Release note

Topic	**ZED-F9R-02B with firmware FW1.00 HPS1.21**
	UBX-21035491 C1-Public
Author	Alex Ngi
Date	24 August 2021

Contents

1   General information

The product with order code ZED-F9R-02B is delivered with the HPS1.21 firmware. This document is also applicable to other devices capable of running this firmware.

1.1   Scope

This release note covers the changes to the HPS 1.21 firmware compared to the HPS 1.20 firmware version. For a comprehensive list of changes with respect to earlier versions, this release note should be read in conjunction with the HPS 1.20 release notes [4].

1.2   Released firmware image

Released firmware image	
File	UBX_F9_100_HPS121. a1bca8df8b1e83c63fe957d8a644d3ac.bin

Firmware version	EXT CORE 1.00 (e2b374)
	FWVER=HPS 1.21
ROM base support	ROM 1.02 - ROM BASE 0x118B2060

1.3 Related software

Version 21.05 (or later) of u-center GNSS evaluation software is recommended to be used with the released firmware. Please contact FAE if this version is not available on the official web site.

Version 19.03 (or later) of the firmware update tool supports this release.

1.4 Related documentation

[1]   u-blox HPS 1.21 Interface description, UBX-21019746
[2]   u-blox ZED-F9R Integration Manual, UBX-20039643
[3]   u-blox ZED-F9R-02B Data Sheet, UBX-21017486
[4]   ZED-F9R-01B-HPS_Release Note, UBX-20057102

2 New features

2.1 SPARTN 1.8

SPARTN, Safe Position Augmentation for Real-Time Navigation, is an open-standard format available at https://www.spartnformat.org/.

A service provider using SPARTN-formatted corrections can enable high precision positioning applications with ZED-F9R. Compared to RTCM, which is used primarily for OSR, SPARTN has a complete set of messages suitable for SSR models without the use of vendor-specific messages. The use of SSR in the foundation allows services to be efficiently delivered over a broadcast medium such as L-band satellite signal or cellular networks. This allows a product to be deployed anywhere on the continent with a single service provider.

This release of SPARTN supports corrections for GPS and GLONASS and relies on a host library to decrypt the services, if necessary.

2.2 E-scooter dynamic model

The dynamic model for an electric scooter often found in cities is available for the dead reckoning algorithm to improve the position accuracy in urban environments where GNSS signals are obstructed.

The purpose is to improve the accuracy in light urban environments to help police the user behavior to ensure compliance with local regulations in terms of operating in bike lanes and parking in designated areas. The E-scooter must be equipped with odometer readings and direction of travel information.

The model is tuned to the normal scooter operating behavior in terms of speed of travel, tilt, acceleration, and roll. The calibration speed of the IMU has been reduced to match the vehicle type.

Please consult the data sheet for additional information.

The default configuration is an automotive dynamic model.

2.3 Robotic lawnmower dynamic model

The dynamic model for a robotic lawnmower is often used in commercial and residential settings. By incorporating high precision GNSS technology into robotic lawnmower designs, the machine can operate more efficiently than the early generation designs which can mostly randomly wander around an area. More complex areas can be handled as the mower builds an internal map of the area that has been cut. In many cases, the need for the boundary wire is eliminated, dramatically reducing installation costs. The dead reckoning algorithm improves the position accuracy in typical garden environments where GNSS signals are obstructed by homes, fences, bushes, and trees.

The model is tuned to the normal operating behavior of a lawn mower in terms of speed of travel, tilt, acceleration, and roll. The calibration of the IMU has been reduced to match the machine type and can start calibration at speed as low as 0.6 km per hour. The RLM dynamic model requires wheel ticks with polarity from both rear wheels. Automatic wheel tick polarity detection should not be used.

Please consult the data sheet for additional information.

The firmware default is an automotive dynamic model.

3 Message interface

3.1 UBX protocol

This firmware supports UBX protocol version 33.21.

3.2 NMEA protocol

NMEA version 4.11 is the default instead of version 4.10 as it was in the in previous release.

