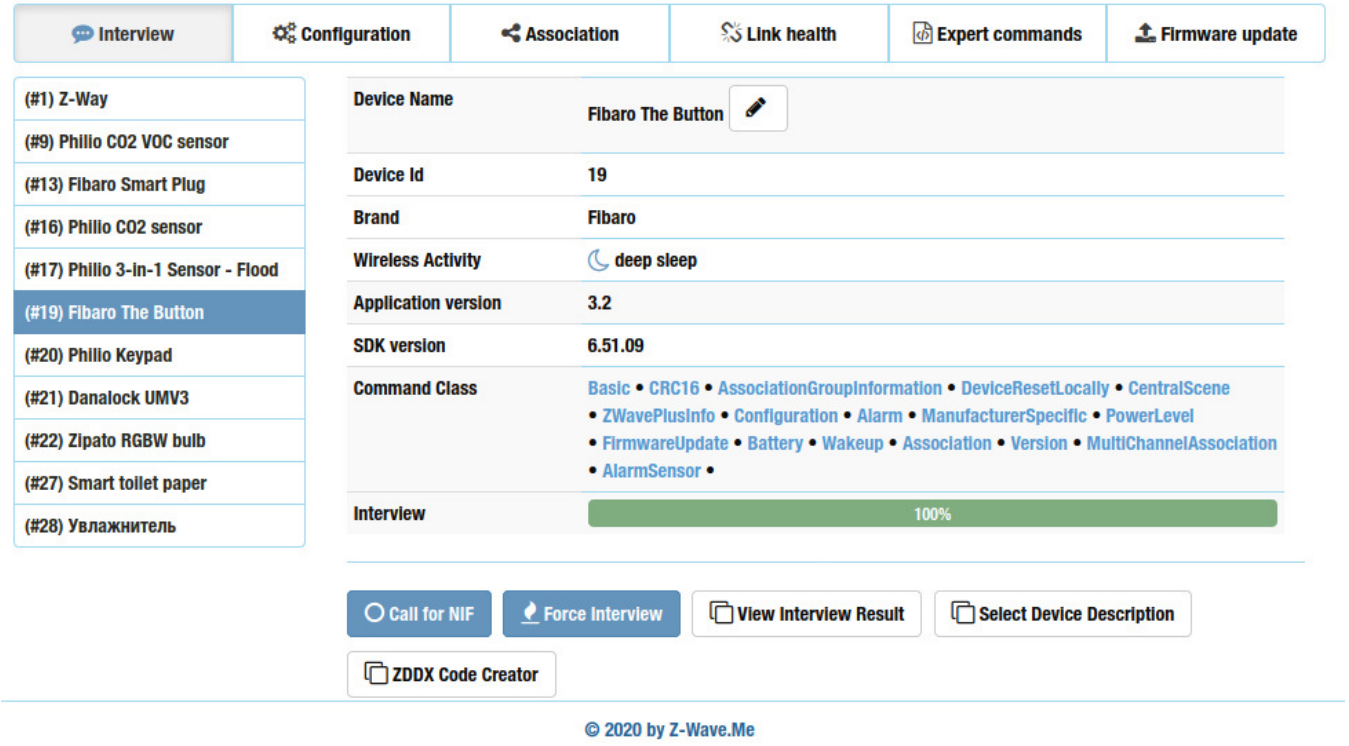
Back to Device

Configuration

There are 6 tabs in this section, you can configure devices, get complete information about a specific device, change its parameters, establish associations, check communication status, interact with device command classes and update firmware, as this section looks like below. You can also get to this section from the Device section by clicking on the name of the device.

Interview

This tab allows you to view or control the results of the device interview. When the Z-Way CIT is added to a network, it attempts to contact all of the devices in the network (listening devices) so that it can get detailed information about that device and the command classes that it supports and controls. Information about the device and bar graph showing the interview progress are shown. Here is an example page:



- **Device Name** – Clicking on the (pencil – edit) button will allow you to change the name of the device to something more friendly so you do not have to remember it by its node number. If you change the name of the device, the device will be referred by this name in all of the other screens of the system. Remember to do a Backup before you remove the Z-Wave from the network so that you can Restore the node names from backup the next time you add the Z-Way CIT to the same network.
- **Device Id** – This is the device's Node Number in the network.
- **Brand** – Displays the manufacturer's brand if it is in the database.
- **Device type** – This is the device type of the device (See the Type info screen)
- **Wireless Activity** – If the Z-Way CIT has communicated with the device and the device acknowledged it, or if the Z-Way CIT heard a communication from this node, then a active symbol will be shown. If it is a battery operated device and cannot be communicated with, then the deep sleep symbol will be shown, and if the device type is one that the Z-Way CIT should be able to communicate with but cannot, then Device seems to be dead will be displayed. (Hint: This is a good indicator of a device that may need to be verified as functional.)
- **Application Version** – This is the same as the Device Firmware Version shown on the Type info screen.
- **SDK Version** – This is the same as the Z-Wave Version shown on the Type info screen.
- **Command Classes** – The Command Classes is a list of Z-Wave Application Layer command and response structures that the device uses. Some command classes may be supported by the device, which means it carries out commands given to it by other nodes, and some command classes are controlled, which means it is controlling that command class in another device. The list of command classes is critical to understanding the capabilities of a Z-Wave device. See the Command Classes section for more information.
- **Interview** – This bar graph shows the progress of the interview. If all information has been retrieved from the device, it will show 100% and be entirely green.
- Call for NIF Clicking the **Call for NIF** button will cause the Z-Way CIT to ask for the device's Node Information Frame (NIF) and it will cause the interview to start all over if the NIF is received.

- Force Interview When clicked, the **Force Interview** button will force an interview that previously stopped (perhaps due to too many attempts) to be retried.
- The View Interview Result button allows you to see the results of the individual items that the interview process is asking for from that particular device, and you may also force the individual items to be retrieved by clicking on a button to force the Z-Way CIT to do that interview item immediately. Here is an example:

Interview Results

Interview Results MainsDevice _11

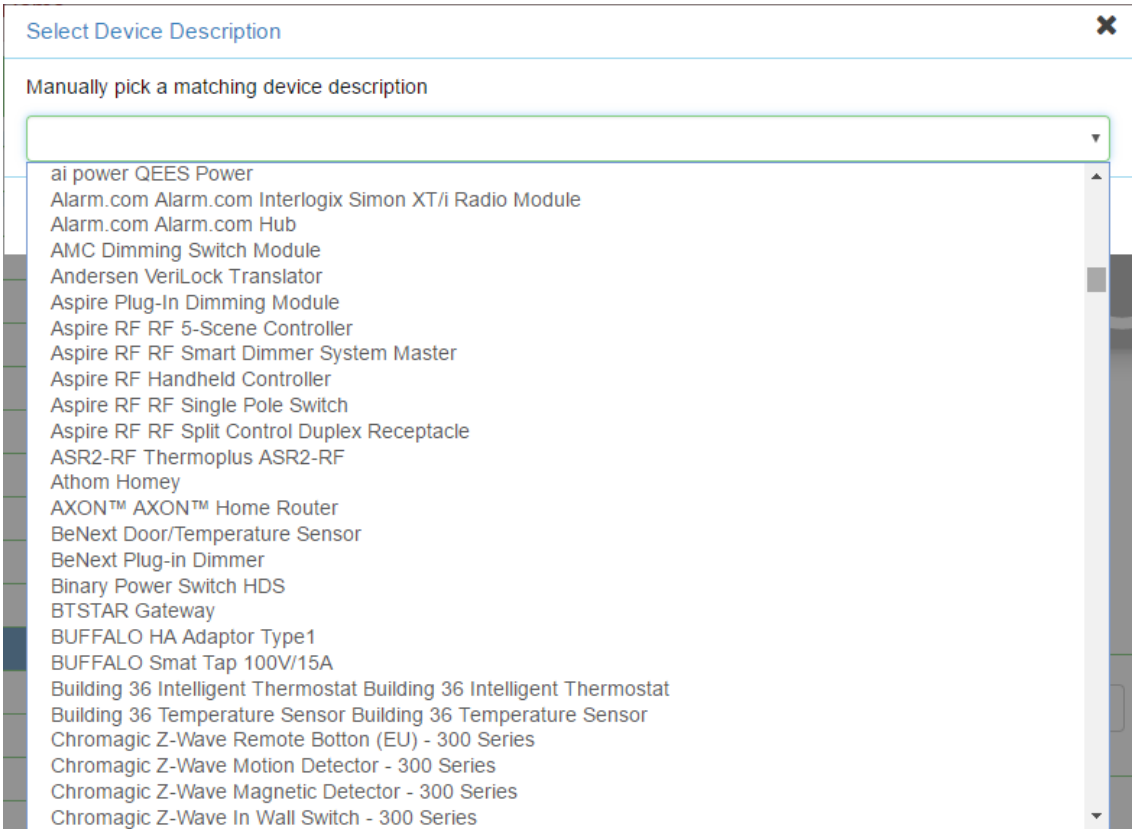
Instance	CommandClass	Result
0	Basic	✔
0	SwitchMultilevel	✔
0	SwitchAll	✔
0	SceneActivation	✔
0	SceneActuatorConf	✔
0	Configuration	✔
0	Alarm	✔
0	ManufacturerSpecific	✔
0	PowerLevel	✔
0	Protection	✔
0	NodeNaming	✔
0	Hail	✔
0	Association	Force Interview
0	Version	Force Interview
0	Indicator	✔

Cancel

In this example, clicking the Force Interview button for Association or Version would force the Z-Way CIT to interview those command class capabilities from the device shown at the top of the page.

- Select Device Description If clicked, will display a dialog allowing you to manually set the make and model of the device – if you are aware of the exact make and model -

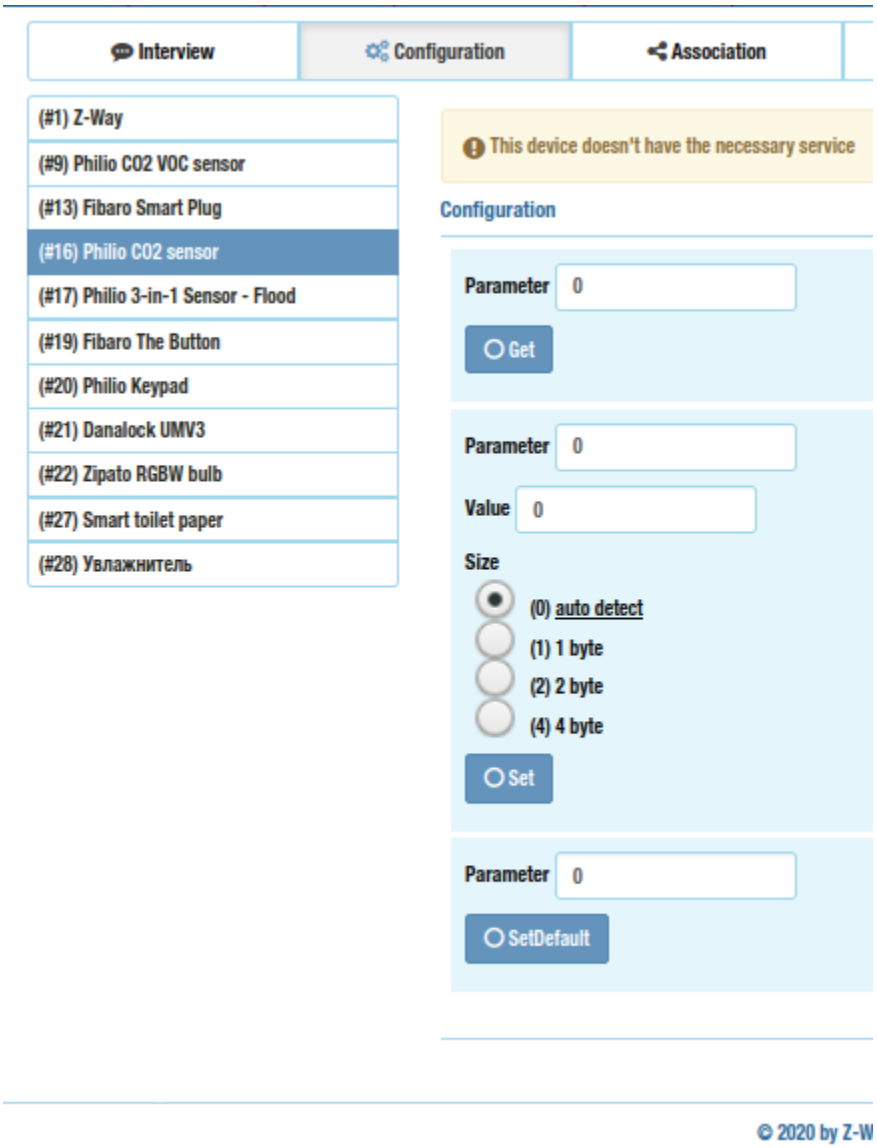
from a list of devices stored in the Z-Way CIT. This will short circuit the interview process by bringing in the information for that device that were previously established by somebody else. This is particularly useful for battery devices as their interview may not be easy to complete due to their sleeping nature. Here is an example of the dialog that would be presented:



- **ZDDX Code Creator** This tool allows you to generate or view a configuration file for this device, which contains information about the type of device, its supported class of teams and group associations.

Configuration

In this section you can configure and view the configuration parameters of the device. Z-Way CIT has a database of popular devices that are regularly replenished. If your device is present in the database, then in this menu will be described all the known configuration parameters of the device, if the device is not in the database, please familiarize yourself with the instructions of the manufacturer and the manufacturer. Example section Configuration without templates:



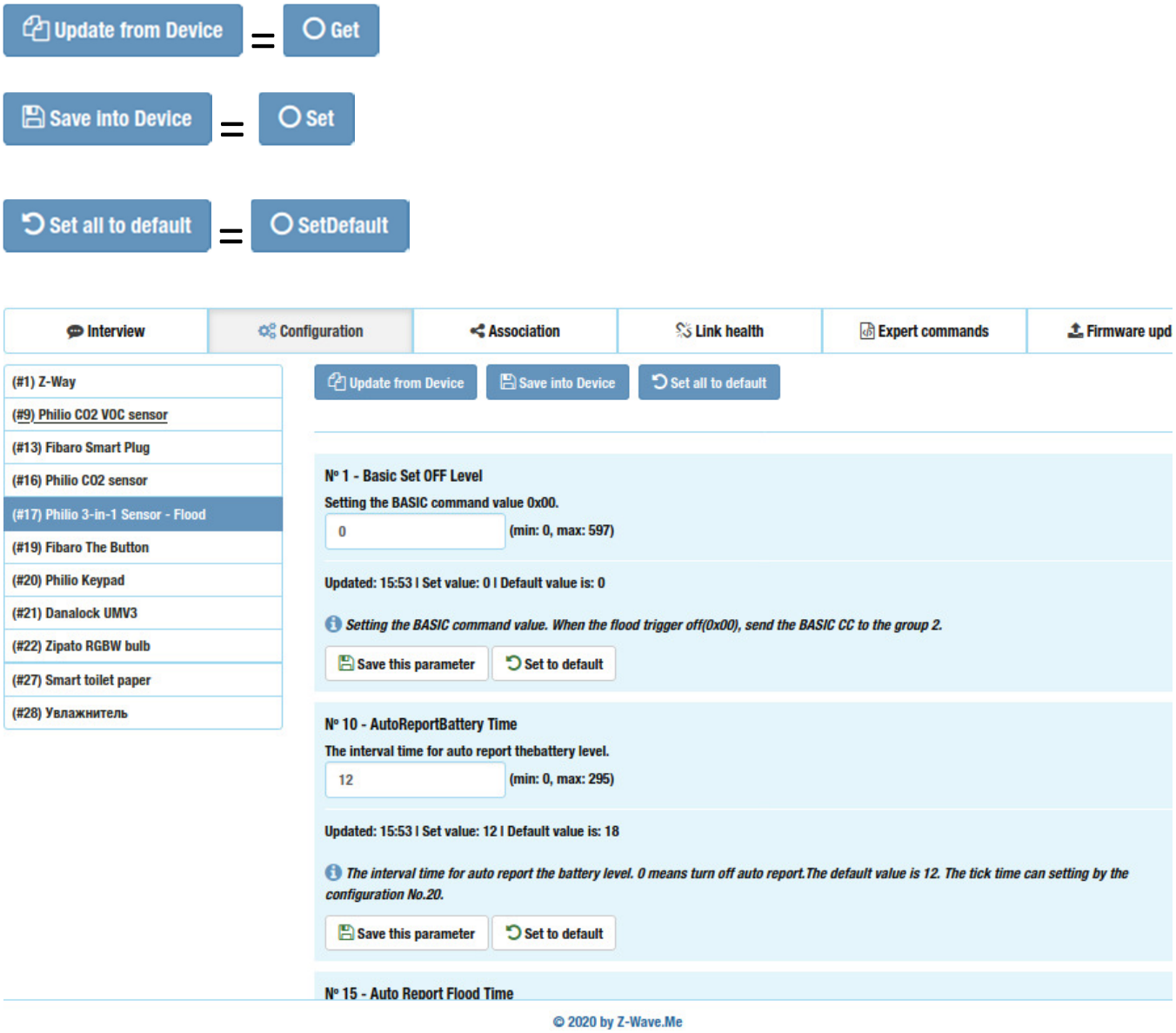
In the first block you can request the value of the desired configuration parameter, then click Get to get Value.

In the middle block you can set the configuration parameters. In the parameter setting, specify the desired parameter for you, select the value of the value in bits and click Set.

So you have the ability to return the default setting by clicking the SetDefault button.

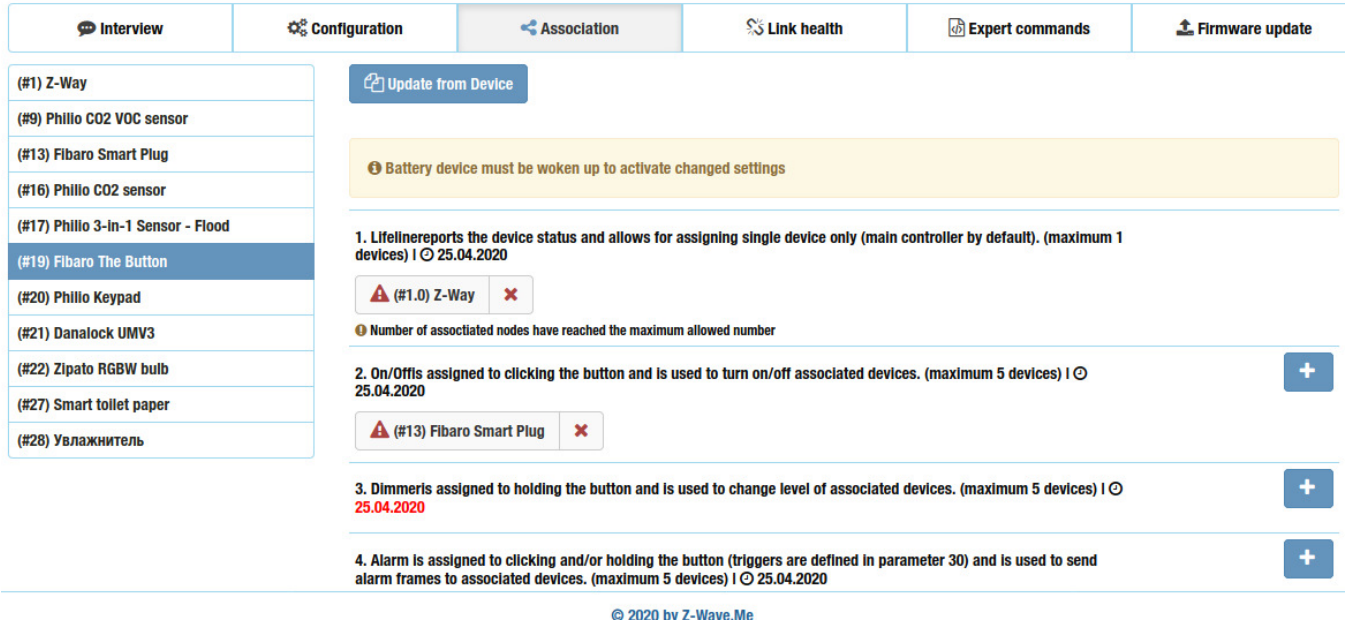
HINT: ***If your device works on batteries, then during the change or query option you need to wake up the device.***

An example of a device with a template, where each configuration parameter has a description, there are also 3 new buttons, but they are similar to the previous one, only their functionality is spread over all parameters.



