

App Note 138

UPB Gen1 and Gen2: Simply Automated Devices (updated 21-Aug-23)

All UPB devices contain firmware which makes possible their operation. The firmware is divided into two parts: the "core firmware" and the "application firmware".

- The "Core" implements the basic operations of all UPB devices. For example, the mechanism for sending and receiving UPB messages, and the basic commands for reading and writing their on-board memory.
- The "Application" is all the functions that are specific to the device type. For example, a switch has a rocker and actions that happen if it is tapped, double-tapped, held, or released. A module, having no rocker, doesn't have any of that.

The PulseWorx products from PCS all use a "core" called "Gen2". This firmware has several important changes to make it more reliable in receiving and transmitting messages. The Simply Automated devices use an older version core.

This application note explains one of the key differences between the Gen2 core and the older version, and what you might notice when working with them. Also some ideas on workarounds are given.

Before getting into the differences between Gen2 and the older version core, there are two additional concepts to understand: Multi-part messages and repeaters.

When a UPB message is sent over the power line it can be sent one time or multiple times. Sending the message more than once increases the chance that the receiver "gets the message". There may be noise or signal attenuation that prevents the message from being received. Sending the same message multiple times can get around those problems. Sending a message once is what we call a "1-time packet". Sending it twice is called a "2-time packet", and you can guess what we call sending it 3 or 4 times is called.

The next concept to understand is the PCS split-phase repeater. This device provides a way to "bridge" messages from one side of your power panel to the other. Without getting too technical here, just know that your breaker box has two sides that are separate and getting a message from one side to the other without a "bridge" requires the signal to travel a long distance. The repeater device is the bridge that shortens that signal distance.

Got all that? Finally, here are the key facts you have been waiting for.

When UPStart sends a message to a device to read or write its memory or to test its transmission or reception signal levels, it always sends that message in a 2-time packet (You can configure Upstart to use a 3-time or 4-







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time packet, but 2-time is what is usually used). The Gen2 devices respond back with the same packet count as the message it received. If UPStart sends a 2-time packet, the Gen2 device sends back a 2-time packet.

The older core in SAI devices always replies with a 1-time packet regardless of what UPStart sent. This can increase the chance that UPStart doesn't receive a reply.

Furthermore, if your system has a repeater, it doesn't work as a bridge when 1-time packets are sent. The message must be sent in a 2-time, 3-time, or 4-time packet or it will not bridge that message to the other side of the power panel.

Because of the 1-time reply, and the fact that the repeater will not repeat the message – it doesn't repeat 1-time packets - UPStart may have a problem reading or programming a device that uses the older core firmware. This is especially true if that device is on a circuit on the opposite side of the power panel from the circuit the PIM is on. If there is noise or signal attenuation in the installation, even if both are on the same circuit, the reply may not be seen.

So, what's the work-around? The obvious answer is to replace SAI devices with the more modern Gen2 PulseWorx devices. As that isn't always practical, you can also move devices around for programming. Make sure that UPStart is using a PIM on the same circuit as the device being programmed for best results.

Finally, as you know, UPB devices are VERY reliable. You may have some that are years and years old in installations. You may want to consider replacing some of the oldest ones that are still using Gen1.

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