3.3 New messages

Message / Configuration item	Description / Comment
SPARTN-1X-OCB_GPS SPARTN-1X-OCB_GLO SPARTN-1X-HPAC_GPS SPARTN-1X-HPAC_GLO SPARTN-1X-GAD	SPARTN 1.8 input messages supported.
CFG-I2CINPROT-SPARTN CFG-SPIINPROT-SPARTN CFG-UART1INPROT-SPARTN CFG-UART2INPROT-SPARTN CFG-USBINPROT-SPARTN	Enable/disable SPARTN protocol input support on all interfaces (default: SPARTN input support enabled).
UBX-RXM-SPARTN	Message to report the SPARTN input status. Message output rate configurable with new CFG-MSGOUT-UBX_RXM_SPARTN-* configuration items.
CFG-MSGOUT-UBX_RXM_SPARTN-*	Enable UBX-RXM-SPARTN message as output across the different interfaces.
UBX_NAV_PVAT	Message output navigation and altitude position in a single message. Message output rate is configurable with the new CFG-MSGOUT-UBX_NAV_PVAT_* configuration items.
CFG-MSGOUT-UBX_NAV_PVAT_*	Enable UBX_NAV_PVAT message as output across the different interfaces.

NMEA-GX-THS	Support for NMEA-Standard-THS message. Message output rate is configured with a new CFG-MSGOUT-NMEA_ID_THS_* configuration items.
CFG-MSGOUT-NMEA_ID_THS_*	Enables NMEA-Standard-THS message as output across the different interfaces.
CFG-TP-DRSTR_TP1	Configuration to set TP1 drive strength (default 4mA).
UBX-SEC-SIG	Message to output state of signal security measures like jamming and spoofing detection. Message output rate is configurable with a new CFG-MSGOUT-UBX_SEC_SIG_* configuration items.
CFG-MSGOUT-UBX_SEC_SIG_*	Enable UBX-SEC-SIG message as output across the different interfaces.

3.4   Modified messages

Message / Configuration item	Description / Comment
CFG_NMEA_PROTVER	Default is NMEA Version 4.11.
CFG-NAVSPG-DYNMODEL	Added two new dynamic models: robotic lawn mower (11) and e-scooter model (12).
UBX-NAV-SIG	SPARTN correction source is reported rather than just reserved.
UBX-NAV-SAT	SPARTN correction source is reported rather than just reserved.
UBX-MON-COMMS	SPARTN correction source is reported rather than just reserved.
CFG-BDS-USE_GEO_PRN	Enable the use of BeiDou geostationary satellites (PRN 1-5 and 59-63). Previously, this configuration item had a different name.

3.5   Removed messages

No messages were removed.

3.6   Firmware changes

3.6.1   Improvements

- I2C robustness improvements.
- Accommodate systems with large wheel tick quantization. This supports low-cost sensors especially useful for applications with small wheels.
- Corrected use of almanac information of non-GPS systems.
- Corrected uninitialized values reported by UBX-ESF-ALG.
- Improved handling when not in RTK fix or float solutions under strong signals where tracking loop is wrong and results in larger measurement errors.
- Improved NMEA messages potentially exceeding length limits in strict configuration.
- Improved handling of Galileo satellites with high eccentric orbits.
- Improved performance handling of RTCM messages with millisecond-ambiguous corrections (RTCM MT 1001, 1003, 1009, 1011, MSM1 to MSM3).
- Corrected output of NMEA GxGSV message under some corner cases with untracked satellites.
- Corrected output of NMEA GxGRS message in version 4.11 regarding signal ID.
- General firmware improvements to reduce exceptions due to configuration changes

- Incorrect status information when SBAS/SLAS is disabled without restart.
- Entering backup mode.

3.6.2 Firmware known limitations

- After exiting a tunnel, solution stays in dead reckoning mode longer than expected.
- System signal configuration performed by CFG-SIGNAL-* immediately after startup may be ignored until the next GNSS restart. Configuring to flash is a workaround.
- NMEA GxVLW and GxTHS messages in version 2.3 where information in version 4.0 is present.
- NMEA GxGRS and GxGNS messages may exceed the 82-character limit to 85 characters.

3.6.3 Hardware known limitations

- USB interface may not be possible to certify according to the USB standard.
- I2C has setup time issue when used with clock stretching and using fast mode is recommended.

4 Revision history

Revision	Date	Name	Comments
R01	24-Aug-2021	ANGI	First release of release note