Association

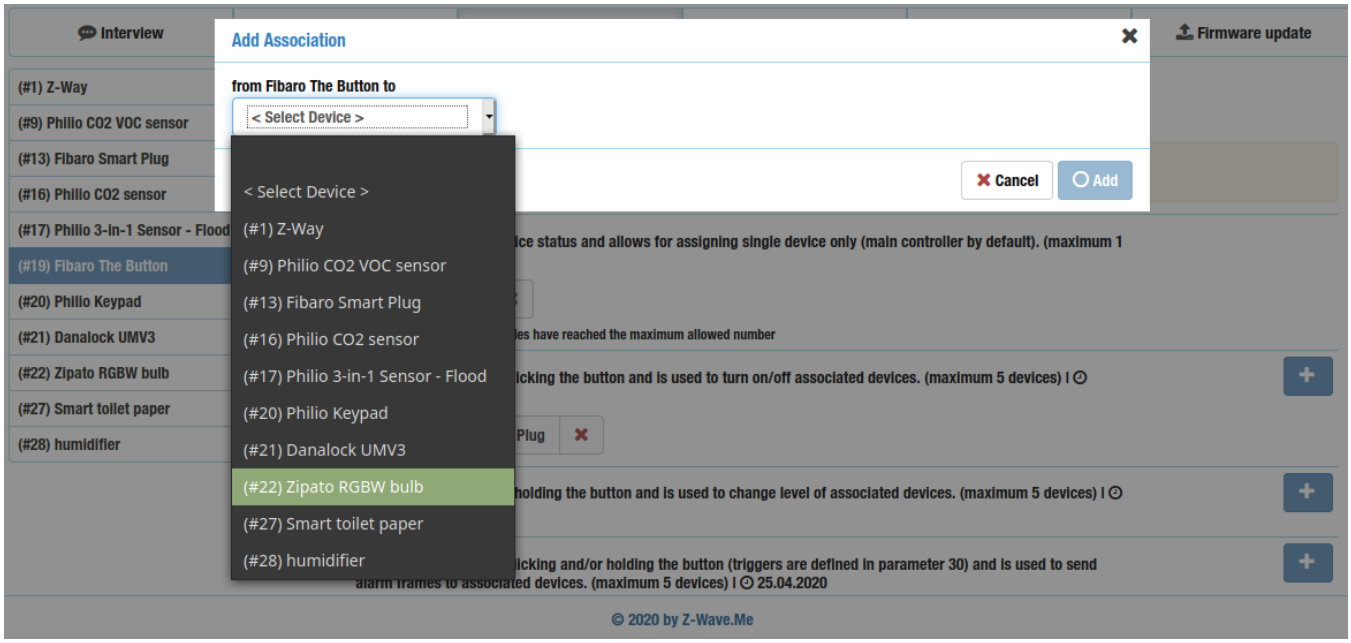
The Associations tab allows you to work with the device's associations through the Association Command Class (or other association command classes such as Multi Channel Association if present). The screen lists the association groups reported by the device, and any associations that are present in any of those groups. Here is an example:



Here are the options and controls available here:

- The

Update from Device button will cause the Z-Way CIT to re-request the association information from the node shown above the button. If the device is a battery operated device that is sleeping, it will be necessary for you to manually wake-up the device so the Z-Way CIT may communicate with it.
- Click , the plus sign button to **Add an Association** to the association group indicated at the beginning of the line. If the association group already has associations up to the maximum number of nodes supported by the association group, then the button will not appear; it will be necessary for you to remove an existing association to add a new association. When you are able to add an association and click on the button, this dialog will appear:

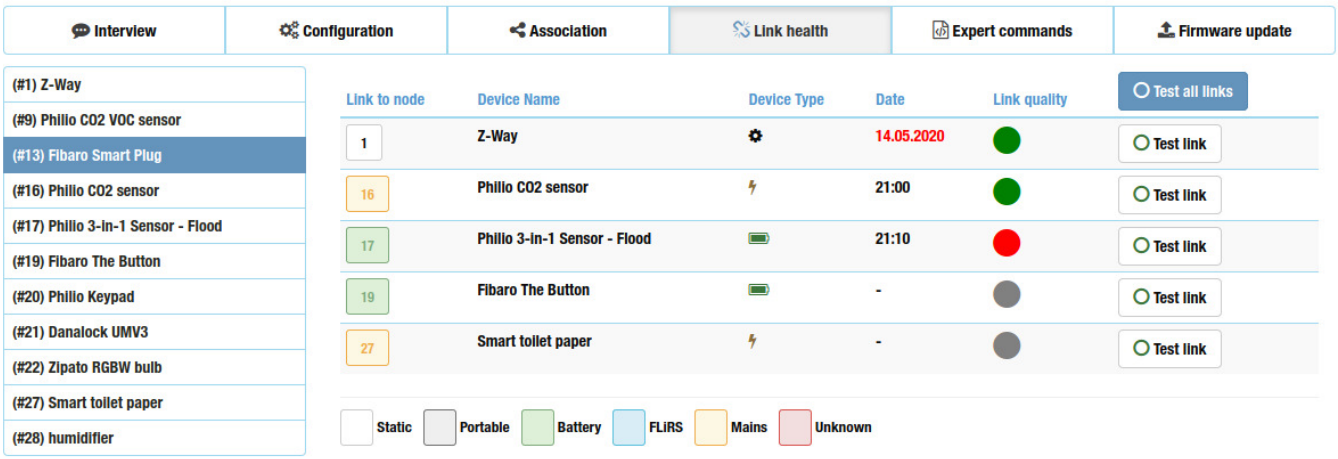


The device you wish to be associated with (in this example) Node 22 can be selected from the list, and then click the Add button to have the Z-Way CIT set the association. Click the Cancel button if you decide you do not want the association.

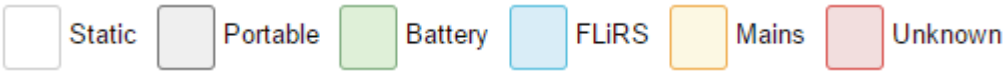
- In each association group listed, the information at the top of the group shows how many nodes may be added to the association group, along with the date that the association information was last updated from the device.
- If you wish to remove an association, find the device listed under the association group that you want the device association removed from, and click the red X button at the end of the device which appears like the example to the left.

Link health

The Link health tab shows you the strength of the link from the node selected at the top of the page, to each of the other nodes in the network. It is not necessary to know the link health between every node in the network, but this is useful if there is a reason for two nodes to directly communicate (e.g. associations) or if you are trying to track down a failure point in the network and need to examine the link quality between certain nodes. The result shown under the Link quality column will be a circle with a color code indicating at a granular level, the quality of the link between the two nodes. If the link quality has never been measured for the selected node, then there will be no entries under the Link quality column or the Date column. Here is what the link quality page looks like:



- At the bottom of the page, you will find a key to understanding the color coding of the squares in the **Link to node** column:

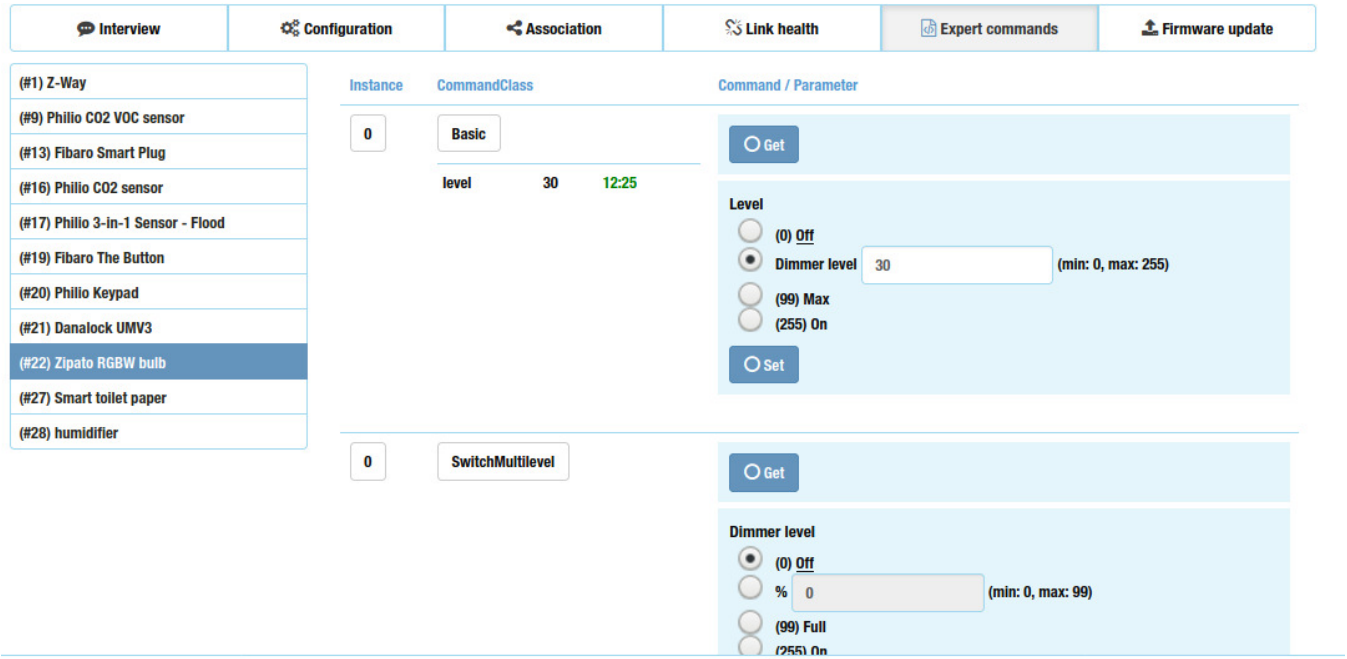
  as this key demonstrates, the color of the square indicates the type of device that it is, allowing for the node number and the device type to be identified together.
- The **Device name** column shows the name of the device.
- The **Device type** column provides another symbol representing the type of device using the icons as explained in the Status page.
- The **Date** column shows the date of the last time the link was tested between the node at the top of the page and the node in the row that the date appears. If there is no date

showing, then the test has not been run. If the date is the same as today's date, only the time will be shown. If the date appears in RED, then the date shows the previous date of a test and it indicates that another test has been called for, and the color will return to BLACK once the new test is finished.

- The **Link quality** column shows a circle colored to indicate the quality of the link if it has been tested.
  - - Indicates a test that is running on that node or one that did not complete successfully so the link quality is unknown.
  - - Indicates a poor link quality or an inability for the Z-Way CIT to communicate with the device. (Battery operated sleeping devices will return a red circle result if they were not forced awake prior to the test.)
  - - Indicates a good quality link between the two nodes.
  - - Indicates an excellent quality link between the two nodes.
- The heading for the last column is the Test all links **Test all links** button. Clicking this button will cause the Z-Way CIT to test the link quality from the node selected at the top of the page to each of the other nodes in the network. This will generate considerable Z-Wave traffic and may take several minutes to complete depending upon the size of the network; consider testing individual links instead. Under that button in each row representing the other nodes in the network is a Test link **Test link** button which when clicked, will perform the link test for the link between the node selected at the top of the page and the node shown at the beginning of the row for the Test link button that was clicked.

Expert commands

This page presents a dialog for doing operations on the command classes present in the device selected at the top of the page. As the name implies, use of these should be for experts who have a familiarity with the Z-Wave Application Layer. Some of the functions available here are duplicated from the Configuration and Association tabs. If the Node Information Frame (NIF) has not been retrieved from the device, no commands will appear on this page. If the interview process has not been completed, only commands for the command classes that have been completed by the interview process will appear. The screen is similar to that of the configuration screen explained earlier – here is a sample:



Using the Switch All command class as an example, you can see the status of the last time the Z-Way CIT was used to retrieve data for this command class from the device:

Under the heading of the command class (SwitchAll) we see the line with 3 parts to it – in this case the word "mode", the value 255, and the time of 12:27. For this command class, it refers to the Switch All mode having been retrieved at 12:27 and at that time had the value 255. In the Mode section shown on the screen, we can see that 255 indicates that the device participates in both Switch All On and Switch All Off commands.

As use of the application layer command classes is mostly beyond the scope of the Z-Way CIT, no further examples or information is provided here on additional command class expert commands.

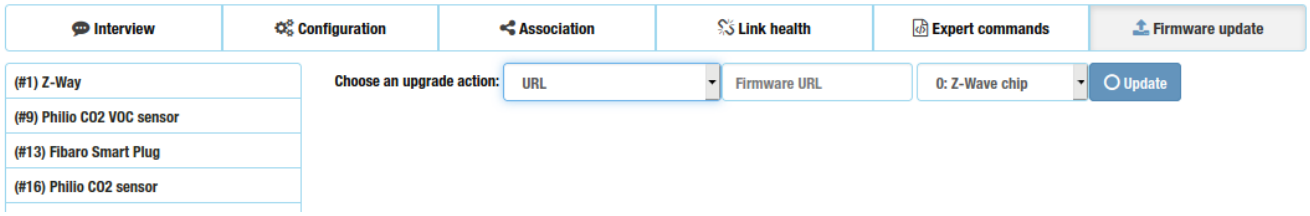
Firmware update

If the device chosen at the top of the page supports over-the-air firmware updating, then this tool page can be used to start an update of the firmware on the chosen device. To do an Over-The-Air (OTA) firmware update, you will need the firmware file from the manufacturer to be loaded onto your client device that you are using to connect to the Z-Way CIT user interface. For best results, all traffic on the Z-Wave network should be reduced as much as possible. If the

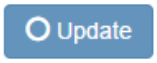
selected device supports Firmware Updating OTA, here is what the screen will look like:

The first drop-down box allows you to select whether the firmware update is for the Z-Wave chip, or for an Additional (secondary) chip/SoC in the device. The Z-Wave chip is selected by default as firmware updating of an additional chip is extremely rare. The next drop-down list allows you to select the **firmware update source** – by default a local file will be used; the Z-Way CIT will look for files with common extensions such as .hex, .bin, or .ota. Click on the **Choose File** button to browse your client computer for the firmware file from the manufacturer. The Z-Way CIT will look for files with common extensions such as .hex, .bin, or .ota.

In some cases, the manufacturer may choose to host the firmware file on their server and provide to you a URL for the Z-Way CIT to download the firmware file from and then start the firmware update. To use this feature, the Z-Way CIT will be required to have Internet connectivity. You may change to this mode by clicking on the **firmware update source** drop down list, and choosing the URL option. When the URL option is chosen, the firmware update screen will change and appear in this way:



When in this mode, enter the URL to the location of the firmware update file in the Firmware URL box.

Whether you use File mode or URL mode, click the 

button to begin the firmware update process. Depending upon the size of the firmware file and the amount of Z-Wave traffic in the network, the update could take anywhere from a few minutes to 10 minutes or more.

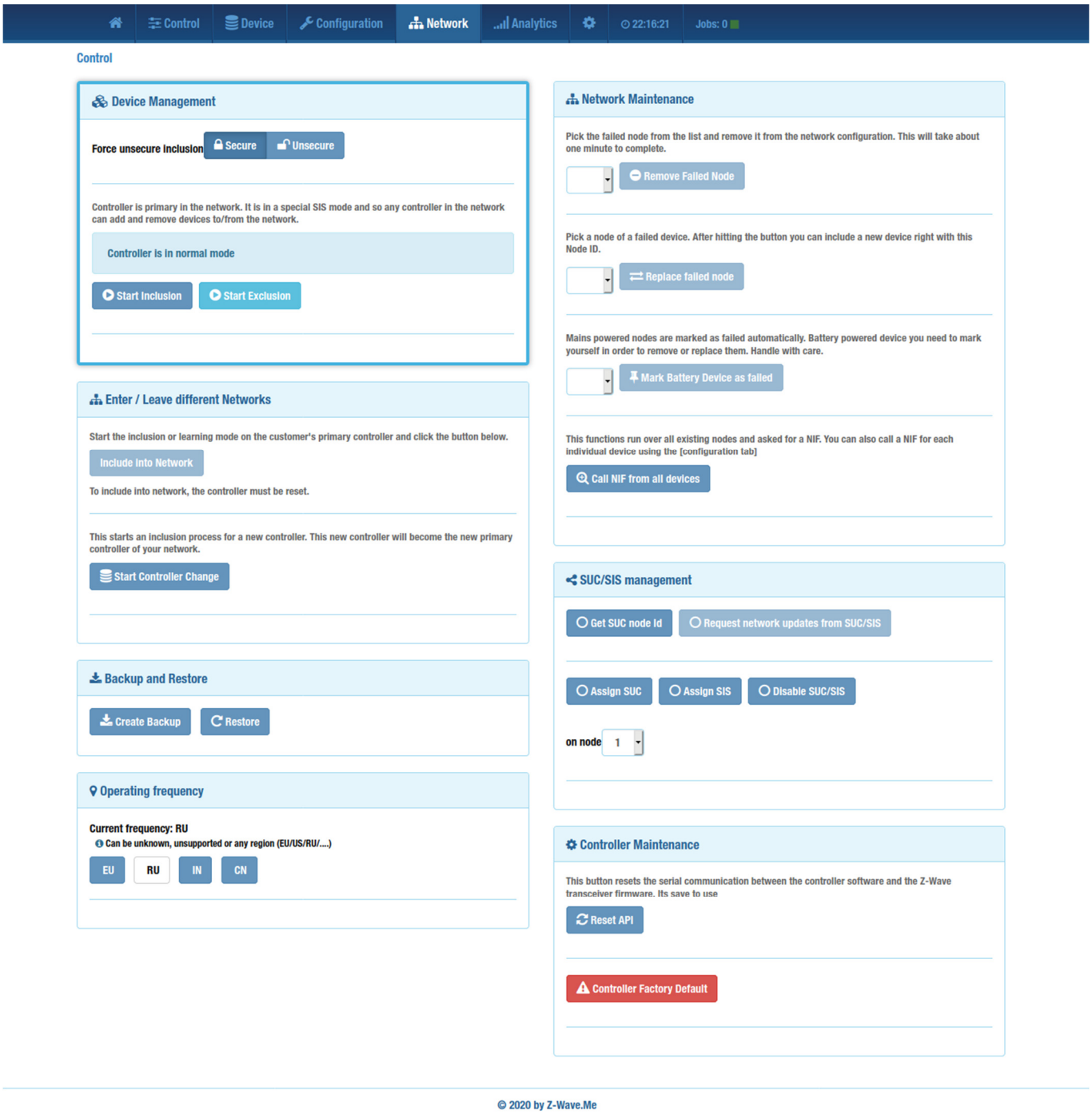
Network

The Network menu option allows you to access information pertaining to the entire network, or items affecting multiple nodes. Here are the menu options under Network:

Control
Neighbors
Reorganisation
Timing_Info
Route map
Link Status
Controller Info

Control

The Control page provides access to controller functions. The Z-Way CIT is being fully certified as a gateway controller and as such has the ability to carry out all of the required network commands. For normal diagnostic purposes, the functions on this page are not used.


Control
Device
Configuration
Network
Analytics
22:16:21
Jobs: 0
Control
Device Management
Force unsecure Inclusion
Secure
Unsecure
Controller is primary in the network. It is in a special SIS mode and so any controller in the network can add and remove devices to/from the network.
Controller is in normal mode
Start Inclusion
Start Exclusion
Enter / Leave different Networks
Start the inclusion or learning mode on the customer's primary controller and click the button below.
Include into Network
To include into network, the controller must be reset.
This starts an inclusion process for a new controller. This new controller will become the new primary controller of your network.
Start Controller Change
Backup and Restore
Create Backup
Restore
Operating frequency
Current frequency: RU
Can be unknown, unsupported or any region (EU/US/RU/....)
EU
RU
IN
CN
Network Maintenance
Pick the failed node from the list and remove it from the network configuration. This will take about one minute to complete.
Remove Failed Node
Pick a node of a failed device. After hitting the button you can include a new device right with this Node ID.
Replace failed node
Mains powered nodes are marked as failed automatically. Battery powered device you need to mark yourself in order to remove or replace them. Handle with care.
Mark Battery Device as failed
This functions run over all existing nodes and asked for a NIF. You can also call a NIF for each individual device using the [configuration tab]
Call NIF from all devices
SUC/SIS management
Get SUC node Id
Request network updates from SUC/SIS
Assign SUC
Assign SIS
Disable SUC/SIS
on node
1
Controller Maintenance
This button resets the serial communication between the controller software and the Z-Wave transceiver firmware. Its save to use
Reset API
Controller Factory Default
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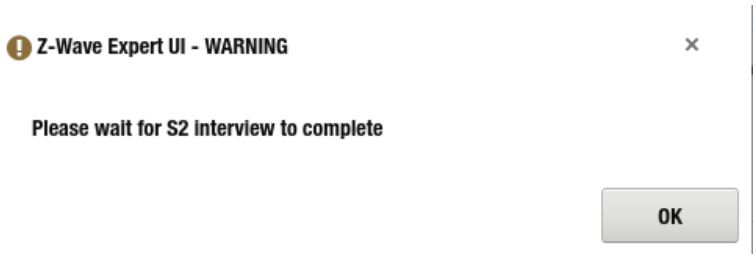
Device Management Section

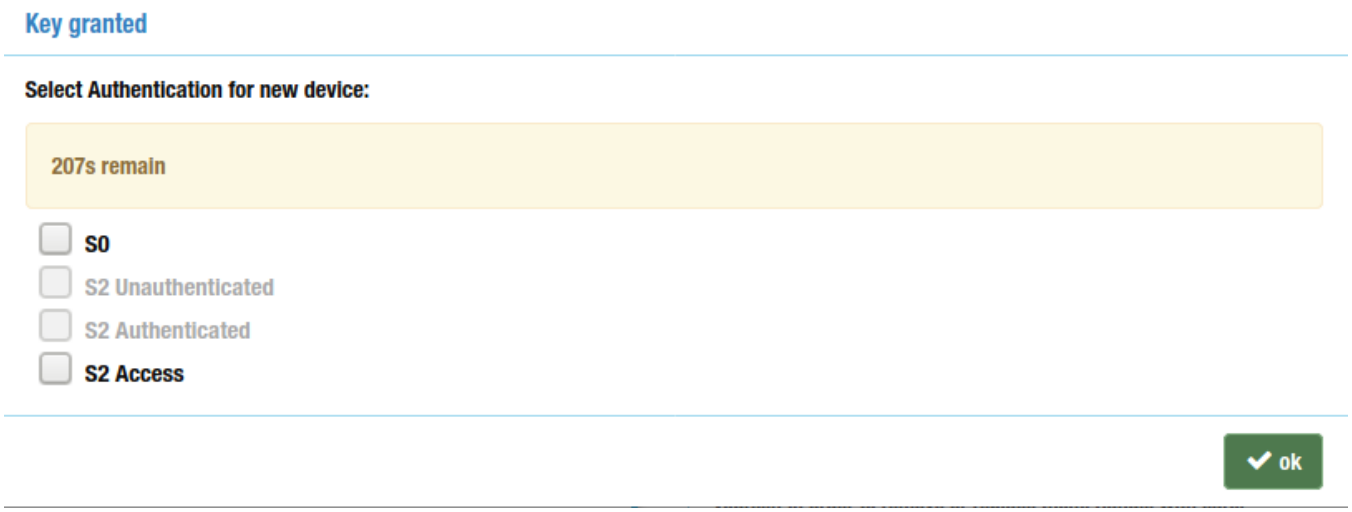
This section controls how devices are included to a network or excluded from a network by the Z-Way CIT.

