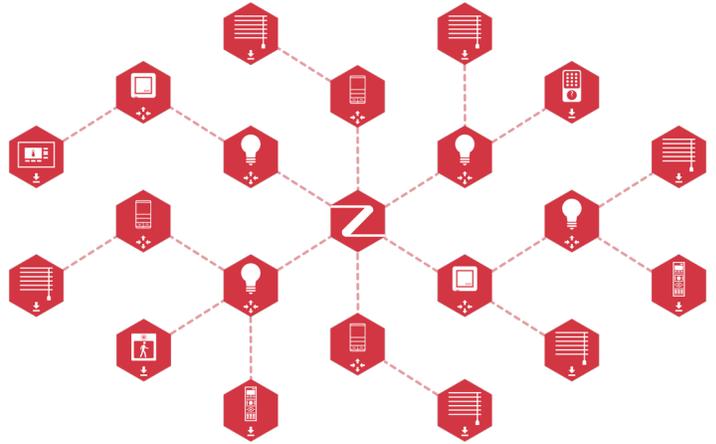


INTEGRATING QMOTION ZIGBEE SHADES WITH CONTROL 4– BEST PRACTICES

BACKGROUND

- There are two types of Zigbee nodes: router nodes and end nodes. Router nodes actively receive and repeat Zigbee communications. End nodes receive and transmit information, but only for their specific device. Other packets transferred to them intended for other devices are dropped. QMotion shades are end nodes. End nodes are devices that are generally battery powered (active routing nodes require full-time power) or 3rd party devices that lack the routing and transmitting protocols native in Control4 produced router nodes.
- End nodes are only able to communicate through router nodes if they are within earshot and the router nodes are operating properly.



STRENGTH OF THE ZIGBEE NETWORK

- The layout of the Zigbee network is crucial for devices to work properly.
- Zigbee and Wi-Fi (along with other devices) use the same band of the spectrum (2.4GHz), and it's very easy for them to create conflicts. There are multiple channels in the 2.4GHz but the channels overlap. The mesh controller will scan the spectrum and pick the channel that works best (causes the least interference), However, things change and new wireless devices get added to the home that can cause interference. The mesh controller does not go back and scan again. This is a one time event. Other sources of wireless interference in a Zigbee 2.4GHz environment include microwaves, cordless phones, baby monitors, and bluetooth devices. Careful planning should occur to avoid placing mesh controllers and end nodes close to such obstacles.
 - o Most Wireless IP networking installations prefer channels 1, 6 or 11 as they do not overlap with each other. If the network is set up to automatically choose one, fix it on one of those channels for your non-Zigbee Wi-Fi devices.
 - o For the Zigbee network configuration, choose a channel that does not conflict with the Wireless IP 2.4GHz channel in operation. Best practice is to place the Zigbee channel as far away as possible from the Wi-Fi channel; channels 15, 20, and 25 do not overlap with the commonly used Wi-Fi channels 1, 6, 11 and so are generally good choices to keep in mind.
 - o If you only need a single Zigbee network, we recommend using Channel 25 as it is outside of Wi-Fi and should have little interference. Just keep in mind that channel 25 is broadcast at less amplitude than other Zigbee channels. If the Zigbee mesh is robust, this should not be a concern.
- When adding Zigbee devices to the Control4 Mesh, devices closest to the mesh controller should be added first and move outward. QMotion shades and other types of end nodes, such as remotes, door locks and thermostats should be added last to ensure that they have access to multiple router nodes. In addition, when devices are identified from the center out, end nodes like QMotion shades get ID'd through the router devices, establishing very clear and robust router-end node connections.

INTEGRATING QMOTION ZIGBEE SHADES WITH CONTROL 4– BEST PRACTICES (CONT.)

ZIGBEE MESH DESIGN PRINCIPALS

1. A mesh controller in Control4 is a controller that has been designated to control a mesh by having a Zserver and ZAP (Zigbee Access Point which broadcasts Zigbee wireless signals) turned on and functioning. In times past, C4 taught that a mesh could be made stronger by turning on the Zserver in one controller, and then activating the ZAPs only in other controllers. **This practice is no longer encouraged.** If a mesh is large enough device wise or coverage wise to necessitate involving another controller, turn on both the Zserver and the ZAP in that controller to make it a ‘mesh controller’ as well. **There are a few BAD locations to place a mesh controller.**
 - a. **Inside of a rack.** There are all kinds of things that can interfere here, not to mention the big metal box that the rack creates.
 - i. If you HAVE to use this as the only mesh controller and can’t locate it somewhere else, use a Control4 external antenna at a minimum to get the signal out of the rack.
 - b. **In a basement.** The basement is usually made of concrete and there are all kinds of things between the basement and first floor that will attenuate signals. HVAC duct work, radiant floor heating, piping, etc.
 - c. **Behind a TV.** A TV can act like a shield, minimizing the RF signal strength outside of the controller.
 - i. If you HAVE to use this as a mesh controller, use a Control4 external antenna.
2. In lieu of using an external antenna to get the RF signal away from possible sources of interference, use a secondary controller as your mesh controller
 - a. EA5, EA3, EA1 or the CA1 all provide the SAME quality Zigbee mesh, so any of them may be used as a mesh controller
3. The mesh controller should be as central to all your Zigbee devices as possible (usually the middle of the home). If you need multiple Zigbee networks in the same home, locate each mesh controller central to the nodes it communicates with.
4. Do not place the Zigbee mesh controller near sources of interference such as Network Wireless Access Points, microwaves or other things that communicate in the 2.4GHz spectrum. Make sure that there is at least 15 feet between an IP Wireless Access Point and a mesh controller.
5. Keep each Zigbee mesh network smaller than 70 nodes. If you have more than 70 nodes, try to split the network in half. (For example, 80 nodes would be two networks of 40 nodes each). Put the mesh controller for each network central to the nodes on that network. It’s also a best practice to make sure that each Zigbee mesh is on a different channel. Ensure that you choose the right mesh controller to ID each shade to – this is not an automatic function. Remember to start in the center of the network and ID moving outward.

