PIKSI MULTI FIRMWARE 2.0 RELEASE

August 16, 2018

Updates to Swift Navigation's Multi-Band, Multi-Constellation Centimeter-Accurate RTK GNSS Receiver

Overview

Swift Navigation is proud to release the latest major firmware upgrade to Piksi® Multi and Duro®. Firmware Version 2.0 adds measurement and navigation support for two dual frequency constellations: BeiDou B1/B2 and Galileo E1/E5b. With these additions, Pikis Multi and Duro now support all global satellite constellations. The additional constellations provide forward-looking support to the product.

Firmware Version 2.0 applies to both the Piksi Multi GNSS Receiver and its ruggedized version, Duro. In the Getting Started Guide, refer to Section 7 entitled Piksi Multi - Upgrading Firmware for detailed instructions on how to upgrade your device. Firmware release binaries and product support documents are available at support.swiftnav.com.

New Features

BeiDou B1/B2 and Galileo E1/E5b - Firmware version 2.0 acquires, tracks, provides raw measurements and incorporates two new satellite constellations in its navigation solution. The additional signal support will improve navigation performance and robustness. The performance will continue to improve as the constellations become fully deployed. Supporting software from Swift (sbp2rinex RINEX converter and the Swift Console evaluation software) can make full use of the additional signals. Note: no BeiDou geostationary satellites will be acquired or tracked.

RTCM MSM Messages - The new firmware adds support for RTCM 3.2 Multi Signal Messages (MSM) message types MSM4 through MSM7. Though Swift devices already support RTCM 3.1, MSM messages provide differential corrections for BeiDou, Galileo, GPS and GLONASS in a unified manner. MSM also allows for interoperability with other existing third-party GNSS receivers for all modern signals and constellations.

Additional SBP Serial Interface - To support configuration of Swift devices and recovery in the case of configuration that leaves the device unable to communicate, Swift now supports an additional USB serial interface that always accepts and provides SBP (Swift Binary Protocol) messages. This USB serial gadget will exist as the second, higher-numbered USB serial adapter, and replaces a former Linux shell on this interface (which is no longer available by default).

Higher Baud Rate Support for UART - It is now possible to choose baud rates of 460800 and 921600 bps on Piksi Multi UART. It is mandatory to make sure that cabling, interfaces, and adapters can operate at these speeds and a signal integrity check is recommended before using them for integration. These higher rates are only recommended when device configuration requires an increase in message bandwidth.

NTRIP Client GGA Output Improvements - The firmware now formats GGA upload strings according to the NTRIP 2.0 specification. The option to enable NTRIP 1.0 style GGA upload is available. By default, version 2.0 is sent out. This makes Swift hardware more compatible with 3rd party infrastructure for corrections.

Changes from Firmware 1.5

Magnetometer Raw Measurement Improvements - We have supported raw magnetometer output since Firmware Version 1.4. With Firmware Version 2.0, the magnetometer support is complete and SBP messages are scaled symmetrically on all axes in units of microteslas, per the factory calibration of the sensor. Note: no heading estimate is produced from the magnetometer.

Firmware Update Changes - Firmware updates will now take about 3 minutes when upgrading or downgrading from Firmware Version 2.0 to another version. If using the Swift Console or command line utilities to upgrade over ethernet or USB, upgrades will take 3 minutes plus the time to transfer the firmware image to device. Make sure to avoid unpowering or resetting device during the upgrade process. It is no longer possible to upgrade devices with SSH and SCP over the Ethernet interface.

Software Development Kit (SDK) Changes - SSH and SCP access, as well as support for the SDK, is temporarily unavailable on Firmware Version 2.0. SDK Users who are developing applications for Piksi Multi and Duro are encouraged to continue to use Firmware Version 1.5 for development and to reach out to Swift as their application matures or should any newer firmware features be required.

The bulk of Piksi Buildroot, the repository where the SDK resides, still remains open source. SDK features are expected to be reinstated in a future firmware release with a more complete user experience. The removal of SSH, SCP and temporarily disabling of the SDK are part of the ongoing effort to make a more approachable SDK in the future and to improve the security of the Linux image for embedded use cases.

Swift Binary Protocol (SBP) Changes - Firmware Version 2.0 conforms to SBP Version 2.4 and the protocol update may require adjustments to user applications. First, SBP MSG_MEASUREMENT_STATE (message ID 97) is now used to communicate satellite tracking status from the device. This message replaces MSG_TRACKING_STATE (message ID 65), which is no longer produced by the device. Any settings saved to hardware for the "enabled_sbp_messages" may need to be adjusted for tracking information to show on the Swift Console. Additionally, a new, more compact GPS and GLONASS ephemeris message is now in use. For applications requiring raw ephemerides, it will be necessary to enable the following messages: MSG_EPHEMERIS_GPS (message ID 135), MSG_EPHEMERIS_BDS (message ID 137), MSG_EPHEMERIS_GAL (message ID 149), and MSG_EPHEMERIS_GLO (message ID 139). All other former ephemeris messages have been deprecated and are no longer in use.

Solution Frequency Allowed Values - Input validation is now active on the "soln_freq" setting in the "solution" group to prevent inadvertent configuration of unsupported frequencies. Supported frequencies are 1, 2, 4, 5, and 10 Hz. Note: this means that providing 20 Hz raw GNSS observations is no longer selectable in the product. Please contact Swift if 20 Hz raw measurements are required for your application.

Known Issues -

- Firmware Version 2.0 prioritizes message processing to ensure robust messaging and navigation performance. Users may notice that settings in the console may take longer to arrive via SBP when raw IMU measurements or raw observations are enabled.

- RTK performance has improved at all solution frequencies from prior releases. Solution frequencies at 10 Hz may use fewer satellites than solutions provided at slower rates. To maximize the number of satellites used in an RTK solution, it is recommended to operate at 5 Hz or below.