- *Force unsecure inclusion:*
  When a device is included into a Z-Wave network and it supports security through the Security Command Class (S0) or Security 2 Command Class (S2), the security exchange will normally be done to include the node securely into the network. The Secure/Unsecure buttons can be used to set the next inclusion to not include a node securely, even if it supports security. In situations where Security S0 is available but not required, such as with a lamp module, including the node non-securely can speed up communication with the device. For items which require security to operate like door locks and garage door openers, including them without security will make them inoperable by any device in the network. To set the next inclusion to be done without security, click the Unsecure button. Click the Secure button to set the next inclusion to do security key negotiation to add the node securely to the network.
- *Start Inclusion / Start Exclusion:*
  If the Z-Way CIT was not added to any network and is a standalone controller, or if the Z-Way CIT was successfully added to a network with a SIS and was added as a Secondary Inclusion Controller, then these buttons will be enabled allowing the Z-Way CIT to add or remove nodes to the network. Click the Start Inclusion button to include a new node to the network that the Z-Way CIT is currently a part of, or click the Start Exclusion button to exclude a node from whatever network it is a part of. (Any controller can be used to exclude a node from a network.)

If you turn on a device that supports S0 or S2 encryption, after the controller finds the device, a dialog box will appear that warns you to wait for the window to select the protection level.



Window for selecting the protection level:



The Z-Wave security solution **S0** comprises of the following features:

- End-to-end security on application level (communication using command classes).
- In-band network key exchange well-known 128 bit zero temporary key.
- Single Network Wide Key.
- AES symmetric block cipher algorithm using a 128 bit key length.
- Secure and non-secure nodes can co-exist in the same network.
- No security solution on MAC layer and routing layer.
- Non-secure nodes can act as repeaters for secure nodes.
- Only single cast is supported.

S2 is a more advanced and faster type of encryption, also this encryption is divided into 3 groups of protection levels recommended for each type of devices.

S2 Unauthenticated

- Devices that have not implemented out of band inclusion methods.
- End devices that are physically exposed and/or not relevant to include in the authenticated group.

- End devices that need to be controlled by other S2 unauthenticated devices via associations.

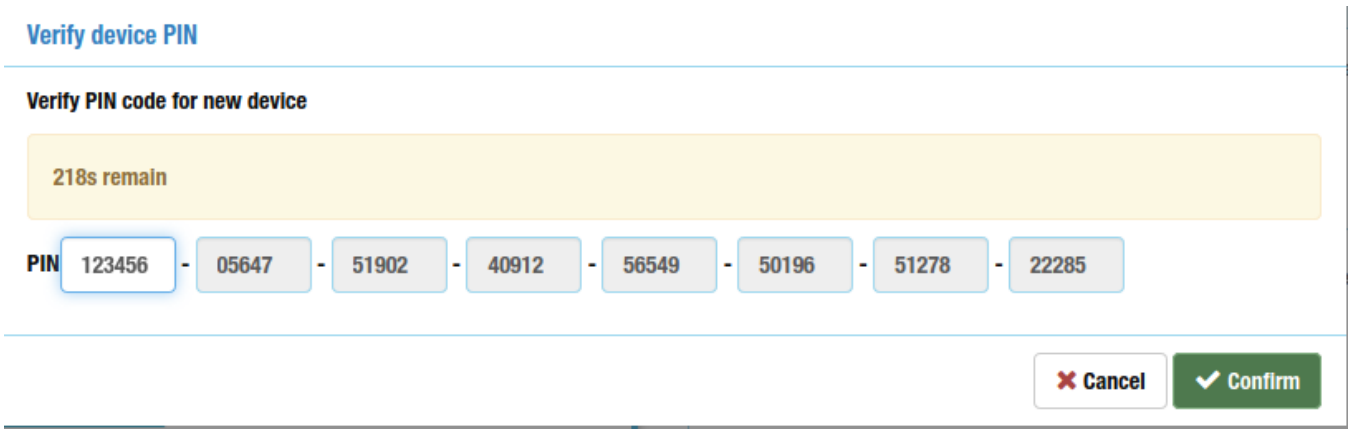
S2 Authenticated

All types of secure end devices including, but not limited to:

- Door/Window sensors
- Switches
- Other sensors
- Valves
- Window blind motors
- Etc.
- Secondary controllers that does not need to control access control devices

S2 Access Control

- Door locks
- Garage door openers
- Controllers that need to control access control devices



When encrypting S2, you need to enter 5 digits of the DSK code in the dialog box, this code is on the label on the device and is often highlighted with an underline or a thick font.

Enter / Leave different Networks Section
This section allows you to join or remove the Z-Way CIT from another Z-Wave network such as a customer's Z-Wave network being diagnosed or repaired.

- *Include into Network /* Leave network*:*
  The functionality here is identical to what is on the Home page. If the Z-Way CIT is not a part of another network, the button will show "Include into Network", and clicking it when the network primary controller is in inclusion or learn mode will cause the Z-Way CIT to be added to the other network. When the Z-Way CIT has already been included into another network, the button will show "Leave network" and clicking it after placing the network primary controller into exclusion mode will cause the Z-Way CIT to be removed from the other network.

- Start Controller Change

This starts an inclusion process for a new controller. This new controller will become the new primary controller of your network.

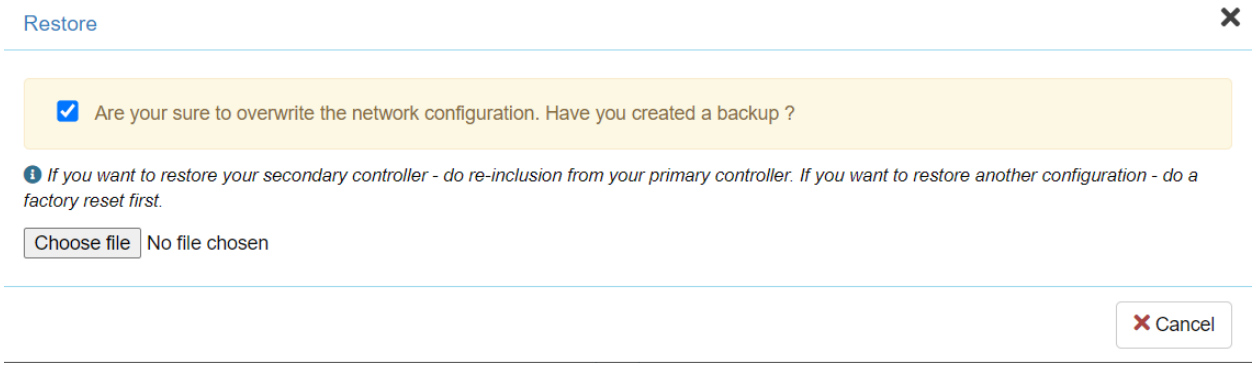
Note: The Z-Way CIT should always be removed from the customer's network if it is being physically removed from the premises. Leaving the node in the customer's network will cause the customer's primary controller to send network updates to the Z-Way CIT, which will delay the performance of the customer's network as it attempts to communicate with the Z-Way CIT.

Backup and Restore Section

At this point you can create or restore a backup copy of the data. To make a backup copy, click the

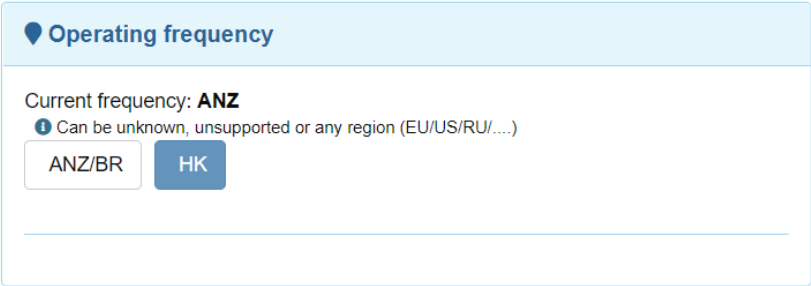
button, after which you will start downloading the system backup file in .zbk format.

If you already have a backup file that you want to restore by clicking RESTORE, then you will see a dialog box in which there will be a warning that the restore will overwrite the current configuration. Then select the installation file. An example of this dialog box:



Operating frequency Section

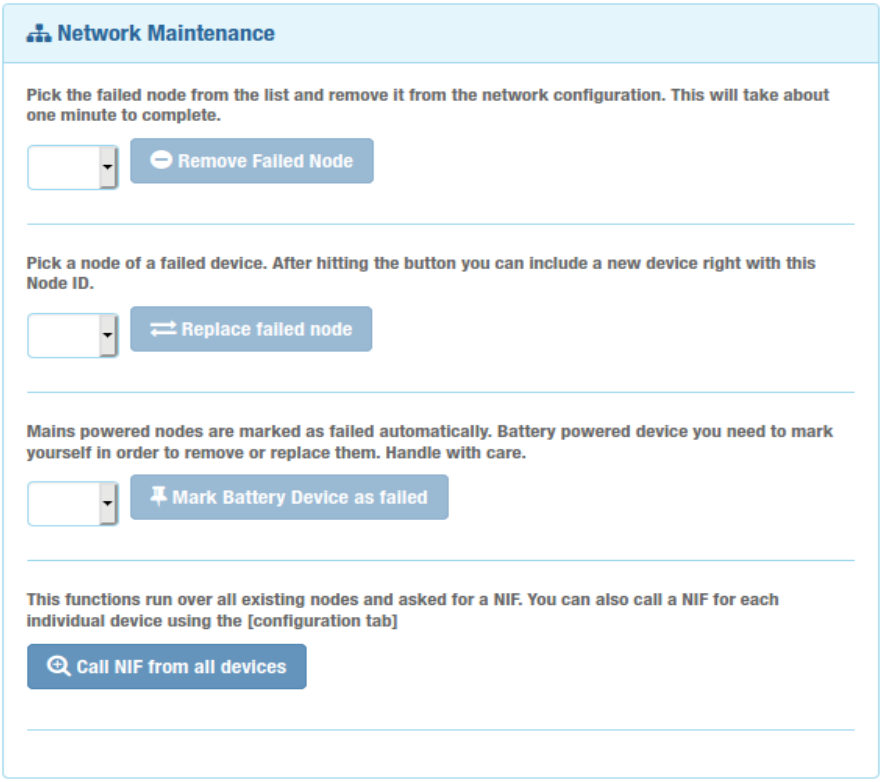
Set the operating frequency through the setting accessed by clicking on to open the setting for the Z-Way CIT's Z-Wave operating frequency. The options available to you will be based upon which version of the Z-Way CIT you received, but the available settings should include the operating frequency for the country you are working in. Example of this section:



In this example, the Z-Way CIT is set to the ANZ/BR frequency group (921MHz).

Network Maintenance Section

This section provides access to network maintenance functions for working with troubled nodes in the network.



- *Remove Failed Node:*
  When a powered (normally listening) node fails and you can no longer cause it to send its Node Information Frame (NIF) so that it can be excluded from the network, you can use this selection and the accompanying button to force the removal of the node from the network. The first step is to select the node that needs to be removed from the drop down list to the left of the button. If the node you want to remove is not in this list, it may be that the node is still communicating. You can use any of the test functions of the Z-Way CIT to attempt communication with the node – if the Z-Way CIT is unable to communicate with the node, the node will be added to the drop down list so that it may be selected and removed. Once the node has been selected, the "Remove Failed Node" button will enable, and you can then click on it to have the Z-Way CIT initiate the removal process. Wait for this process to finish before performing other network functions.
- *Replace failed node:*
  When a powered or battery operated node fails, and you can no longer cause it to send its Node Information Frame (NIF) so that it can be excluded from the network, you can

use this selection and the accompanying button to facilitate the removal and replacement of the Z-Wave device with a new one, which will be given the same Node ID as the failed node. To do this, you must first make sure that the node you wish to replace can be found in the drop down list to the left of the "Replace failed node" button – if the node ID is not in the list, the device may still be functioning and communicating via Z-Wave. You can use the Z-Way CIT test functions to attempt to communicate with the failed node – if the Z-Way CIT is unable to communicate with the node, the node ID will be added to the drop down list. Once the node ID is in the drop down list, go ahead and physically replace the failed device with the new one, but do not include the new device into the network as you normally would – instead, click the "Replace failed node" button, and then activate inclusion on the new device. When the process is completed successfully, the new device will have the node ID of the old device, and the node ID will no longer appear in the drop down list of failed nodes.

- *Mark Battery Device as failed:*
  Since battery devices are not normally listening devices, a lack of a response to a command by a battery operated sleeping device will not cause its node ID to land in the list of failed nodes for use with the "Remove Failed Node" or "Replace Failed Node" functions. To use this, find the node ID of the battery device you wish to mark as failed from the drop down list of battery node IDs to the left of the button. Select the battery device node ID, then click the "Mark Battery Device as Failed". The node ID you selected will now appear in the failed device list which you can use with Remove Failed Node or Replace Failed Node.
- *Call NIF from all devices:*
  This button will tell the Z-Way CIT to request the Node Information Frame (NIF) from all devices in the network. If clicked, the process will make the Z-Way CIT busy for potentially a very long time if the network is large. It is the same as what happens when you include the Z-Way CIT to a new network and click "Detect all Nodes" because calling for the NIF can cause device interviews which were previously suspended to resume.

SUC/SIS management section

Two special functions for a Z-Wave controller are when they are the Static Update Controller (SUC) and SUC ID Server (SIS). When one of the controllers in the network is assigned to be the SUC, it means that other controllers in the network can get updates about network topology

(nodes that were added or removed) from the SUC. Normally, updating network information in another controller is done by initiating replication, which is started by "re-including" it into the network. When the SIS functionality is available, it allows other secondary controllers in the network to be able to add and remove nodes from the network – the SUC ID Server talks to the secondary controller to learn about nodes it has removed, or to vend it the Node ID for the next node being added to the network. Most of the time, the network primary controller will also be your SUC/SIS controller. A Z-Wave Plus controller that starts a network (is not included into another network) will always assign itself the SUC/SIS functionality. If a controller has the SIS functionality, it will also have the SUC functionality. These functions deal with these special capabilities.

- *Get SUC node Id:*
  If the Node Id of the SUC in the network changes, which is extremely rare, this button will cause the Z-Way CIT to send a message requesting the Node Id of the SUC. This is necessary for the next function which is to request a network update. You can see the SUC/SIS Node Id in the Controller Info page.
- *Request network updates from SUC/SIS:*
  After adding or removing nodes from the network, or making any changes to routing and network topology on the primary controller for the network, use this function to have the Z-Way CIT request a network update from the SUC (primary controller). When the Z-Way CIT is used to make changes to the network, this function can also update the primary controller for the network.
- *Assign SUC:*
  In the unlikely event that you need to force a different node on the network to be the SUC, use this function. Use the Disable SUC/SIS function first. Choose the node you wish to be the new SUC using the "… on node" drop down list, then click the "Assign SUC" button to assign the SUC function to the selected node. This is a very uncommon procedure.
- *Assign SIS:*
  In the unlikely event that you need to force a different node on the network to be the SIS, use this function. Use the Disable SUC/SIS function first. Choose the node you wish to be the new SIS using the "… on node" drop down list, then click the "Assign SIS"

button to assign the SIS function to the selected node. This is a very uncommon procedure.

- *Disable SUC/SIS:*
  In the unlikely event that you need to disable the SUC/SIS functionality before assigning a new node to be SUC and/or SIS, use this function. Choose the node you wish to disable the SUC/SIS capability on using the "… on node" drop down list, then click the "Disable SUC/SIS" button to remove those functions from the selected node. This is a very uncommon procedure.
- *… on node:*
  When using the above three SUC/SIS management functions, this drop down list allows you to select the affected node Id. Only controllers in the network capable of being SUC/SIS will be listed.
-

Controller Maintenance Section
This section allows you to reset the controller two different ways.

- *Reset API:*
  If the Z-Wave functions by the Z-Way CIT do not appear to be working, or if advised to do so by support, click the Reset API button to restart the Z-Wave part of the Z-Way CIT system. This will not cause you to lose any configuration data and the reset will take only several seconds to complete.
- *Controller Factory Default:*
  Clicking the Controller Factory Default button will cause the Z-Way CIT to prompt for a confirmation before the action is carried out. A factory default will reset the Z-Way CIT to its factory default state which means that it will lose all nodes, it will no longer be a part of any other network, and all device names will be lost if they were not backed up first.

> *Note: Controller Factory Default will cause a Device Reset Locally signal to be sent to the primary controller, which under normal circumstances would cause the controller to remove the Z-Way CIT from the network. However, non Z-Wave Plus nodes, or issues with the network that may prevent the signal from arriving can cause the Z-Way CIT's node information to remain in the network as*

described above. Do not rely on Controller Factory Default to remove the Z-Way CIT from the customer network.

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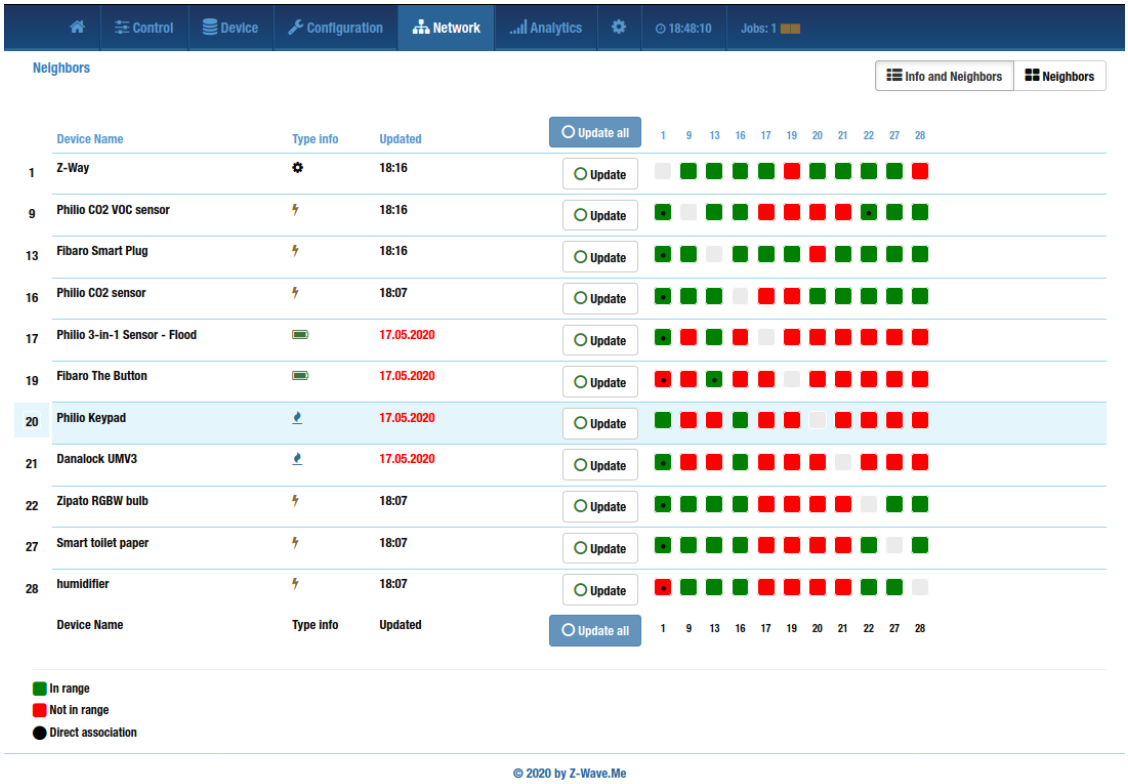
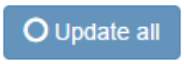
Neighbors

The Neighbors page shows you the relationship of each node in the network to each other node in the network by indicating information about the route that would be used for them to communicate. Here is a sample of this page:

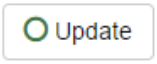


Nodes do not communicate with themselves, and so the series of gray squares running diagonally from top to bottom, left to right represent intersections of the same node number. To read any other neighbor relationship, pick a node along the left hand side of the chart, and then move along that row to your right until you are under the column numbered for the node that you wish to check the neighbor status. The neighbor status is indicated by color using the chart at the bottom of the page. The black dot at the intersection of the two nodes means that between them is set up a direct association.The possible values are In the Range or Not in the Range as indicated by green or red. Being "in the range" indicates that the two nodes are within range (distance) for direct communication with each other. Here are the other columns and functions on this page:

- **Device name** – The device name, with the node Id of the device being shown to the left of the device name.
- **Type info** – This is the icon representing the different types of devices as explained here.
- **Updated** – This column shows the last date the neighbor information was retrieved for the node indicated at the beginning of the row. If the time of the last update was within the current day, the time is shown instead. When the time is shown in RED, it indicates that the value is being updated, or that a request to update the value recently has failed.
- The 

Update all button at the top of the page is used to force the Z-Way CIT to have all nodes in the network do a Node Neighbor Update. The results are then updated in the Network / Neighbors page (a browser page refresh may be needed to get the latest information).

