Release note

Topic **u-blox M10 firmware SPG 5.30 Release note**

UBXDOC-304424225-20393 C1-Public

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Contents

1 General information

1.1 Scope

This Release note applies to u-blox M10 firmware version SPG 5.30.

1.2 Open-source declaration

This u-blox positioning product described in this Release note, comprising the company's proprietary software, does not contain open-source software to declare.

1.3 Related documentation

[1] u-blox M10 SPG 5.10 firmware Release note, UBX-22001426
[2] u-blox M10 SPG 5.30 Interface description, UBXDOC-304424225-20121
[3] u-blox UBX-M10150-KB Integration manual, UBXDOC-304424225-20458, NDA required

2 Released firmware image

2.1 External SPG 5.30 image

Released firmware image	
File	EIP_EXT_SPG530RELEASE.20a32d538797b96b64c220109cd723f3.bin
Firmware version	SPG 5.30 (24b86c)
Protocol version	34.30
ROM base support	ROM 2.00 – 0x6C1C37B0

The image can be used as an external image stored on flash or downloaded to the on-device RAM at every startup.

2.2 Released software tools

2.2.1 u-center 2

u-center GNSS evaluation software	
File	https://u-center2-updates.u-blox.com/u-center2-installer.exe
Version	25.07

2.3 Identification

2.3.1 Boot screen

The receiver shall output a boot screen similar to the following one, with the differences expected in the CHIPID=... row (this is meant to be unique for every chip).

```
$GNTXT,01,01,02,u-blox AG - www.u-blox.com*4E
$GNTXT,01,01,02,HW UBX 10 000A0000*53
$GNTXT,01,01,02,EXT SPG 5.30 (24b86c)*6E
$GNTXT,01,01,02,ROM BASE 0x6C1C37B0*2F
$GNTXT,01,01,02,FWVER=SPG 5.30*42
$GNTXT,01,01,02,PROTVER=34.30*1C
$GNTXT,01,01,02,CHIPID=000000D0D69D0F7A54*0B
$GNTXT,01,01,02,GPS;GAL;BDS*08
$GNTXT,01,01,02,SBAS;QZSS*60
$GNTXT,01,01,02,ANTSUPERV=*22
$GNTXT,01,01,02,ANTSTATUS=DONTKNOW*2D
$GNTXT,01,01,02,PF=F7FFF*4F
$GNTXT,01,01,02,Starting GNSS*5A
```

3 Changes compared to ROM firmware SPG 5.10

3.1 Added features

3.1.1 SouthPAN (SBAS)

SouthPAN (PRN122) has been added to the default list of searched SBAS satellites. This list can be edited using the CFG-SBAS-PRNSCANMASK message.

3.1.2 KASS (SBAS)

KASS (PRN134) has been added to the default list of searched SBAS satellites. This list can be edited using the CFG-SBAS-PRNSCANMASK message.

3.1.3 RTCM version 3.4

RTCM corrections input data will be used to compute the PVT solution. The following list contains supported RTCM input messages.

Message type	Description
RTCM 1005	Stationary RTK reference station ARP
RTCM 1006	Stationary RTK reference station ARP with antenna height
RTCM 1071...1077	GPS MSM 1...7
RTCM 1081...1087	GLONASS MSM 1...7
RTCM 1091...1097	Galileo MSM 1...7
RTCM 1101...1107	QZSS MSM 1...7
RTCM 1111...1117	BeiDou MSM 1...7
RTCM 1121...1127	SBAS MSM 1...7

3.1.4 Data logging

Data logging allows the GNSS receiver to autonomously store position, speed, odometer, heading and other information to a flash memory connected to it.

3.1.5 Geofence

Four circular geofence areas can be defined with latitude, longitude and radius using the CFG-GEOFENCE message category. The GNSS receiver autonomously detects if the actual position enters or leaves the defined areas and informs the host system by message or PIO pin. This allows the host system to save power at the same time.

