The importance of a stable Z-Wave network

In large network the risk for instabilities increases over time as more and more devices are added.

Z-wave uses mesh-network to extend the range and secure connections through the network, important part of this is that each unit knows or can find working path. On type of instabilities here is that the working route changes over time or that the devices doesn't have a working path to use. This leads to extencive extra signalling in the network in search for a working path. Problems like this in a mesh-network is tricky to discover, ambiguous symptom as increased latency and increased current consumption of devices. Instabilities generates a lot of more signalling to the network. A failed message leads automatically to re-sending within the default route, thereafter the alternative route is tried if that one is not working either a search fore new route is done. In total up to 7 attempts are done in contacting of the Controller.

To get a stable mesh-network it is recommended to do a complete re-installation of the Z-wave network. After excluding all devices (no devices has to be demount from there positions). The adding of devices should be done when they are at there actual position.
The important thing is to start with the routing devices nearest the Controller and gradual add routing devices further away from the Controller. With all routing devices in place a network healing could be perform before adding sleeping devices, battery powered devices are normally sleeping devices. Same here add the devices closes to the Controller first and work gradually further away. This to make sure that a stable working path is stored as default path used during the inclusion process.

This is a tedious work effort that takes time to do. Unfortunately mesh-net works can be tricky, difficult to understand what is actually ongoing. Even if they seems to work fine there can be a lot off excess traffic ongoing under the surface that leads to increased battery consumption and eventually decreased performance, response time and drop out of units.

See also following articles:
https://drzwave.blog/2017/01/20/seven-habits-of-highly-effective-z-wave-networks-for-consumers/
https://www.clarecontrols.com/dealer-news/6-z-wave-tips-and-tricks

More tips to get a stable network

Avoid unnecessary traffic to keep the air "free" for important messages, avoiding collisions between messages and re-sending of these by:

- Making sure that each unit is within range of the controller or a routing device.
- Exclude devises from the controller that are no longer needed.
- Removing dead or otherwise unreachable units, as these will create overhead traffic in the network until they are marked as failed by the controller.
- Exclude all disappeared devises from programmed scenarios or events (association groups).
- Avoiding frequent reallocation of devices. Moving a device will require a network heal (updating of routing tables for all devices).
- Use reasonable polling intensity in the controller settings. Heavy polling creates a lot of traffic and should therefore be limit.
- Setting long wake up intervals for all included devices (preferably to the maximum).
- Most metering devices (power-, temperature measuring devices etc.) are configurable to send sensor data at different frequencies or to only send when a change occur. Use these settings to avoid unnecessary reporting.
- Devise that now or then drops out of direct contact with the controller and has to use a routing devise occasionally, will trigger a network heal each time. Place the unit for either for stable direct contact with controller or so that the same routing device is used all the time.
- Some controllers support manual activation of network heal (updating device's routing tables) and it is good practice to do this each time a devises has been added/remover or moved, but not on a regular basis due to the extensive signaling it generates.