  ***Important Note**: Doing a neighbor update causes each node to re-discover the other non-battery powered nodes that are within direct range. The results are used by controllers to determine the routes that will be used for nodes to communicate. The controller being updated with the updated information in this case is the Z-Way CIT, not the customer's primary controller. Having the nodes re-discover their neighbors is still beneficial after performing work on the nodes to improve the network, but once the neighbor updates have been completed, a Node Neighbor Update (sometimes called "Network Repair" or "Optimize") should be done on the customer's controller so that the latest neighbor information will be uploaded to the controller running the network.*

- To avoid a significant amount of time in updating the neighbor information, especially on a large Z-Wave network, consider using the individual 

Update buttons in each node row on the neighbor page. If a change has been made to one node in the network, performing an update of the nodes around it can save a significant amount of technician time.
- At the top of the Neighbor page, there are two more buttons which act as a toggle against each other:

The **Info and Neighbors** button causes the default display shown upon entering the page. The **Neighbors** button will eliminate the information and Update buttons to allow for the maximum amount of the neighbor table to be visible. Use the scroll bars at the top or bottom of the page to move the table display right or left as needed.

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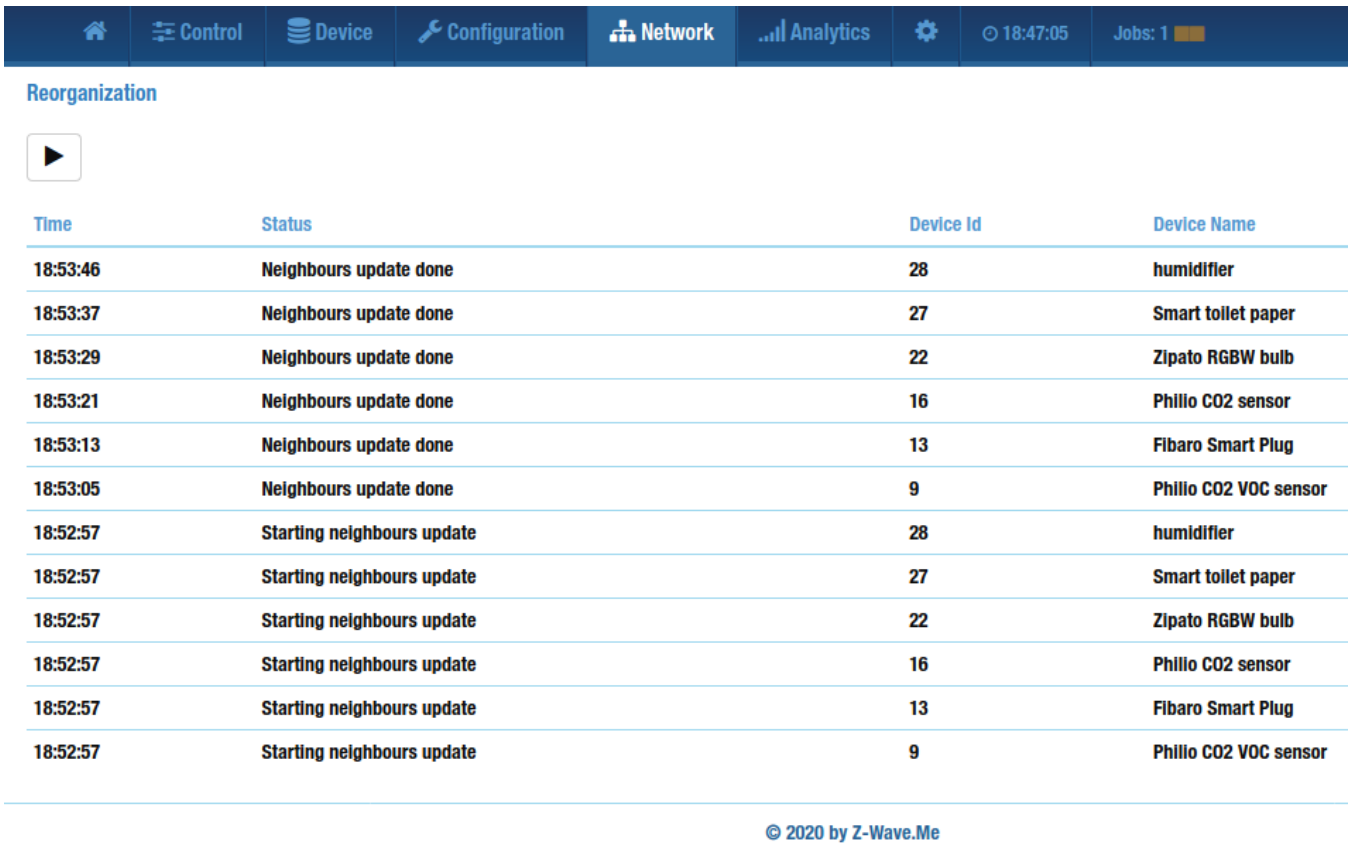
Reorganization

This tool automatically adjusts the best paths between the nodes, it is recommended to reorganize the network after adding new devices, rearrange furniture or at least once a week, etc. the signal is affected by a huge collision of not obvious factors, such as the emission of electrical appliances. It is also recommended to reorganize the network in case of large delays.



Time	Status	Device Id	Device Name
18:53:46	Neighbours update done	28	humidifier
18:53:37	Neighbours update done	27	Smart toilet paper
18:53:29	Neighbours update done	22	Zipato RGBW bulb
18:53:21	Neighbours update done	16	Philio CO2 sensor
18:53:13	Neighbours update done	13	Fibaro Smart Plug
18:53:05	Neighbours update done	9	Philio CO2 VOC sensor
18:52:57	Starting neighbours update	28	humidifier
18:52:57	Starting neighbours update	27	Smart toilet paper
18:52:57	Starting neighbours update	22	Zipato RGBW bulb
18:52:57	Starting neighbours update	16	Philio CO2 sensor
18:52:57	Starting neighbours update	13	Fibaro Smart Plug
18:52:57	Starting neighbours update	9	Philio CO2 VOC sensor

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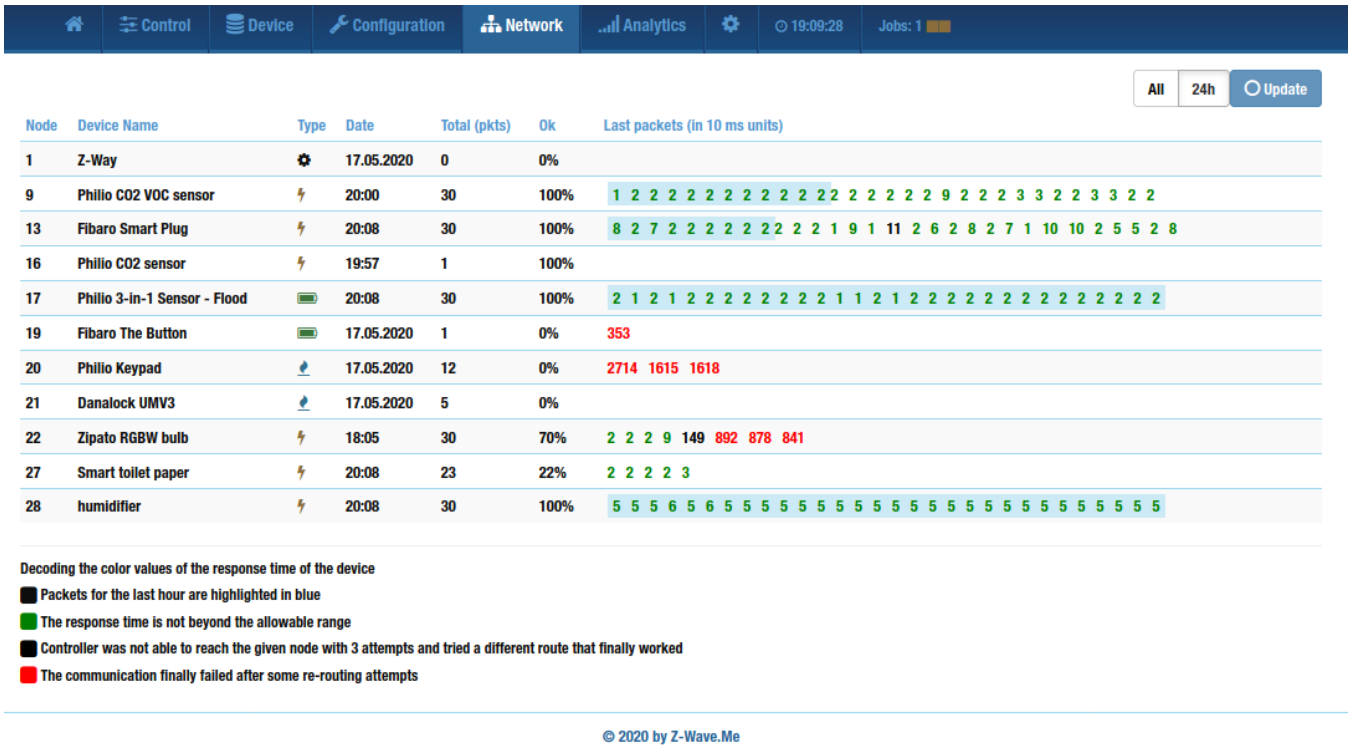
Timing Info

The timing info page is useful for seeing, at a glance, which nodes are using multiple hops to communicate because their time for a transmission is long. Long transmission times can also indicate other network problems. Here is a sample of the page:



Node	Device Name	Type	Date	Total (pkts)	Ok	Last packets (in 10 ms units)
1	Z-Way		17.05.2020	0	0%	
9	Philio CO2 VOC sensor		20:00	30	100%	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 9 2 2 2 3 3 2 2 3 3 2 2
13	Fibaro Smart Plug		20:08	30	100%	8 2 7 2 2 2 2 2 2 2 2 2 1 9 1 11 2 6 2 8 2 7 1 10 10 2 5 5 2 8
16	Philio CO2 sensor		19:57	1	100%	
17	Philio 3-in-1 Sensor - Flood		20:08	30	100%	2 1 2 1 2 2 2 2 2 2 2 2 1 1 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2
19	Fibaro The Button		17.05.2020	1	0%	353
20	Philio Keypad		17.05.2020	12	0%	2714 1615 1618
21	Danalock UMV3		17.05.2020	5	0%	
22	Zipato RGBW bulb		18:05	30	70%	2 2 2 9 149 892 878 841
27	Smart toilet paper		20:08	23	22%	2 2 2 2 3
28	humidifier		20:08	30	100%	5 5 5 6 5 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5

- **Node** – This is the node Id of the device.
- **Device name** – This is the name of the device.
- **Type** – This is the icon representing the type of device that the node is on the network as explained here.
- **Date** – This is the date (time if it is within the same day) that the Z-Way CIT last communicated with the node.
- **Total (pkts)** – This shows the total number of Z-Wave frames (packets) sent and acknowledged since the Z-Way CIT was last started or restarted.
- **Ok** – This shows the percentage of packets acknowledged successfully.
- **Last packets (in 10 ms units)** – This shows the time that the round trip communication took, from the Z-Way CIT sending the packet to the time the Z-Way CIT received an acknowledgement frame back from the node. The unit is 10 ms increments, so a value of 33 for example is 330 ms or about 1/3 of a second. Transmission times are shown in

one of three different colors according to this legend which is found at the bottom of the page:

Decoding the color values of the response time of the device

- The response time is not beyond the allowable range
- Controller was not able to reach the given node with 3 attempts and tried a different route that finally worked
- The communication finally failed after some re-routing attempts

Note: Occasional failures (RED numbers) may be a sign of network congestion, but should be investigated as this means that all other attempts to route the frame to the node have failed. Frequent occurrences of RED values may be an indication of noise, with the source being near the node that frequently experiences failed transmissions. When all of the transmission time values are RED, that is an indication of a failed node, or one that has been orphaned in the network and has no other nodes as neighbors. Battery operated nodes that normally sleep will not have any transmission attempts because the Z-Way CIT will not try to contact a battery sleeping node unless it knows it is awake.

- The

button in the top right corner of the page can be used to load the latest values without having to refresh the web browser page.

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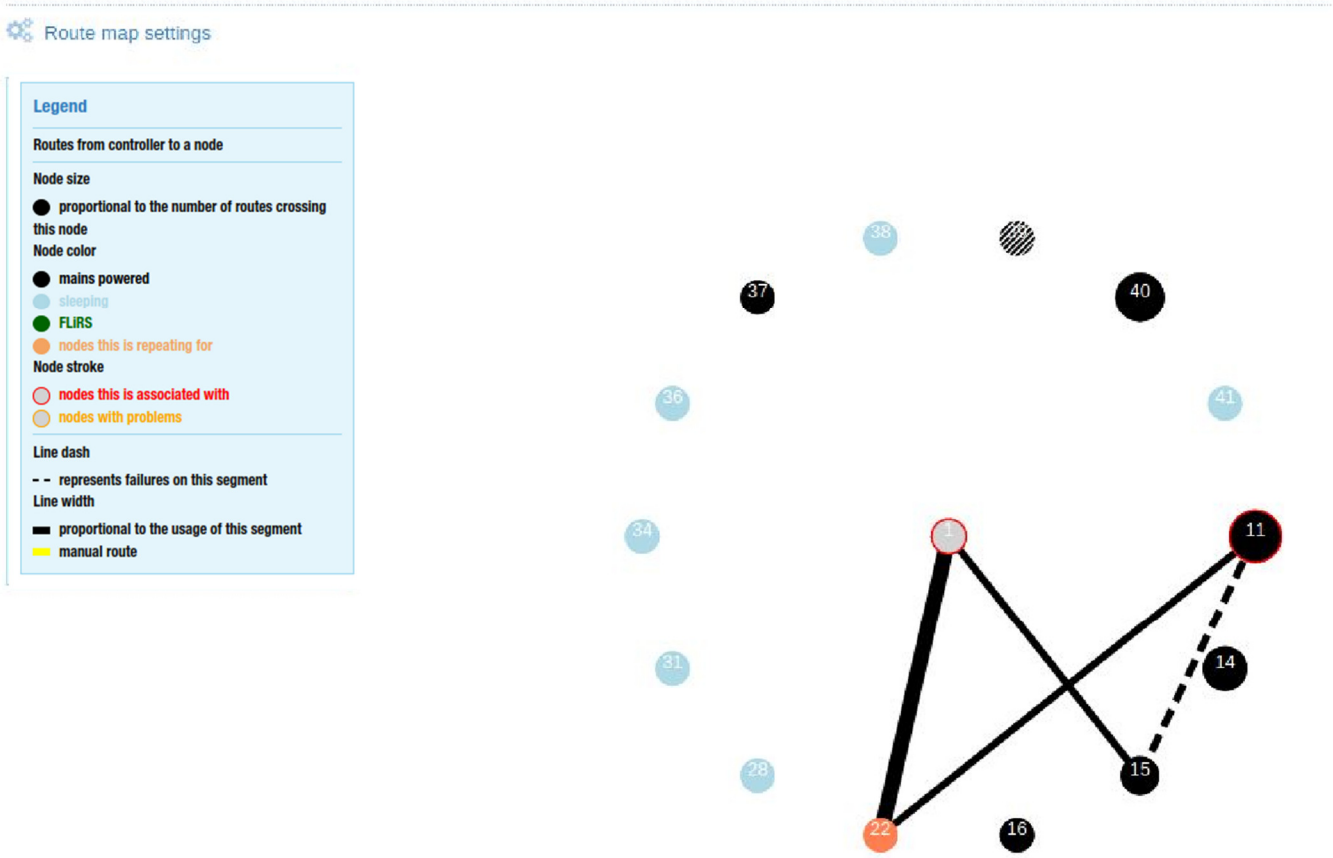
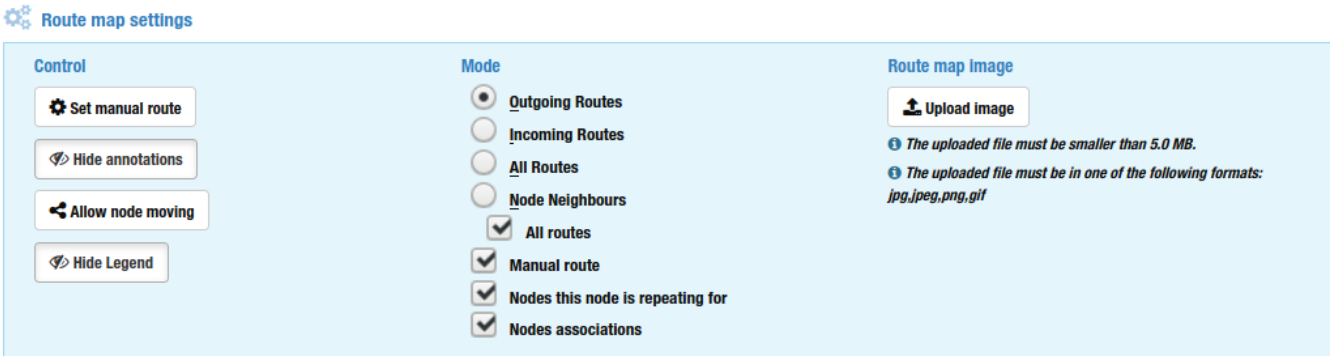
Route Map

The network map page is a graphical representation of the same information on the Neighbors page. It is useful for determining – at a very quick glance – how well the network is meshed for any given node. The nodes are displayed according to the number of connections that they hold when you initially enter the page, so note that the nodes in the same row may appear to only have a connection to one another left and right. Here is a sample:



Also in this window it is possible to download the floor plan and arrange nodes according to their actual presence for convenience. If you are not satisfied with the route to the host (for example, a not stable connection), you can configure the route manually. This menu appears if you click **Route map settings**.

Consider this menu in more detail:



- This function allows you to manually register the routes to the node, click this button and then on the map, specify a new route by clicking on the nodes.

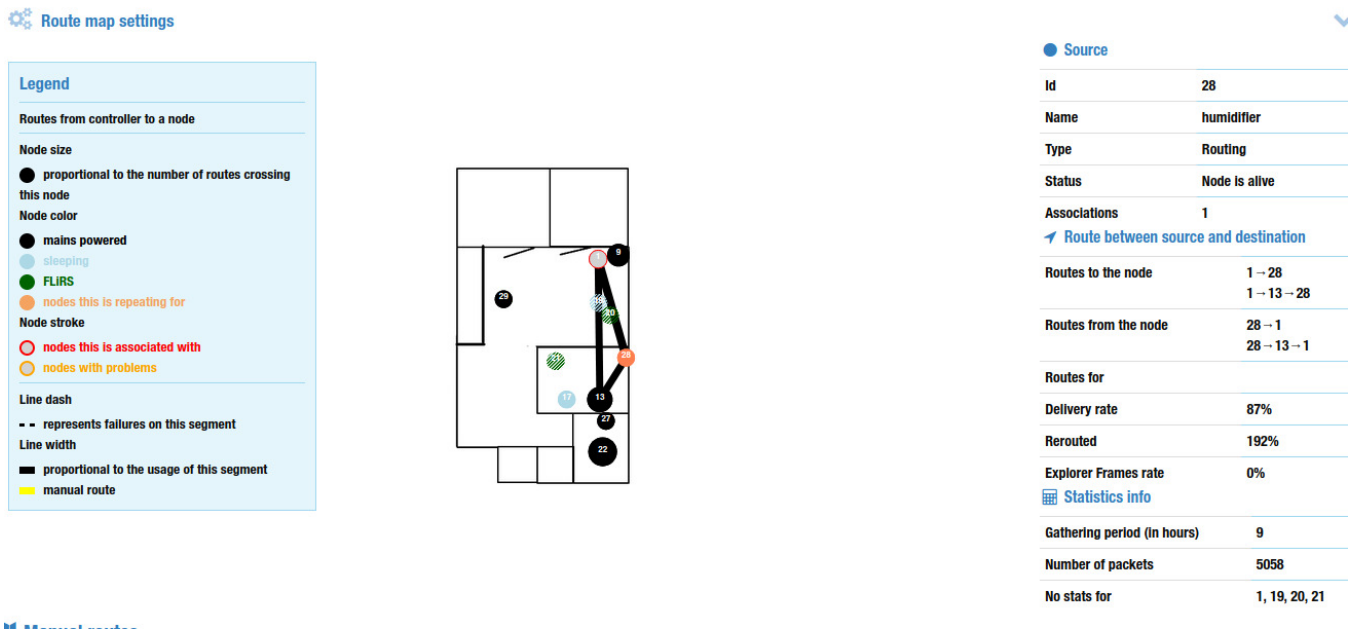
- This button hides the section with additional information located on the right showing information about the node, an example of this menu is shown in the picture below.