3.2 Improved features compared to SPG 5.10

3.2.1 Reporting of signal security information

This release introduces two new messages, UBX-SEC-SIG and UBX-SEC-SIGLOG, to give detailed status information about signal security (jamming, spoofing).

UBX-SEC-SIG summarizes the current state of jamming and spoofing detection.

UBX-SEC-SIGLOG provides a log of past signal security related events providing the type of event, start and stop timestamp.

3.2.2 Power saving modes PSMCT, LEAP

The Low Energy Accurate Positioning (LEAP) mode improves power consumption while retaining superior position accuracy. The position accuracy compared to power-save mode cyclic tracking (PSMCT) is greatly improved. In addition, the GNSS receiver enables an external LNA only when needed to further reduce power consumption.

3.2.3 Reduced position outliers and improved accuracy

The firmware has been optimized for improved performance under low signal conditions. Additionally, the default firmware configuration has been changed with the intention of reducing position outliers (large position errors) particularly under weak signal conditions, for instance going inside or coming out of tunnels, driving under elevated roads or other areas with suppressed GNSS signals.

The receiver might output potentially fewer position fixes than with SPG 5.10, depending on signal conditions.
The firmware can be configured to fine-tune the performance according to the needs of the application. See the product integration manuals for details.

3.2.4 Improved Hotstart TTFF without RTC

This item only applies to products without connected RTC, such as UBX-M10150-KB(-AN).

Faster time to first fix (TTFF) can be achieved with firmware SPG 5.30 if a backup domain is supplied, but no RTC is connected to the GNSS.

3.2.5 System performance monitor

New message UBX-MON-SYS informs about CPU, memory and IO usage and other system parameters for monitoring or debugging purpose.

3.2.6 BDSBAS

The firmware can be configured to use BDSBAS signals.

The required configuration items of the CFG-SBAS configuration group and the steps to enable these signals in the receiver are described in the interface description and integration manual.

3.3 Changed features

3.3.1 Time pulse

New configuration item CFG-TP-DRSTR_TP1 allows to configure the drive strength for the Time Pulse pin 1 (TP1) output to 2, 4, 8 or 12 mA.

3.3.2 Weak signal tracking

When facing very weak signals, tracking those signals can lead to very large position errors (“outliers”), which can sometimes rise to hundreds of meters. The firmware settings were changed to have fewer outliers, with the consequence that a position is not reported at all in such situations. However, the behavior of the firmware can be set as needed. Please refer to the Integration manual [2] for details.

3.4 Removed and changed features compared to SPG 5.10

3.4.1 Protection level

SPG 5.30 does not support this feature.

3.4.2 Data batching buffer reduced from 10 to 5 min

The firmware supports storage of navigation solutions for up to 5 minutes (at 1 Hz) within the receiver without the need of an external flash. This can reduce the system power consumption by allowing the application processor to stay the in low-power mode for a longer time.

4 Message interface

4.1 NMEA protocol

There is no difference in NMEA messages when compared to SPG 5.10. The default NMEA protocol version 4.11 is the same as for SPG 5.10.

4.2 UBX protocol

The firmware supports the UBX protocol version 34.30.
The symbol (•) shown in the tables of this chapter indicates the presence of the message in the firmware column where it appears.

4.2.1.1 New messages

Message	Audience	Description/Comment	FW510	FW530
UBX-LOG-CREATE	PUB	Creates a log file and activates the logging subsystem		•
UBX-LOG-ERASE	PUB	Deactivates the logging system and erases all logged data		•
UBX-LOG-FINDTIME	PUB	Finds index of a log entry based on a given time		•
UBX-LOG-INFO	PUB	Polls for log information		•
UBX-LOG-RETRIEVE	PUB	Requests log data		•
UBX-LOG-STRING	PUB	Stores arbitrary string in on-board flash		•
UBX-MON-POST	PUB	Power on self test (POST) information		•
UBX-MON-SYS	PUB	Current system performance information		•
UBX-NAV-GEOFENCE	PUB	Geofencing status		•
UBX-RXM-COR	PUB	Differential correction input status		•
UBX-SEC-SIG	PUB	Information related to the security, i.e. availability and integrity, of the signals		•
UBX-SEC-SIGLOG	PUB	Log of past signal security related events, that is, events related to jamming and spoofing		•

4.2.2 Configuration keys

The symbol (•) shown in the tables of this chapter, indicates the presence of the configuration key in the firmware column where it appears.