OTHER SOURCES OF ISSUES

- For integration with QMotion shades, it’s recommended that there is only a single ZServer/ZAP per Zigbee network and if range is an issue, use a device to extend the range such as a Zigbee IO device.
- In general, the Zigbee devices can transmit about 30 feet (line of sight) without any issues. Construction materials affect the distance. Make sure there are multiple routing nodes within 30 feet of a shade for best performance
- It’s recommended that each QMotion shade have no more than 3 hops to the mesh controller.

INTEGRATING QMOTION ZIGBEE SHADES WITH CONTROL 4– BEST PRACTICES (CONT.)

SOFTWARE TOOLS FOR TROUBLESHOOTING

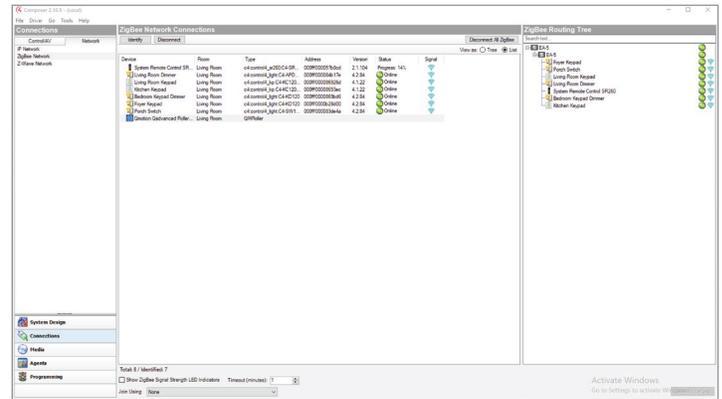
Composer Pro, the Control4 programming software, can be used to diagnose QMotion Zigbee problems. Below are three helpful tips to use to simply guide dealers through the diagnostic process.

First, the shade must be properly identified to the **Zigbee network**.

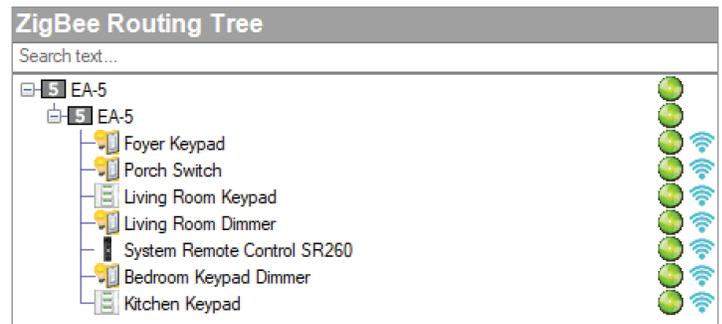
The steps to troubleshoot this are:

1. Click Connections
2. Click the Network tab
3. Locate the desired device
4. Insure the MAC address is appearing in the Zigbee table

If it is not, the device needs to be identified.



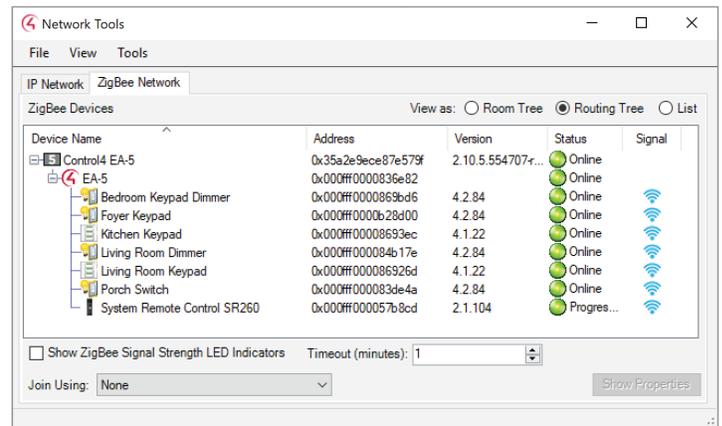
If the device is identified, take a look at the **number of bands displayed in the wireless signal**, which indicates the strength of signal the device is receiving from it's closest router node. If this signal is weak, recommend the technician place an active router node close to the shade (for example, a Control4 lighting device, configurable keypad, or Z2IO device).



Another diagnostic tool that is helpful is **Network Tools**.

To access this tool, click Tools in the upper pane of Composer Pro, and then click Network Tools, and Zigbee Network.

Here you can obtain a closer view of the strength of the Zigbee signal.



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