- **Id** - This is the node number of the device in the network.
- **Name** - The device name can be generated automatically after inclusion or renamed by the user.
- **Type** - The type of device may be Routing, FLiRS, Sleeping or Controller.
- **Status** - Shows the status of the device on the network, may be dead or alive.
- **Associations** - Shows which nodes in the network a direct association is established.
- **Routes to the node** - shows the route from the controller to the node, there can be a maximum of 4 jumps.
- **Routes from the node** - Shows routes from the node to the controller, there can be a maximum of 4 jumps.
- **Routes for** - it shows which devices this node is routing.
- **Delivery rate** - Shows the percentage of packages delivered.
  Rerouted - the number of route changes to the number of packets sent (192% means that on average 1.9 times routes were sent when sending).
- **Explorer Frame rate** - Explorer Frame rate - the share of incoming packets with EF - i.e. the sender did not know how to get to the routes he knew.

- **Gathering period (in hours)** - The time taken for this statistics collection.
- **Number of packets** - The number of packets sent.
- **No stats for** - means that in the collected statistics no data was found for these nodes.

Allow node moving - This tool allows you to set the nodes in a way that is convenient for you; when you activate this function, you can move the nodes with the mouse.

Hide Legend - This button hides the "legend" menu with the designation of marking lines and nodes on the network map. Example of this menu:



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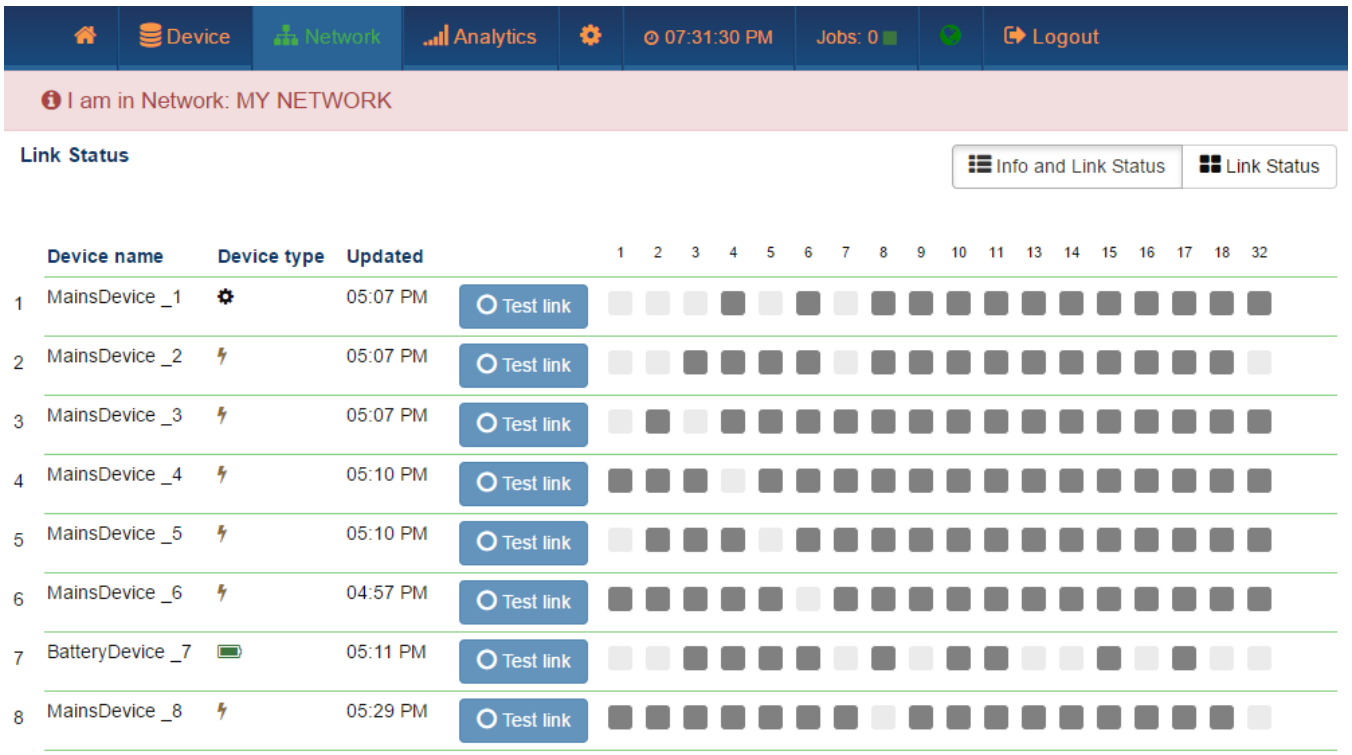
Link Status

The link status page is an indicator and test for the specific quality of the link between two nodes. The link quality is only shown for nodes which are neighbors to each other, the remaining nodes are grayed out. Here is what the screen looks like if no link tests have been performed:

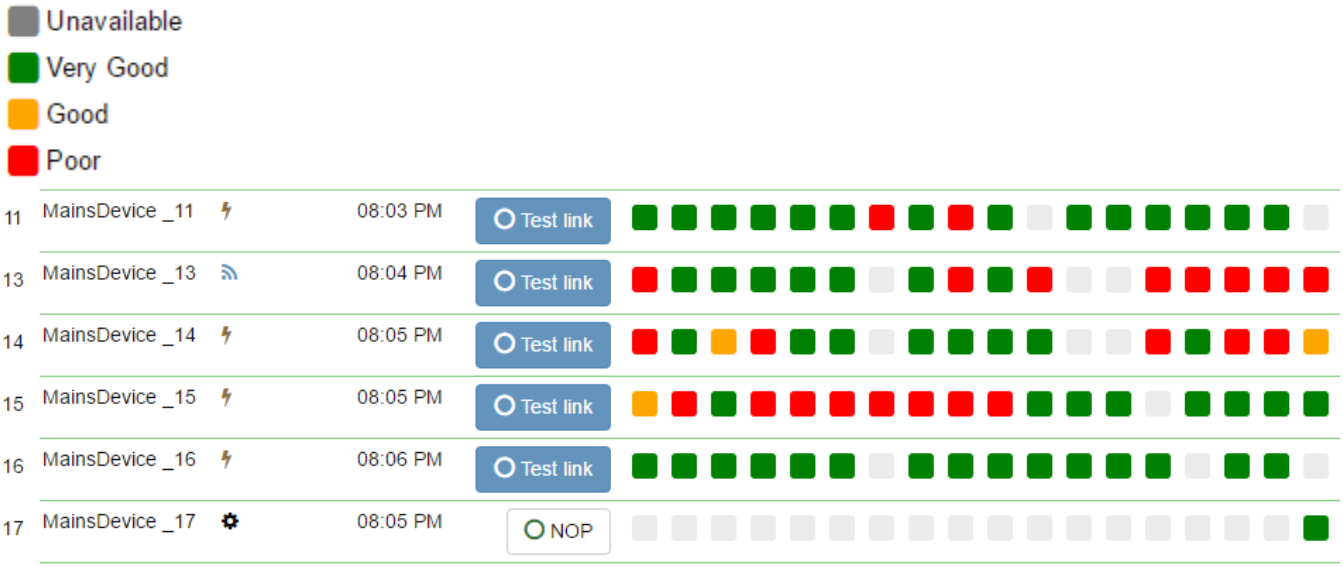


- **Device name** – This is the name of the device, and the corresponding Node Id is displayed to the left of the device name.
- **Device type** – This is the icon representation of the type of node that it is in the network.
- Updated – This is the date, or time if it is within the same day, that the link status information was last updated for the node or if a link status test was never done, it will display the date or time when the neighbor information was last updated.
- The

Test link button in each row can be used to tell the Z-Way CIT to perform a link status test on that node. A more comprehensive link status test can be done between two Z-Wave Plus nodes. If a node supports the appropriate command classes to form a test, the Test link button is shown. If the node is an older node or communication has made the Z-Way CIT unable to determine whether it can do more

in-depth tests, then the

NOP (No Operation) button will be shown instead. NOP will not determine the signal strength and actual quality of the link, but it will use the round trip timing, and received signal strength, to try to determine the relative quality of the link. After performing link status testing, the display will update and provide you with information on the link status. Just like in the Network / Neighbors page, the node ID in the start of the row on the left can be matched up with node IDs printed along the top and bottom of the display to see the link status between individual nodes. Here is an example:



The legend indicating what the colored squares mean is at the bottom of the page:

Note: A "Poor" link status only needs to be addressed if there is A) a specific reason the two nodes need to communicate, such as an Association that exists between them, or B) if the nodes are used as part of a route for the same reason and there are no other direct links available.

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Controller Info

The controller information page is accessed from the Network / Control area. The controller information page provides another way to get to the controller Job Queue in addition to the one in the main menu, but has no other functions; it is informational only.

Here is a sample of the controller information page:

Control | Device | Configuration | Network | Analytics | 20:11:05 | Jobs: 1

Controller Info

View Job Queue — *The inspect queue will open a second window to allow monitoring the commands sent out by this controller.*

Role in Network

Node Id:	1
Home Id:	0xe016e78a
Primary Role:	Yes
Primary Capability:	Yes
SUC/SIS in network:	1 (SIS)

Hardware

Vendor:	RaZberry by Z-Wave.Me
Vendors Product ID:	1024 / 2
Z-Wave Chip:	ZW0500

Firmware

Library Type:	Static Controller
SDK Version:	6.81.01
Serial API Version:	05.38

Capabillities:

UUID:	2b367a99c3f5d12446b94641d3763c4c
Subvendor:	0x0000
Nodes limit:	Unlimited
Capabillities:	SIM

Software Information

Version number:	v3.0.6
Compile-ID:	82a4fd59993dc610c06507351714f95f21475262
Compile-Date:	2020-04-28 13:52:20 +0300

UI

UI version	1.5.1
Built date	03-04-2020 13:45:40

Send Controller NIF | Debug mode | Show controller data | Show controller's device data | Firmware Update

Functions:

SerialAPIGetInitData (0x02) • SerialAPIApplicationNodeInformation (0x03) • ApplicationCommandHandler (0x04) • GetControllerCapabilities (0x05) • SerialAPISetTimeouts (0x06) • GetSerialAPICapabilities (0x07) • SerialAPISoftReset (0x08) • Not implemented (0x09) • Not implemented (0x0a) • SerialAPISetup (0x0b) • Not implemented (0x10) • Not implemented (0x11) • SendNodeInformation (0x12) • SendData (0x13) • Not implemented (0x14) • GetVersion (0x15) • SendDataAbort (0x16) • RFPowerLevelSet (0x17) • Not implemented (0x1c) • GetHomeId (0x20) • MemoryGetByte (0x21) • MemoryPutByte (0x22) • MemoryGetBuffer (0x23) • MemoryPutBuffer (0x24) • FlashAutoProgSet (0x27) • Not implemented (0x28) • NVMGetId (0x29) • NVMExtReadLongBuffer (0x2a) • NVMExtWriteLongBuffer (0x2b) • NVMExtReadLongByte (0x2c) • NVMExtWriteLongByte (0x2d) • Not implemented (0x2e) • Not implemented (0x37) • Not implemented (0x38) • ClearNetworkStats (0x39) • GetNetworkStats (0x3a) • GetBackgroundRSSI (0x3b) • RemoveNodeIdFromNetwork (0x3f) • GetNodeProtocolInformation (0x41) • SetDefault (0x42) • ReplicationReceiveComplete (0x44) • Not implemented (0x45) • AssignReturnRoute (0x46) • DeleteReturnRoute (0x47) • RequestNodeNeighbourUpdate (0x48) • ApplicationNodeUpdate (0x49) • AddNodeToNetwork (0x4a) • RemoveNodeFromNetwork (0x4b) • CreateNewPrimary (0x4c) • ControllerChange (0x4d) • AssignPriorityReturnRoute (0x4f) • SetLearnMode (0x50) • AssignSUCReturnRoute (0x51) • EnableSUC (0x52) • RequestNetworkUpdate (0x53) • SetSUCNodeId (0x54) • DeleteSUCReturnRoute (0x55) • GetSUCNodeId (0x56) • SendSUCNodeId (0x57) • AssignPrioritySUC ReturnRoute (0x58) • ExploreRequestInclusion (0x5e) • Not implemented (0x5f) • RequestNodeInformation (0x60) • RemoveFailedNode (0x61) • IsFailedNode (0x62) • ReplaceFailedNode (0x63) • Not implemented (0x66) • Not implemented (0x67) • Not implemented (0x78) • GetRoutingTableLine (0x80) • Not implemented (0x90) • GetPriorityRoute (0x92) • SetPriorityRoute (0x93) • Not implemented (0x98) • Not implemented (0xb4) • Not implemented (0xb6) • Not implemented (0xb7) • Not implemented (0xb8) • Not implemented (0xb9) • RFPowerLevelGet (0xba) • Not implemented (0xbd) • SendTestFrame (0xbe) • Not implemented (0xbf) • SetPromiscuousMode (0xd0) • PromiscuousCommandHandler (0xd1) • WatchDogStart (0xd2) • WatchDogStop (0xd3) • Not implemented (0xd4) • Not implemented (0xee) • Not implemented (0xef) • ZMEFreqChange (0xf2) • ZMERestore (0xf3) • ZMEBootloaderFlash (0xf4) • ZMECapabilities (0xf5) • Not implemented (0xf7) • ZMESerialAPIOptions (0xf8) •

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Of note on this page:

- **Role in Network** – This will confirm that your Z-Way CIT has been included into another network (Home Id: Other network), and will list the Node Id of the customer's SUC / SIS

in the network if that functionality is provided (SUC / SIS in network: 1 (SIS)). Networks based upon Z-Wave Plus controllers should at least have a SIS in the network. If the controller is independent and is not included in another network, then you will see the home id of this controller.

- **Hardware -** It shows information about the controller on which Z-Way CIT is running, such as the manufacturer of the controller and which Z-Wave chip is used.
- **Firmware -** This section provides information about the firmware of the Z-Wave radio module.
- **Capabilities -** Information about the Z-Wave features under the control of the Z-Way CIT server, such as the maximum number of included nodes (if you use UZB without a Z-Way CIT license you will have a maximum of 2 devices), a unique ID for this controller (UUID).

  SlM is an abbreviation of **S**ecure **l**ow **M**ilticommand, where the key register means this function is enabled or not.

  S - The controller supports the inclusion of encrypted devices.

  s - The controller does not support the inclusion of devices with encryption.

  L - The controller works with additional delays.

  l - The controller works without delay.

  M - the controller supports sending several commands in one packet.

  m - The controller does not support the transmission of several commands in one packet.

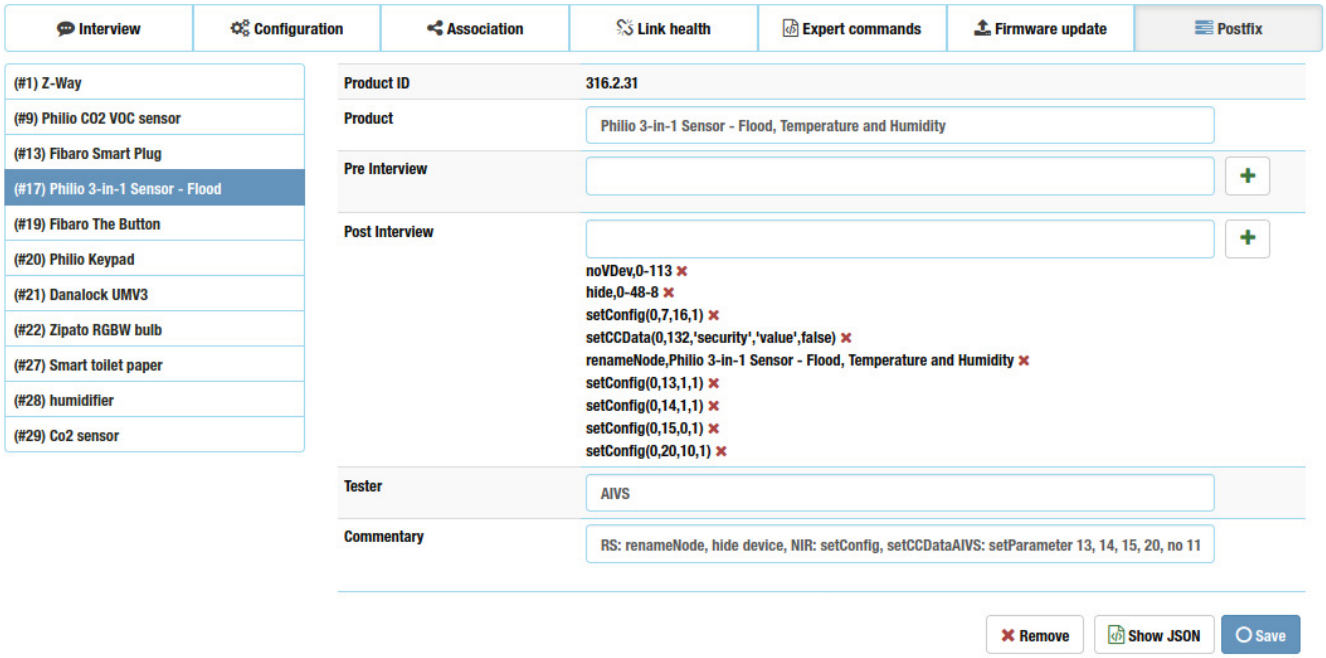
  SlM - means that the controller runs at maximum speed and supports encryption

  sLm - means that the controller is slow and does not support encryption, this is the case if you do not have a licensed Z-Wave interface.
- **Software Information** and **UI** – These sections should be provided to support if requested, as they provide detailed information about your Z-Way CIT software environment.
-

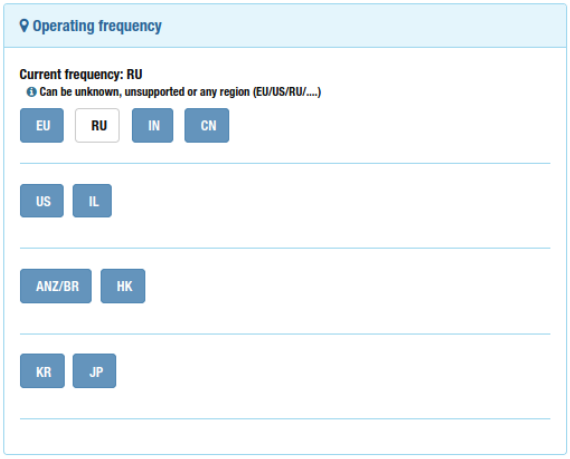
- In the Z-Wave protocol, each device must be able to send an NIF packet, the controller needs this ability to inform the main controller (if this controller is connected to the secondary network) or devices that it is alive.