4.2.2.1 New configuration keys (compared to SPG 5.10)

Message	Audience	Description/comment	FW510	FW530
CFG-BDS-D1D2_NAVDATA	PUB	Enables only the given BDS D1/D2 navigation data streams, ignoring the others		•
CFG-GEOFENCE-FENCE1_LAT	PUB	Latitude of the first geofence circle center		•
CFG-GEOFENCE-FENCE1_LON	PUB	Longitude of the first geofence circle center		•
CFG-GEOFENCE-FENCE1_RAD	PUB	Radius of the first geofence circle		•
CFG-GEOFENCE-FENCE2_LAT	PUB	Latitude of the second geofence circle center		•
CFG-GEOFENCE-FENCE2_LON	PUB	Longitude of the second geofence circle center		•
CFG-GEOFENCE-FENCE2_RAD	PUB	Radius of the second geofence circle		•
CFG-GEOFENCE-FENCE3_LAT	PUB	Latitude of the third geofence circle center		•
CFG-GEOFENCE-FENCE3_LON	PUB	Longitude of the third geofence circle center		•
CFG-GEOFENCE-FENCE3_RAD	PUB	Radius of the third geofence circle		•
CFG-GEOFENCE-FENCE4_LAT	PUB	Latitude of the fourth geofence circle center		•
CFG-GEOFENCE-FENCE4_LON	PUB	Longitude of the fourth geofence circle center		•
CFG-GEOFENCE-FENCE4_RAD	PUB	Radius of the fourth geofence circle		•
CFG-GEOFENCE-PIN	PUB	PIO pin number		•
CFG-GEOFENCE-PINPOL	PUB	PIO pin polarity		•
CFG-GEOFENCE-USE_FENCE1	PUB	Use first geofence		•
CFG-GEOFENCE-USE_FENCE2	PUB	Use second geofence		•
CFG-GEOFENCE-USE_FENCE3	PUB	Use third geofence		•
CFG-GEOFENCE-USE_FENCE4	PUB	Use fourth geofence		•
CFG-GEOFENCE-USE_PIO	PUB	Use PIO combined fence state output		•
CFG-I2CINPROT-RTCM3X	PUB	Flag to indicate if RTCM3X should be an input protocol on I2C		•
CFG-LOGFILTER-APPLY_ALL_FILTERS	PUB	Applies all filter settings		•
CFG-LOGFILTER-MIN_INTERVAL	PUB	Minimum time interval between logged positions		•
CFG-LOGFILTER-ONCE_PER_WAKE_UP_ENA	PUB	A single position every wake-up period is recorded		•
CFG-LOGFILTER-POSITION_THRS	PUB	Position threshold		•