- Debug mode - When you activate this mode in the interface, you will have access to the hidden functions of the controller for debugging. For example, when you activate this mode, you have the opportunity to watch and edit PostFix, set the working frequency to any working frequency (By default, it is possible to select only the frequencies supported by the antenna)

PostFix Tab Example:



An example of choosing any frequency:



- Show controller data - Show information about the Z-Wave controller, in this menu the controller primarily means the Z-Wave radio interface, an example of this window:

CommandClass

/: None (17.05.2020)
nodeId: 1 (17.05.2020)
homeId: -535369846 (17.05.2020)
SUCNodeId: 1 (17.05.2020)
isPrimary: true (17.05.2020)
isInOthersNetwork: false (17.05.2020)
isRealPrimary: true (17.05.2020)
isSUC: true (17.05.2020)
SISPresent: true (17.05.2020)
libType: Static Controller (17.05.2020)
SDK: 6.81.01 (17.05.2020)
ZWlibMajor: 6 (17.05.2020)
ZWlibMinor: 2 (17.05.2020)
ZWLib: 1 (17.05.2020)
ZWVersion: 6 (17.05.2020)
ZWaveChip: ZW0500 (17.05.2020)
APIVersion: 05.38 (17.05.2020)
APIVersionMajor: 5 (17.05.2020)
APIVersionMinor: 38 (17.05.2020)

Cancel

- Show controller's device data - Considering that the Z-Wave radio module is also a Z-Wave device, in this window we can see the configuration and capabilities of this interface. An example of this window with the configuration of the controller:

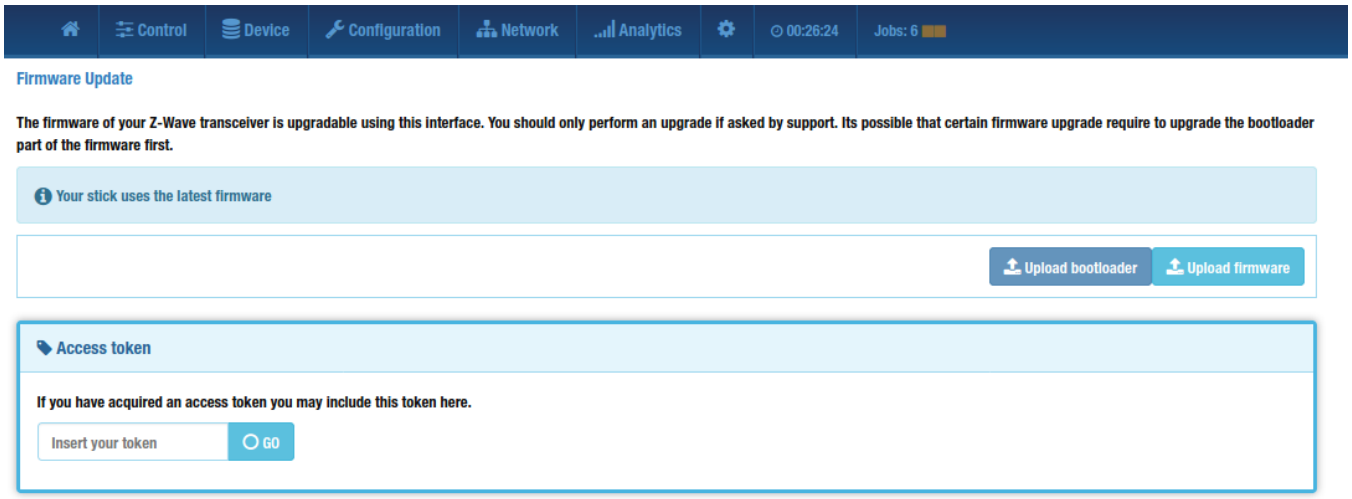
CommandClass

genericType: 2 (17.05.2020)
specificType: 1 (17.05.2020)
infoProtocolSpecific: 13866497 (17.05.2020)
deviceTypeString: Static PC Controller (17.05.2020)
isVirtual: false (08.04.2020)
isListening: true (17.05.2020)
isRouting: true (17.05.2020)
isAwake: false (08.04.2020)
optional: true (17.05.2020)
isFailed: false (08.04.2020)
sensor250: false (17.05.2020)
sensor1000: false (17.05.2020)
neighbours: 9,13,17,20,21,22,27,28,29 (20.05.2020)
manufacturerId: 0 (08.04.2020)
vendorString: (08.04.2020)
manufacturerProductType: 0 (08.04.2020)
manufacturerProductId: 0 (08.04.2020)
ZWLib: 0 (08.04.2020)
ZWProtocolMajor: 0 (08.04.2020)
ZWProtocolMinor: 0 (08.04.2020)

Cancel

- Firmware Update - This button takes you to the firmware and bootloader update page

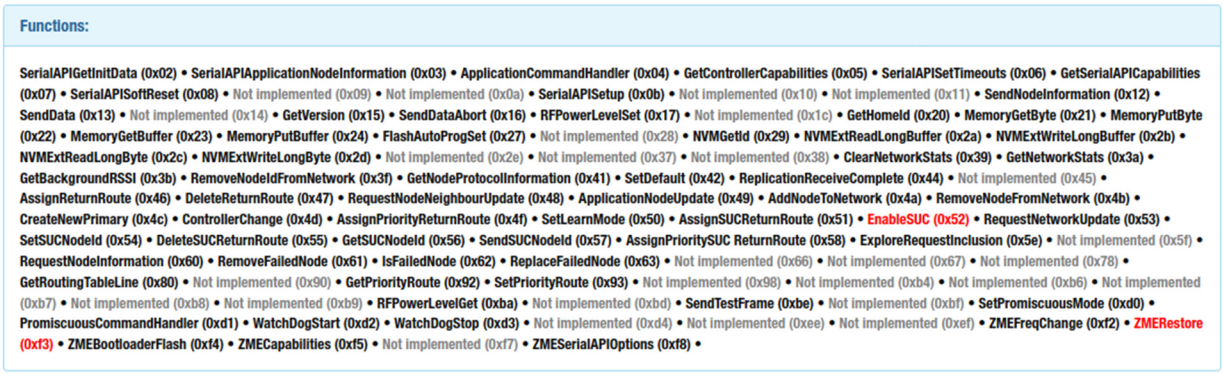
to update the Z-Wave radio chip itself. Example of this page:



In this window, new firmware versions for the Z-Wave radio chip will appear. If you have a firmware and bootloader file, you can download them using the

buttons. Attention! It is not recommended to update the firmware of the radio module yourself using the firmware found on the Internet, this can break the radio module! Use only official firmware obtained from z-wave.me.

The Functions section presents all the functions of SerialAPI with the help of which the Z-Way CIT interacts with the Z-Wave chip. The black text shows those functions that the Z-Wave chip and Z-Way CIT support, the gray one shows what the stick supports but is not currently implemented in Z-Way CIT, the red color shows what the Z-Way CIT supports but does not support the Z-Wave chip.



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Analytics

The menu items on the analytics tab are used to perform deeper analysis of what is going on in the network in terms of the Z-Wave RF signals, and the Application Layer Frames of data. Here are the menu options under Analytics, click on one of the menu options to jump to that section:

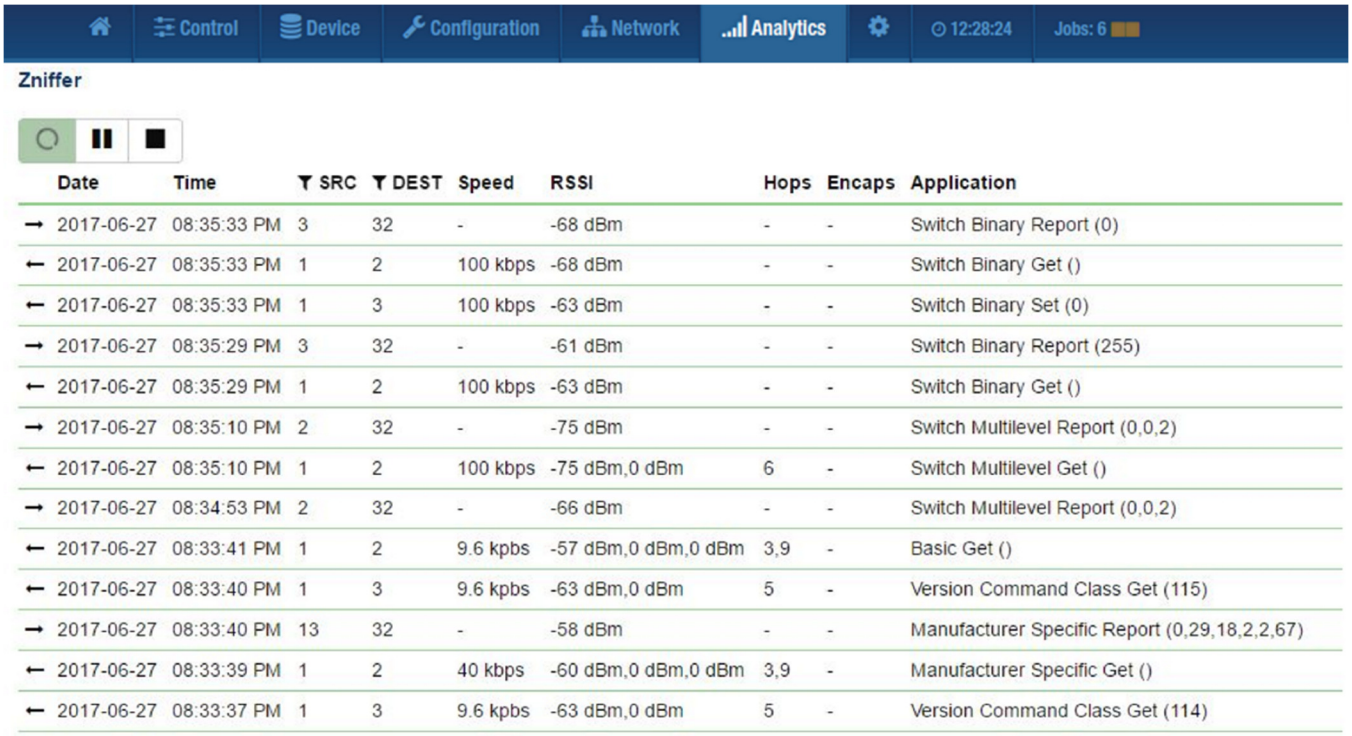
Zniffer
Background Noise
Noise Meter
Zniffer History
Statistics

Zniffer

"Zniffer" is the name of a popular Z-Wave Software Development Kit (SDK) diagnostic tool by Silicon Labs; it is a shortened form of Z-Wave Packet Sniffer. Zniffer displays the partially decoded Z-Wave frames so that you can see the actual command class and command that was sent or received. In this version of Zniffer, the Z-Way CIT is using an eavesdropping mode of the Z-Wave library, which means that it only displays frames heard for its own network, and does not show certain special Z-Wave frames such as the "Beaming" signal that FLiRS devices use and the protocol messages exchanged during network events such as inclusion, exclusion, replication, etc. It is very useful when you have confirmed that the network has a robust health, but perhaps a node is still not reacting to the receipt of a transmission from another node as the customer is expecting. For example, when an association is set up between a dimmer switch and a controller, the dimmer switch – upon being turned on locally – may send a BASIC REPORT command when the receiving controller may have been expecting a SWITCH MULTILEVEL REPORT. These types of signaling issues are normally handled by an integrator with additional knowledge regarding the application layer of Z-Wave. For the installer or integrator, Zniffer is a great tool for determining that nodes are communicating at the application level.

At the top of the Zniffer screen are Play, Pause, and Stop controls:

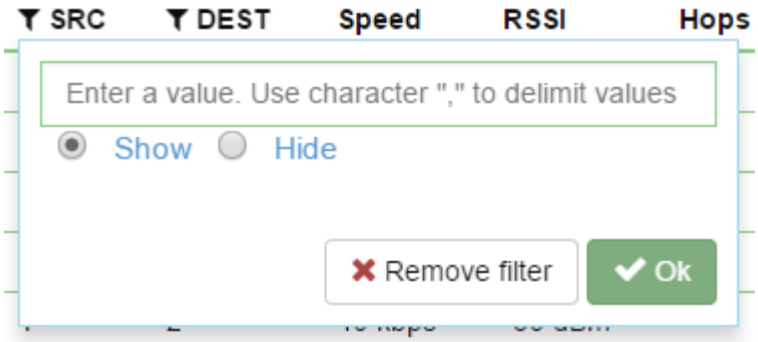
When you first enter the Zniffer screen the **Play** control (first button) should be started automatically. Zniffer will not "capture" any new frames for display unless it is in the play mode. To pause the display, use the **Pause** button (the middle button); frames will continue to be captured, but they will not be displayed. Clicking the **Stop** button (the third button) will stop the capture of frames and the display of new frames. Here is what the zNiffer screen looks like after capturing some frames:



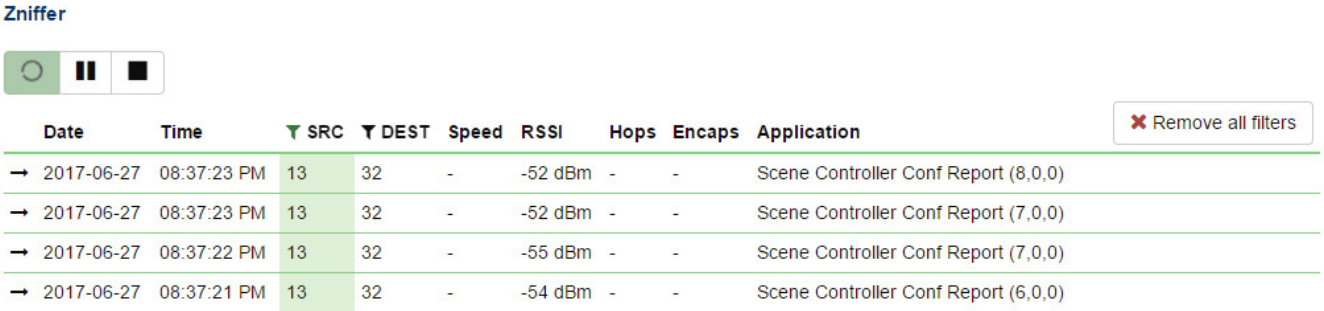
	Date	Time	SRC	DEST	Speed	RSSI	Hops	Encaps	Application
→	2017-06-27	08:35:33 PM	3	32	-	-68 dBm	-	-	Switch Binary Report (0)
←	2017-06-27	08:35:33 PM	1	2	100 kbps	-68 dBm	-	-	Switch Binary Get ()
←	2017-06-27	08:35:33 PM	1	3	100 kbps	-63 dBm	-	-	Switch Binary Set (0)
→	2017-06-27	08:35:29 PM	3	32	-	-61 dBm	-	-	Switch Binary Report (255)
←	2017-06-27	08:35:29 PM	1	2	100 kbps	-63 dBm	-	-	Switch Binary Get ()
→	2017-06-27	08:35:10 PM	2	32	-	-75 dBm	-	-	Switch Multilevel Report (0,0,2)
←	2017-06-27	08:35:10 PM	1	2	100 kbps	-75 dBm,0 dBm	6	-	Switch Multilevel Get ()
→	2017-06-27	08:34:53 PM	2	32	-	-66 dBm	-	-	Switch Multilevel Report (0,0,2)
←	2017-06-27	08:33:41 PM	1	2	9.6 kpbs	-57 dBm,0 dBm,0 dBm	3,9	-	Basic Get ()
←	2017-06-27	08:33:40 PM	1	3	9.6 kpbs	-63 dBm,0 dBm	5	-	Version Command Class Get (115)
→	2017-06-27	08:33:40 PM	13	32	-	-58 dBm	-	-	Manufacturer Specific Report (0,29,18,2,2,67)
←	2017-06-27	08:33:39 PM	1	2	40 kbps	-60 dBm,0 dBm,0 dBm	3,9	-	Manufacturer Specific Get ()
←	2017-06-27	08:33:37 PM	1	3	9.6 kpbs	-63 dBm,0 dBm	5	-	Version Command Class Get (114)

- The first column, to the left of the Date column, is an arrow indicating the **direction** of the frame; whether the frame was sent by the Z-Way CIT (outgoing - arrow pointing left) or was received by the Z-Way CIT (incoming – arrow pointing right). You can hover your pointing device over the arrow to see whether it is incoming or outgoing as well.
- **Date** – It is here that the date the frame was sent or received is shown.
- **Time** – The time that the frame was sent or received is shown here.
- **SRC** & **DEST** – These are short forms of SOURCE and DESTINATION, and both of these columns are preceded by a funnel (▼) icon indicating that they are capable of filtering. These columns indicate the Z-Wave node ID that sent the transmission (source) and where the transmission was being sent (destination). If you are working with a specific

node or nodes, and you only want to see traffic to/from that node or nodes, click on the funnel icon to configure a filter:



Here, the funnel on the SRC column has been selected. To see only the frames where the source is from nodes 2 or 5, enter "2,5" (without quotes) and click the OK button. If you already have a filter in place, you can click the "**Remove filter**" button to remove the existing filter. This will only show the frames where the sending node (source) is 2 or 5, but it will still display the frames when node 2 is sending to node 7 for example, or 5 is sending to node 10. To isolate Zniffer to only show the traffic between nodes 2 and 5, configure a second filter on the DEST (destination) side using the same node numbers (2 and 5) and the result will be that only traffic between those two nodes will be shown. Here is an example of Zniffer with a filter on source node 13:



Date	Time	SRC	DEST	Speed	RSSI	Hops	Encaps	Application
2017-06-27	08:37:23 PM	13	32	-	-52 dBm	-	-	Scene Controller Conf Report (8,0,0)
2017-06-27	08:37:23 PM	13	32	-	-52 dBm	-	-	Scene Controller Conf Report (7,0,0)
2017-06-27	08:37:22 PM	13	32	-	-55 dBm	-	-	Scene Controller Conf Report (7,0,0)
2017-06-27	08:37:21 PM	13	32	-	-54 dBm	-	-	Scene Controller Conf Report (6,0,0)

The "**Remove all filters**" button is also shown on the Zniffer screen when a filter is active; click this button to turn off the filters without having to click on the individual funnel icons.

- **Speed** – This indicates the speed that frames sent or received by the Z-Way CIT were transmitted at; there are currently 3 possible values of 9.6 Kbps, 40 Kbps, and 100 Kbps. If a transmission is being routed through a node that is not capable of higher transmission speeds, a lower speed will be used. If a transmission is not routed, and the node is a newer Z-Wave Plus node capable of 100 Kbps speeds but it is still transmitted at a lower speed, this is an indicator of a possible problem that may be caused by noise or a weak link between the nodes.

- **RSSI** – This is the Received Signal Strength Indicator, a value in dBm (decibel-milliwatts) representing the relative strength (power) that the signal was sent or received with. Starting with the Z-Wave library that the Z-Way CIT was built upon, Z-Wave is transmitting RSSI information back through routed transmissions as well. As this is a new feature, it will take some time before newer Z-Wave devices are present and the RSSI is available for both parts of a transmission – the send and the acknowledgement – between each hop of a routed transmission. An RSSI value of 0 dBm indicates a perfect transmission with no measurable loss of signal strength. An RSSI value of -70 dBm or lower indicates a weak transmission. A weak transmission can be tolerated if there are no other sources of RF noise or interference in the network (see Background Noise in the next section). Transmissions in the range of -65 dBm and higher are more typical.
- **Hops** – The hops column indicates which nodes a transmission was routed through between the source and destination nodes.
- **Encaps** – Encaps is short for encapsulation. Z-Wave frames which are transmitted securely for example, are first constructed like a normal frame, and then placed inside another type of frame or frame format for transmission. In the case of a secure transmission, the actual frame is encrypted and then placed inside a security frame. The types of encapsulation and how they are indicated are as follows:
    - "I" indicates multichannel (formerly multi-**I**nstance) – Devices which have multiple copies of the same functionality – for example a Z-Wave multiple outlet strip with four outlets controlled by Z-Wave – will use multi-channel frames which include information on the "Endpoint" (which outlet in our example) the transmission is being sent or received for.
    - "M" indicates **M**ulticommand – a multi-command capable device is often a battery operated device, because multi-command allows for multiple Z-Wave frames to be encapsulated into a single transmission to save battery life. By sending multiple frames and waiting for a single ACKnowledgement, battery life can be considerably extended.
    - "S" indicates **S**ecurity – a security encapsulated frame is transmitted no differently than any other Z-Wave frame, but the contents or "payload" of the frame are encrypted.

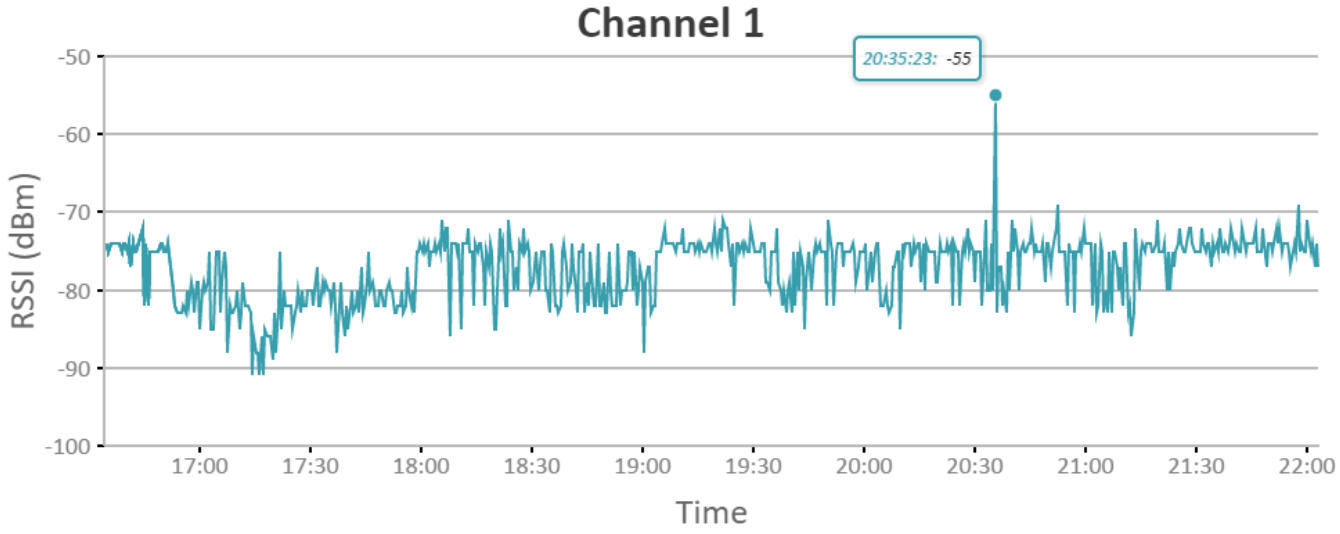
- "C" indicates **C**RC16 – a method of encapsulating a frame and including a Cyclical Redundancy Check (CRC) value which, when calculated at the receiving end, would indicate if the contents of the frame may have become damaged in transmission.

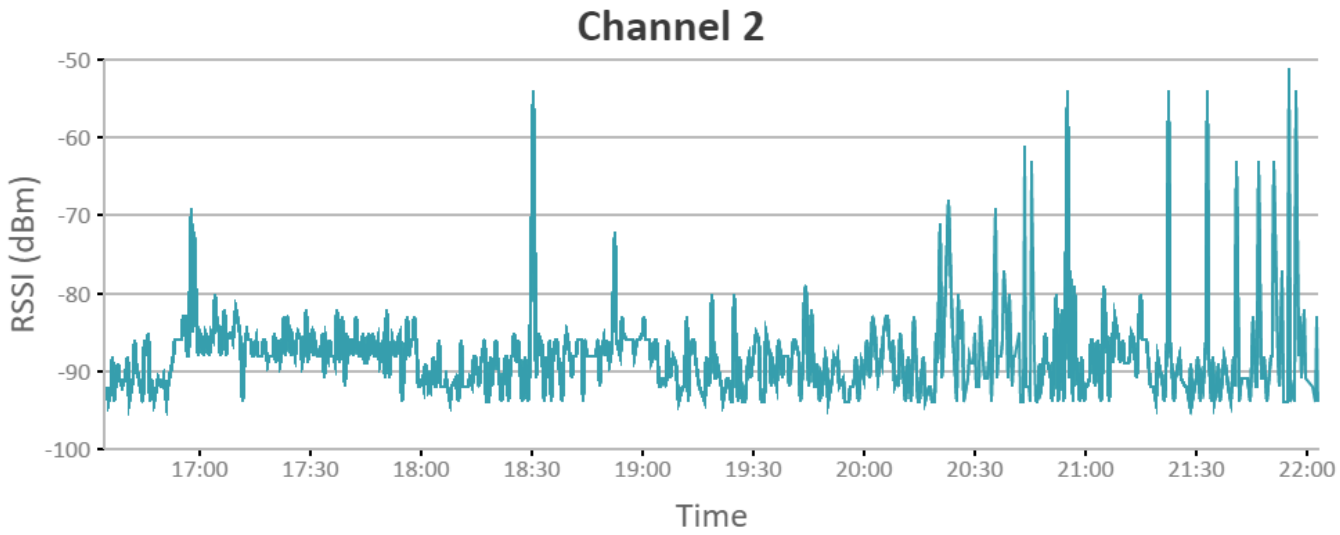
- **Application** – The application is the partially decoded Z-Wave Application Layer frame. In a Z-Wave frame, the first couple of pieces of data are the Command Class and the Command (within the given command class). If the Application in Zniffer says "Switch Multilevel Get()", then the command class is Switch Multilevel (a dimming light switch or module) and the command was "Get" which means the source node was asking the destination node for the Switch Multilevel value that the device is currently set to. In some cases, additional values may be shown in parenthesis – these are the further data points from the frame and may be decoded by reading the Z-Wave Command Class Specifications. The actual application layer part of the frame is an important diagnostic tool. For example, if a controller is expecting either a Basic Report or Switch Multilevel Report when a dimmable light is changed, but the device transmits a Basic Set or Switch Multilevel Set instead, then the Zniffer page can help determine errors such as this. The Z-Way CIT should be placed physically near the customer's central controller so that it "hears" the same as the customer's controller – in this type of arrangement the Z-Way CIT can indicate that the frame was received (so it was likely received by the customer's controller as well) and with the information on the type of signal (application layer), technical support time with the controller manufacturer when there is an issue with the controller's response to the frame (or lack of response) is greatly reduced.

Background Noise

Z-Wave devices may select from one of two RF channels to transmit information. If a Z-Wave device is sending at the 9.6Kbps or 40Kbps rates, it is using Channel 1. If the device is sending at the 100Kbps rate, it is using Channel 2. The background noise page shows the effects of RF

noise and how it may affect your Z-Wave network. Here is a sample:





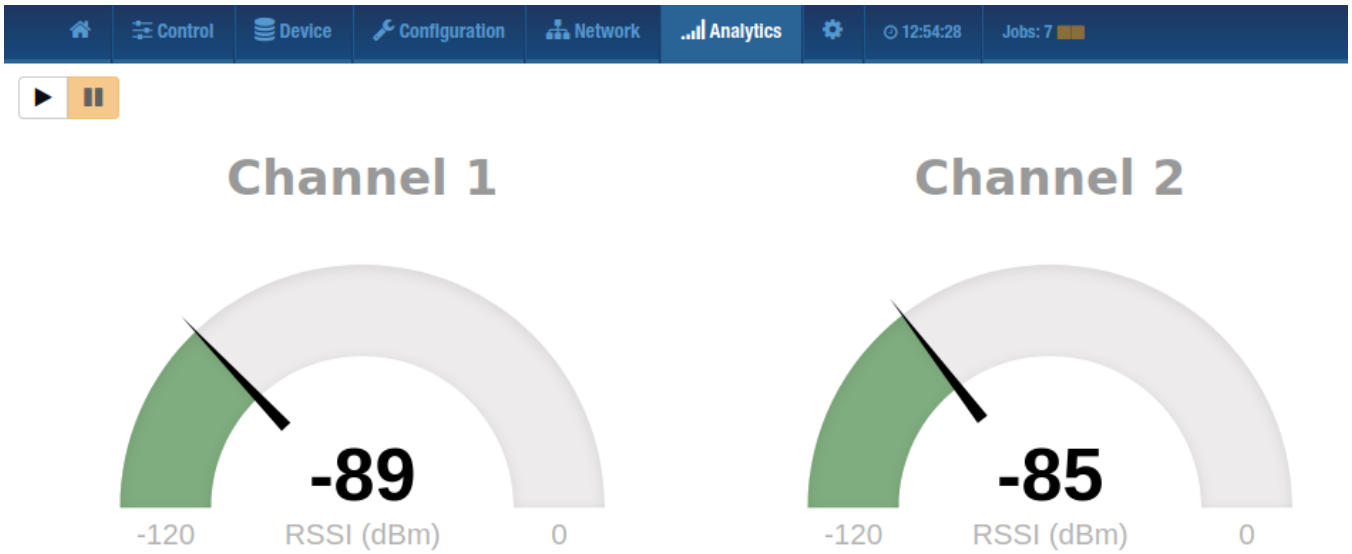
The information to be retrieved from this page is the "Noise Floor", which is the typical level of noise in the location where the Z-Way CIT has been installed. In the case of the Z-Way CIT being placed physically near the central controller, the Z-Way CIT can measure the noise floor at the controller. If you were to draw a line across these two graphs (which will be done for you in a future release) at the point at which it is darkest – eliminating the spikes that go higher – this is your noise floor. In the above example, there is no measurable noise floor as the graph is entirely made up of "spikes" or Z-Wave transmissions. If for example there was a solid mass below the spikes, the level of this solid colored area would be the noise floor. If you have a lot of spikes around this level, indicating a noise floor near your Z-Wave transmission levels, then you have a very noisy RF environment for Z-Wave and steps should be taken to try to reduce

the cause of the noise. The noise floor, once established, will help you examine transmissions subject to difficulties because of noise on the Zniffer and Zniffer History pages. On the Zniffer pages, if transmissions are being received at -75 dBm, and the Background Noise shows an almost solid line (instead of spikes) at the -75 dBm level, then transmissions at that level are more than likely to fail than to succeed. It is preferred to have a "noise floor" of -80 dBm or lower.

Using your pointing device, you may hover over points along the graph to see the precise measurement and time of any point in the graph. In the example above, the pointer is hovering over a data point showing the time it was measured being at 20:35:23 with a measured value of -55 dBm (a Z-Wave transmission).

Noise Meter

The noise meter examines the RF traffic in the Z-Wave frequency spectrum for each channel that Z-Wave uses. (Channel 1 for 9600bps and 40Kbps, Channel 2 for 100Kbps) Upon first entering the Noise Meter page, the meter will not be active. Using the controls at the top left corner of the page (and shown here) click on the Play control (first button) to start the meters "listening". Click the second button (Pause) to suspend the meter's measurements. Here is a sample of the Noise Meters in use measuring the noise:



When the noise or activity is sufficiently low, the meter will show green. When there is RF traffic on these channels, the levels may turn yellow-orange or red. It is normal to see the

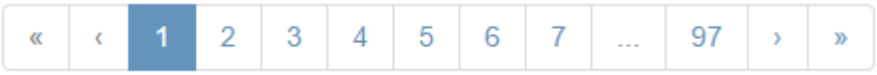
meter go yellow-orange or red for normal Z-Wave transmissions, but long, sustained periods of being yellow or red indicate a potential source of noise on that frequency other than Z-Wave, or a Z-Wave node that has gone bad and is transmitting too much.

How to Use the Noise Meters

The noise meters are ineffective when the Z-Way CIT is placed near the primary controller and the source of noise is elsewhere in the network – noise is frequently strongest nearest its source which may not always be near the primary controller. If the Timing Info screen is providing a clue as to a location where noise may be occurring, go mobile! The RaZberry uses a micro-USB power adapter, which is the same provided by mobile battery packs for smart phones and tablets. Using one of these, power your Z-Way CIT and connect to the user interface of the Z-Way CIT via its built-in WiFi access point. (Consult your Quick Start guide for more help in connecting via WiFi) You may now enable the Noise Meters and move to the area in the dwelling where the devices that experienced noise are located. As you get closer to the source of the noise, the meters will react with a higher noise value and red indicators. Remember that in multi-family buildings such as apartments and condominiums, the source of noise may be in a neighboring unit.

Zniffer History

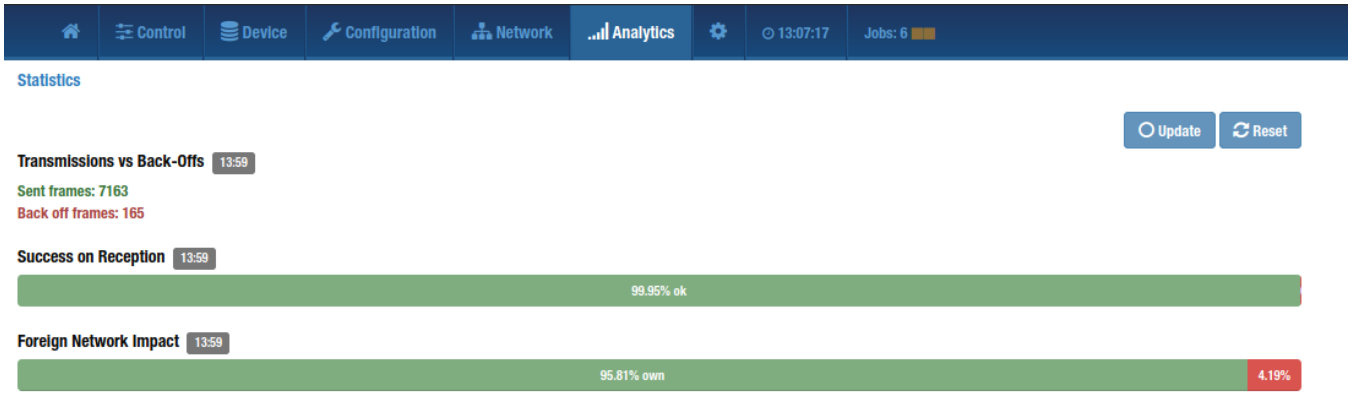
Zniffer history is the same as the Zniffer page, but the collection of frames never stops unless it is turned off in the Background Zniffer Collection settings of the Network / Control page. All of the frames that have been collected by the Z-Way CIT are available here. The page will show the most recent frames, and using the navigation buttons at the bottom of the screen, you can navigate through the pages of frames to find what you are looking for. Here is an example of the Zniffer History page navigation menu:



In this example, we are on page 1 of 97 pages. The < button will go back one page, the > button will go forward one page, << will go to the first page, and >> will go to the last page.

Statistics

Statistics is a new feature and as such, is being further developed. The Statistics page conveys information about Z-Wave frames transmitted on the network that it is a part of. Here is a sample:



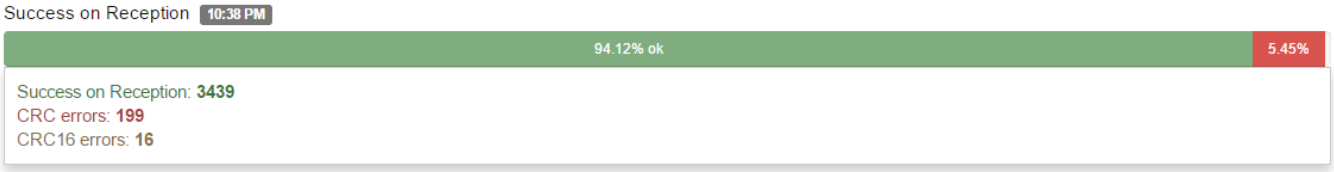
The information displayed is the result of data collected over time by the Z-Way CIT. Two operational buttons in the upper right corner of the Z-Way CIT,

(Update and Reset) allow you to update the display with the latest information collected (click the Update button) without having to refresh the browser window, and the Reset button will reset all statistics to zero and will begin collecting statistical data again. The information presented on this page includes:

- **Transmissions vs Back-Offs**
  A "Back-Off" is a condition where two or more Z-Wave nodes attempt to transmit at the same time in the same channel. This would result in corrupted frames, so Z-Wave devices detect when this happens and both go into a "back-off" mode; they each wait a random small amount of time and attempt their transmission again. This is very similar to the CSMA/CD method used in an Ethernet network. The presence of a lot of back-offs can indicate that there are too many Z-Wave transmissions occurring, and it could be impacting the performance of the network. If the Z-Wave transmissions are originating from the network in the homeowner's residence, then nodes that do unsoliZ-Way CITed transmissions should be checked to see if they are configured to send updates too frequently. However, Z-Wave transmissions among different networks use the same channels, so the source of the transmissions may be from another network (see Foreign Network Impact below). It is common to have some back-offs in a Z-Wave system.

- **Success on Reception**

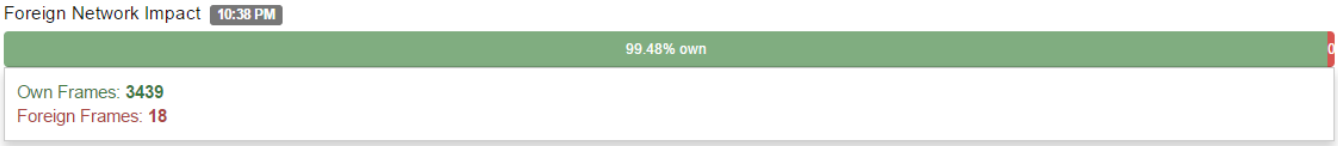
  This information is represented graphically as a measure of the number of successful transmissions received versus transmissions received with errors. Obviously, it is good to have a low number of failures (the red area) but it is normal to have some amount of errored receptions. If you click on the bar graph itself, it will expand to show the data that underlies the bar itself as in this example:



  Here we see that out of 3,654 total receptions, 199 had CRC errors and 16 had CRC16 errors; the error receptions made up 5.45% of the total receptions.

- **Foreign Network Impact**

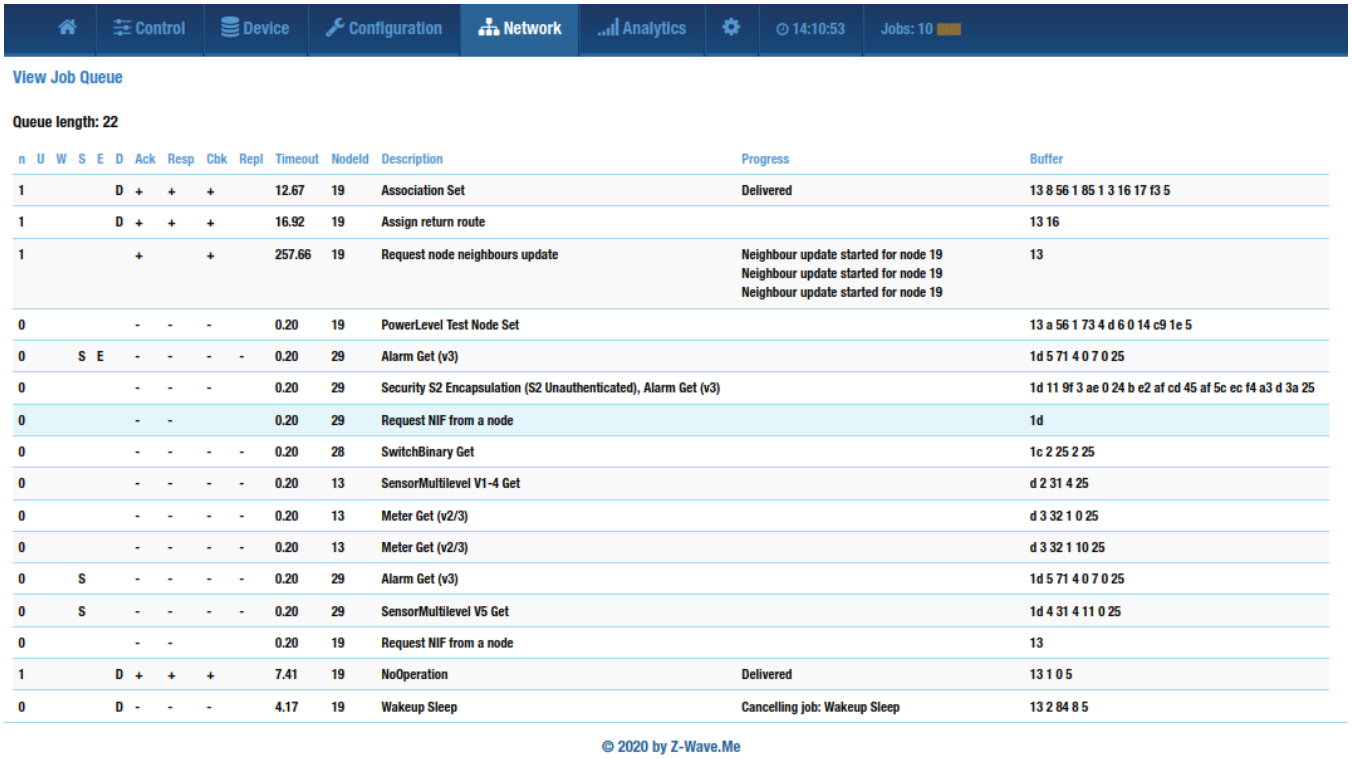
  If your network is experiencing a high number of back-offs as shown in the first statistic, the source of the additional transmissions may be from a neighbor's Z-Wave network. The Foreign Network Impact statistic can help you figure this out. Because each Z-Wave network has a unique identifier of its primary controller, the Z-Way CIT can examine this and determine when transmissions are from a different network. This graph shows the percentage of transmissions of the network that the Z-Way CIT is on against transmissions of any other network. If you click on the bar graph, you can see the data behind the chart as in this example:



  In this case, there were 3,439 transmissions on the Z-Way CIT's network and 18 from another network.

Jobs

Clicking on the **View Job Queue** button on the Controller Info Page, or clicking on the word **Jobs** in the top menu will open a new page and display the Job Queue. Here is a sample:



n	U	W	S	E	D	Ack	Resp	Cbk	Repl	Timeout	NodeId	Description	Progress	Buffer
1					D	+	+	+		12.67	19	Association Set	Delivered	13 8 56 1 85 1 3 16 17 f3 5
1					D	+	+	+		16.92	19	Assign return route		13 16
1						+		+		257.66	19	Request node neighbours update	Neighbour update started for node 19 Neighbour update started for node 19 Neighbour update started for node 19	13
0						-	-	-		0.20	19	PowerLevel Test Node Set		13 a 56 1 73 4 d 6 0 14 c9 1e 5
0			S	E		-	-	-	-	0.20	29	Alarm Get (v3)		1d 5 71 4 0 7 0 25
0						-	-	-		0.20	29	Security S2 Encapsulation (S2 Unauthenticated), Alarm Get (v3)		1d 11 9f 3 ae 0 24 b e2 af cd 45 af 5c ec f4 a3 d 3a 25
0						-	-			0.20	29	Request NIF from a node		1d
0						-	-	-	-	0.20	28	SwitchBinary Get		1c 2 25 2 25
0						-	-	-	-	0.20	13	SensorMultilevel V1-4 Get		d 2 31 4 25
0						-	-	-	-	0.20	13	Meter Get (v2/3)		d 3 32 1 0 25
0						-	-	-	-	0.20	13	Meter Get (v2/3)		d 3 32 1 10 25
0			S			-	-	-	-	0.20	29	Alarm Get (v3)		1d 5 71 4 0 7 0 25
0			S			-	-	-	-	0.20	29	SensorMultilevel V5 Get		1d 4 31 4 11 0 25
0						-	-			0.20	19	Request NIF from a node		13
1					D	+	+	+		7.41	19	NoOperation	Delivered	13 1 0 5
0					D	-	-	-		4.17	19	Wakeup Sleep	Cancelling job: Wakeup Sleep	13 2 84 8 5

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Here are the information pieces displayed on this page:

n – "Number" This is the number of times the frame has been sent to the destination node.
U – "Urgent" This indicates a high priority transmission, such as when the Z-Way CIT may be responding to a battery device's "wake up" signal. (Not used for normal Z-Way CIT operations since wake-up signals should be going to the customer's primary controller.)
W – "Wait Wake-Up" This transmission is waiting on a battery device to wake-up so it can be sent.

S – "wait Security" This transmission is waiting for part of the security S0, S2 handshake (e.g. Nonce Report) before it can continue.

E – "Encapsulated" The transmission is encapsulated

D – "Done" The transmission/command is finished – it remains in the job queue for a short time so you can review.

Ack – "Acknowledge" The Z-Way CIT is waiting for the device to acknowledge receipt of the transmission. A "-" sign is shown here when it is waiting for the signal, and a "+" sign is shown when it receives it.

Resp – "Response" The Z-Way CIT is waiting for a response to a controller function being carried out. A "-" sign is shown here when it is waiting for the signal, and a "+" sign is shown when it receives it.

Cbk – "Callback" Similar to a response, some controller functions use a callback signal which indicates progress until the command is complete. When the Z-Way CIT is waiting on a callback, it is indicated here. A "-" sign is shown here when it is waiting for the signal, and a "+" sign is shown when it receives it.

Repl – "Reply" Indicates that the Z-Way CIT is waiting for a reply from a device. A "-" sign is shown here when it is waiting for the signal, and a "+" sign is shown when it receives it.

Timeout – This is the amount of time before the command times out and is removed from the queue.

NodeId – This is the node number of the affected node. Node ID 0 indicates a controller function on the Z-Way CIT itself.

Description – This is a description of the command or job in the queue.

Progress – Information on what has been done, or responses received, are shown here.

Buffer – The information shown here is a partial listing of the data sent or the data received, in hexadecimal format. This is not useful diagnostic information without knowledge of the Z-Wave SDK or command classes.

Find Service

When the Z-Way CIT boots up and has an Ethernet connection, it will get its IP address from a DHCP (Dynamic Host Configuration Protocol) Server on the network it is on. The Razberry will also use DHCP in itself to create a network on its WiFi interface so that it can be connected to using a client device. In these cases, the IP address that was vended by the customer equipment and the Z-Way CIT are not known, so it is not easy to connect to it without knowing its IP address. Furthermore, if the Z-Way CIT has Internet access, connecting to it meant putting an entry in the router for the network that would re-direct requests for the Z-Way CIT to the IP address that it was vended. The Z-Way CIT's Find Service which is included with the Z-Way CIT solves all of these problems!

The Find Service will look on the local network for Z-Way CIT unit(s) and will present the IP addresses with links so that you can quickly and easily connect to it. If the Z-Way CIT has internet access, then it also notifies the Find Service server and opens a connection so that you may connect to the Z-Way CIT remotely without having to configure any routers.

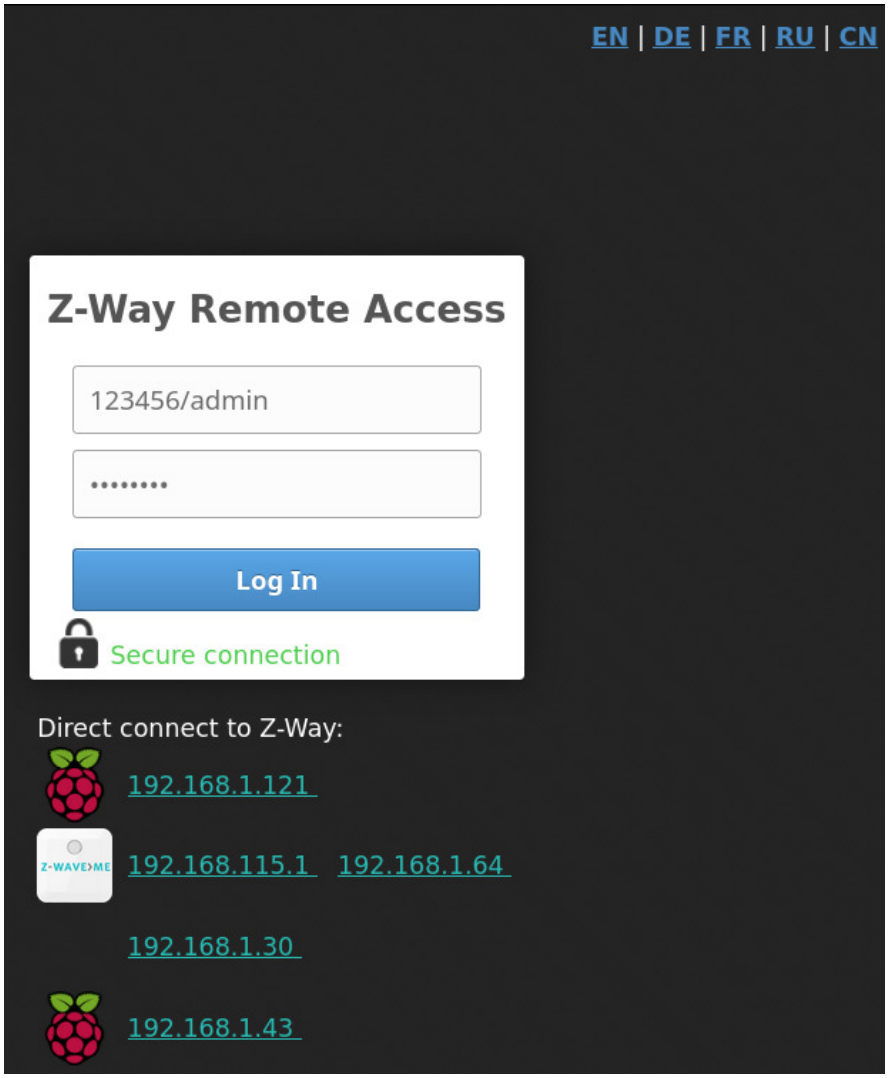
Much of how to use the Find Service is covered in the Getting Started Guide that came with your Z-Way CIT. This section explains the remote access capabilities.

Connecting Remotely

As explained in the Quick Start Guide, use a computer with a web browser and go to the URL:

https://Find.Z-Wave.me

Here you will see a screen similar to the one shown below – notice the IP address(es) listed at the bottom of the page:



The address(es) listed here – in this case 4 of them because there are 4 Z-Way CIT units on the local network – are found automatically on the local network without having to log in to the Find Service.

In this form, you will need to specify an ID, login and password for a remote connection. In the first column, the ID and login must be indicated by a slash, an example of filling this form in the picture above.

In order to return to the remote connection page again, click on the

button in the normal interface or follow the link:

https://find.z-wave.me/zboxweb

Command Classes

Command Classes are how the features in Z-Wave products are used, or are how the features of a Z-Wave product are communicated and used with other Z-Wave products. Command classes form the structure of communication that all Z-Wave products utilize. Each command class is made up of commands (such as 'set' or 'get') and the expected response (such as 'report'). Since command classes make up the language of Z-Wave, these command classes – how they are interpreted and handled – form the basis of Z-Wave's interoperability rules. When a new feature is added to a command class, the version is incremented. It should be noted, however, that new features are always implemented in such a way as to make it possible for other devices supporting the same level or higher to make use of those features, without breaking the ability for older devices to communicate at a lower version level. This is how a controller that perhaps only supports version 2 of the switch multilevel command class, can still control a dimming light switch that has version 3 of the switch multilevel command class.

Following is a partial list of Z-Wave command classes and what they are used for. This is not the exhaustive list of all command classes available in Z-Wave; these are some of the more common command classes to help you identify features and capabilities that may be frequently found in some Z-Wave devices. You can find more detailed information regarding command classes at the Z-Wave Public Specification website.

Association & Multi Channel Association	Used to set up a relationship with another node on the network to receive a Z-Wave command class signal when a specific event occurs in a device. The Multi Channel Association command class is used to set up these relationships in devices with multiple copies of the same functionality, such as a Z-Wave outlet strip that has 4 outlets, each controlled separately by Z-Wave.
Association Group Information	This is used to report information about the association capabilities of a device – the events that trigger an associated command to be sent, and what type of command is sent.

Barrier Operator	Barriers to entry such as a garage door or motorized gate are controlled with this command class, and use of this command class requires the device to support security.
Basic	This is a base level command class that all Z-Wave devices support as the lowest possible common command class which can be used for control and status reporting. This command class can be used if no other common command class can be found.
Basic Window Covering	(Replaced with Window Covering)
Battery	This command class is used to report a device's battery level.
Central Scene	This is used to report events that happen on a device, such as button pushes, to a central controller so that the central controller can carry out the commands of a scene defined by the owner of the controller. See also the "Scene" command classes.
Configuration	This command class provides a mechanism to change user changeable settings in a Z-Wave device.
Door Lock (Lock)	Locking mechanisms such as doors and safes are controlled with these command classes, and use of these command classes in a device also requires the Security (or Security 2) command class.
Firmware Update MD	The presence of this command class indicates the potential for the device to support having its firmware be updated via Z-Wave Over-The-Air (OTA).
Indicator	This command class allows for a device's indicators (lights, etc.) to be controlled or set by another device in the network.
Manufacturer Specific	Information regarding the manufacturer, and product identifiers are communicated using this command class.
Meter	This command class reports measured (metered) data for electriZ-Way CITy, fluids, and gasses.
Multi Channel (Multi Instance)	Formerly called Multi Instance, this class is used in devices which have multiple copies of the same technology. For example, an outlet strip which has 4 outlets that may be controlled independently by Z-Wave uses this command class to identify each endpoint of duplicated functionality. The first outlet would be endpoint 1, the 2nd outlet would be endpoint 2 and so on.
Multi Cmd a.k.a. Multi Command	To conserve battery life in a battery powered device, it may use this command class as a means of joining together several different Z-Wave command class signals for transmission all at once.
NOP a.k.a. No Operation	This command class has no action associated with it – it is used frequently in a Z-Wave network as a means of determining if another node in the network can be reached. When a Z-Wave command is sent to another node, the receiving node sends an ACK (acknowledgement) of receipt. If this command is sent to another node, the ACK confirms that the node can be reached.

Notification (formerly Alarm, includes Sensor Alarm, & Sensor Binary functions)	Combining the functions of several older command classes, the Notification command class contains many types of notifications used by sensors and other types of devices. This command class is used today to notify of when a door is unlocked, mains power is lost, when there is water present (where it should not be) or when the temperature is too high or too low among many other signals.
Scene Activation, Scene Actuator Conf, Scene Controller Conf	With the Actuator Conf being found in end devices, Controller Conf in controllers or wall controllers, and Scene Activation often in both, this indicates support of the Z-Wave Scene command classes which allow for lighting and control scenes to be configured and programmed into devices, eliminating the need for a central controller to activate (invoke) the scene or to turn the scene off. The scene command classes provide for a timeframe for the scene to become active (several seconds to as much as several hours), specific levels for devices, and is implemented in such a way as to usually be able to activate the scene in all devices at the same time, eliminating the "popcorn" effect in many lighting systems.
Schedule, Schedule Entry Lock, Climate Control Schedule	These command classes specify for a day of the week and/or time of day for specific functions in a device to take place.
Security, Security 2	High levels of data encryption and protection are provided by these command classes.
Sensor Multilevel	This command class is used to report varying levels of information reported by a sensor in a device. Temperature, Humidity, and Light level are common examples of information reported by this command class.
Switch All	This command class allows for devices that have the feature enabled and the appropriate setting, to all be switched ON or OFF together.
Switch Binary	Devices which turn something on or off, open or closed, up or down will use this command class. This class is used frequently in light switches and plug-in modules that cannot be dimmed.
Switch Multilevel, Switch Color	Devices such as dimming light switches, dimming modules, or motors which can have their level raised or lowered use this command class. Devices supporting multiple colors will have the Switch Color command class combined with it; Switch Multilevel is used to control the on/off and device level, while Switch Color is used to specify the color value.
Thermostat Fan Mode / Fan State / Heating / Mode / Operating State / Setback / Setpoint	Thermostats use different combinations of these command classes depending upon the features they provide. Often, Sensor Multilevel is present in a thermostat to report the temperature as well.

User Code	This is used to program and report codes for users in door locks, security panels, and other devices controlling locks or barriers.
Version	Version information for Z-Wave and the device itself are reported through this command class.
Wake Up	Battery operated devices that go into long periods of sleep – when their Z-Wave radio is turned off – use this command class to be told how often to wake up and check for commands, as well as to notify a central controller when they have awakened and can be delivered their commands from their mailbox.
Window Covering	As the name implies, different types of window coverings (shades, blinds, curtains, etc.) are controlled through this command class. In some cases, the Switch Multilevel command class may also be used.
Z-WavePlus Info	This command class is used by a Z-Wave device or controller to report that it is a Z-Wave Plus capable device or controller, and which role type and node type it is in the network.

Z-Wave Troubleshooting

Now that you are familiar with the Z-Way CIT, let's take a look at how you can diagnose specific things about the Z-Wave network being examined.

Missing communication, delayed execution of commands or nodes that appear in the failed node list indicates problems in Z-Wave networks. For trouble shooting it is helpful if the problem nodes are already identified however sometimes the whole network seems to be infected.

To find the root causes of the problem follow the steps below:

Defect and/or nonconforming electrical gear causing noise (baby monitor, old cordless phones, wireless speakers, motors …)

Check Noise Floor. The noise floor is the middle line of the viewgraph. If < 80 dBm you are fine, if its > - 60 dBm it can cause severe problems. You can move the Z-Way CIT to find the direction of the noise source. Use instant noise floor testing for this. The Noise Meter provides instantaneous measurements of the noise floor – look for prolonged periods of the meter(s) being red.

Other Z-Wave Networks nearby

If you see too many spikes above noise floor this is an indicator that other Z-Wave networks may be interfering with your network, or that devices on your network are configured to send unsoliZ-Wayed reports too frequently. You can verify this with network statistics and compare the portion of foreign Z-Wave frames to the total amount of received frames. Please keep in mind that Z-Wave devices have to comply with the 1% duty cycle rule.

Faulty behavior of devices in own network (e.g. endless loop)

Check the Zniffer!

Weak mesh of devices

It is the best if you already know the trouble making devices. You can test their connection to the controller and to the devices they have association connections to. If the device in trouble

does not have a stable direct link to the controller or the associated device, you need to dig in and fix the routing. Look at the network map to see problems with routing.

Weak signal of devices

Use Zniffer to look at the traffic between nodes and the RSSI to determine the links that have a low (e.g. < -60 dBm) connection strength between two devices that are communicating. If the device has a low number of routes, it is advisable to add a node in between as two strong hops are better than one weak one.

Wrong configuration - Polling

Check the Zniffer – devices should be getting polled, or sending unsoliZ-Wayed frames, more often than the 1% duty cycle of the network. Polling is done by the controller (change the setting for anything polling too often) and unsoliZ-Wayed frames are usually caused by bad configuration settings in the device.

Dead Associations

Check the Active associations! See "Occasional Delays" below for further details.

No Battery Levels / Reports

Battery level can only be obtained by the Z-Way CIT if it "eavesdrops" on the battery level being sent to the primary controller at a wake-up event; it is very rare. However, a lack of accurate battery level and updates on the primary controller indicates either A) that the wake-up interval needs to be set/reset, or that B) the battery device does not have a route back to the controller. After making sure that there are valid path(s) between the battery device and the controller, remove and re-add the association using the Z-Way CIT or – preferably – the primary controller. When a battery device wakes up, it sends an "I'm awake" signal to the controller so the controller can send it any commands from its mailbox for that node. In many cases, the battery device will also send its battery level, but not always! In some cases, the battery level has to be requested as it is not sent automatically. In these cases, be sure to set up a poll of the battery level on a regular basis that is at a lower interval than the wake-up interval for the device.

Here are some **further scenarios** and ways you can detect and repair:

- **Communication to the nodes** – The first two device screens should give you an indication of any nodes that cannot be reached, excluding the sleeping battery devices. For any nodes that you should be able to reach but cannot, use the neighbor table and the network map to see if there are obvious gaps in the mesh network that can be easily fixed by adding a repeater device. If this is an older network where the Explorer Frame is not always available, then you may try using Node Neighbor Update or "Repair Network" as some gateways call it to cause the nodes in the network to re-discover their neighbors. Remember, at the end of inclusion of a node (let's say node 10 for example), its neighbor information is transmitted to the controller. If more nodes are added which are neighbors to node 10, the controller may record nodes that are neighbors to 10, but will not know that 10 is a neighbor to them unless the neighbor information is updated. You may think that if two nodes are neighbors that it works both ways, but not always! Another way to force the update of the neighbor information is to repeat the inclusion procedure. Re-including a node that is already a part of the network will not cause it to get a new node number, but it will cause the examination of its neighbors to take place again.
- **Occasional Delays** – There can be a few causes of this including noise, but one situation that you definitely want to resolve are nodes which have associations to nodes that no longer exist. When a node is replaced, it is possible that another node that had an association to it was never updated to use the new node ID. The customer may not notice this because it is an infrequently used device, or perhaps the association is to keep an indicator up to date and the customer never noticed that it was inaccurate. The attempts to reach a node that no longer exists are no different than if the destination node failed – Z-Wave will make several attempts to reach it including use of the Explorer Frame, which will make multiple seconds to complete on even a medium sized network. Make sure – using the Device/Active Associations page, that you do not have any associations in place to old node numbers.
- **Occasional Delays** – Another cause of this could be other Z-Wave networks, in the situation where the customer is in a multi-family dwelling. A quick check of the Foreign Network bar on the Analytics/Statistics page will tell you if many of the transmissions of your customer's Z-Wave network are hearing (and thus having to wait for) another network's transmissions. This is usually OK and is a logical reason for occasional delays, but if the RSSI of the neighboring network is strong enough that it is blocking

communication to some of your nodes, then it may be time to add nodes to the mesh network so that each hop is stronger than the background noise of the other network.

- **Transmission failures, Signals not being received, Occasional delays** – this can be indicative of weak links between nodes, which are then being blocked or delayed by some of the previously mentioned reasons. On the Analytics/Statistics page, frequent Frequency Backoff or a high number of CRC frames being corrupted are sure signs of either strong noise, or weak transmissions that are being affected by noise that would otherwise have not caused a problem. If there is a specific node experiencing this problem more than others, go to the Link status page for that device and update the link quality measurement, then take steps to improve the mesh in areas where there are weak links. If the links appear strong, check the Analytics/Background noise page for a potentially high noise floor. You can physically move the Z-Way CIT closer to a node experiencing an issue with noise so that you may more accurately measure the noise near the affected node. If a plug-in power source is not available, the Z-Way CIT can be powered using a commercially available cell phone portable battery source for a period of time. Remember once you have moved the Z-Way CIT to allow for adequate time for the measurement of noise at the new location to take place.
- **Controller Not Updating** – when you know the network is robust and a node sends a status update to the controller, but the controller is not updating, it may be that the controller was not expecting the type of signal it received. When a controller requests the status from a node, it may use a specific command class supported by the node, but when the node is sending an unsoliZ-Wayed update, it may be sending a different type of command class. A great example of this is when a controller requests the level from a dimmer using SWITCH_MULTILEVEL command class, but status updates sent by the dimmer unsoliZ-Wayed use BASIC command class. Use the Zniffer screen to capture what is sent unsoliZ-Wayed, as well as when the controller requests the status (this means having to use the customer's controller to request the status). Take this information to the controller manufacturer along with the information about the product used in the sending node, and you may find the controller manufacturer receptive to addressing the situation.

Additional Information

- As a controller in a Z-Wave network, the Z-Way CIT may receive signals from other nodes in the network. If the Z-Way CIT receives a BASIC command from another node in the network, it will be acknowledged but not displayed to the end user. The UI of the Z-Way CIT does not include a way to render a status UI for devices in the network.
- Within this guide, the Z-Wave terms Inclusion, Exclusion, and Replication are synonymous with the corresponding terms Add, Remove, and Copy and may be used interchangeably with one another.
- Z-Wave networks comprised of certified Z-Wave devices will operate together and communicate easily – they are known to be "Interoperable" with one another – regardless of who manufactured the device. This level of interoperability is guaranteed through the Z-Wave Certification program which is required for all Z-Wave devices sold commercially in the world. Interoperability is different from compatibility however, in that manufacturer's partnerships with other manufacturers may result in a reduced level of functionality at the User Interface (UI) level.
- No nodes in a Z-Wave network which are battery powered may act as a repeater or assist with the routing of Z-Wave frames from a source to a destination. Conversely, all "mains" or permanently powered Z-Wave devices are configured to transparently assist with the routing of information around a Z-Wave network.
- The Z-Way CIT supports 1 Association group at Group 1 – the Z-Wave "Lifeline" group. It can have 3 nodes in that group. The Z-Way CIT will send a Device Reset Locally notification to the node(s) in this group if the Z-Way CIT is factory default reset.

Resources

- Official site of the Z-Way CIT project: https://z-wave.me/
- Here you can find the Z-Way CIT version for your equipment. The core development focuses on the image for the Raspberry 3b / 3b + / 4. Z-Way CIT can also work on Linux and Windows operating systems. https://z-wave.me/z-way/download-z-way/
- The official forum for installers and users of Z-Way: https://forum.z-wave.me/
- For feedback on this documentation, write to us at support@z-wave.me
- Z-Wave.me distributor in Australia, New Zealand: https://www.digitalhomesystems.com.au/products/z-wave-certified-toolkit-cit