Message	Audience	Description/comment	FW510	FW530
CFG-LOGFILTER-RECORD_ENA	PUB	Recording enabled		•
CFG-LOGFILTER-SPEED_THRS	PUB	Speed threshold		•
CFG-LOGFILTER-TIME_THRS	PUB	Time threshold		•
CFG-MSGOUT-UBX_LOG_INFO_I2C	PUB	Output rate of the UBX-LOG-INFO message on port I2C		•
CFG-MSGOUT-UBX_LOG_INFO_SPI	PUB	Output rate of the UBX-LOG-INFO message on port SPI		•
CFG-MSGOUT-UBX_LOG_INFO_UART1	PUB	Output rate of the UBX-LOG-INFO message on port UART1		•
CFG-MSGOUT-UBX_MON_SYS_I2C	PUB	Output rate of the UBX-MON-SYS message on port I2C		•
CFG-MSGOUT-UBX_MON_SYS_SPI	PUB	Output rate of the UBX-MON-SYS message on port SPI		•
CFG-MSGOUT-UBX_MON_SYS_UART1	PUB	Output rate of the UBX-MON-SYS message on port UART1		•
CFG-MSGOUT-UBX_NAV_GEOFENCE_I2C	PUB	Output rate of the UBX-NAV-GEOFENCE message on port I2C		•
CFG-MSGOUT-UBX_NAV_GEOFENCE_SPI	PUB	Output rate of the UBX-NAV-GEOFENCE message on port SPI		•
CFG-MSGOUT-UBX_NAV_GEOFENCE_UART1	PUB	Output rate of the UBX-NAV-GEOFENCE message on port UART1		•
CFG-MSGOUT-UBX_RXM_COR_I2C	PUB	Output rate of the UBX-RXM-COR message on port I2C		•
CFG-MSGOUT-UBX_RXM_COR_SPI	PUB	Output rate of the UBX-RXM-COR message on port SPI		•
CFG-MSGOUT-UBX_RXM_COR_UART1	PUB	Output rate of the UBX-RXM-COR message on port UART1		•
CFG-MSGOUT-UBX_SEC_SIG_I2C	PUB	Output rate of the UBX-SEC-SIG message on port I2C		•
CFG-MSGOUT-UBX_SEC_SIG_SPI	PUB	Output rate of the UBX-SEC-SIG message on port SPI		•
CFG-MSGOUT-UBX_SEC_SIG_UART1	PUB	Output rate of the UBX-SEC-SIG message on port UART1		•
CFG-MSGOUT-UBX_SEC_SIGLOG_I2C	PUB	Output rate of the UBX-SEC-SIGLOG message on port I2C		•
CFG-MSGOUT-UBX_SEC_SIGLOG_SPI	PUB	Output rate of the UBX-SEC-SIGLOG message on port SPI		•
CFG-MSGOUT-UBX_SEC_SIGLOG_UART1	PUB	Output rate of the UBX-SEC-SIGLOG message on port UART1		•
CFG-NAVSPG-CONSTR_DGNSSTO_SCALE	PUB	DGNSS timeout value scale for CFG-NAVSPG-CONSTR_DGNSSTO		•
CFG-RTCM-DF003_IN	PUB	RTCM DF003 (Reference station ID) input value		•

Message	Audience	Description/comment	FW510	FW530
CFG-RTCM-DF003_IN_FILTER	PUB	RTCM input filter configuration based on RTCM DF003 (Reference station ID) value		•
CFG-SBAS-ACCEPT_NOT_IN_PRNMASK	PUB	Accept corrections from SBAS SV, even if not self-included in PRN MASK (message type 1)		•
CFG-SBAS-USE_IONOONLY	PUB	Use SBAS ionosphere correction only		•
CFG-SEC-JAMDET_SENSITIVITY_HI	PUB	When set, go for a more sensitive jamming detection (at the cost of increased false alarm rate)		•
CFG-SEC-SPOOFDET_SIM_SIG_DIS	PUB	Disabling the simulated signal spoofing detection		•
CFG-SPIINPROT-RTCM3X	PUB	Flag to indicate if RTCM3X should be an input protocol on SPI		•
CFG-UART1INPROT-RTCM3X	PUB	Flag to indicate if RTCM3X should be an input protocol on UART1		•

4.2.2.2 Modified configuration keys (changed behavior, default, etc.)

Message	Audience	Description/comment	FW510	FW530
CFG-ANA-USE_ANA	PUB	Use AssistNow Autonomous	TRUE	FALSE
CFG-PM-WAITTIMEFIX	PUB	Wait for time fix	FALSE	TRUE
CFG-QZSS-SLAS_MAX_BASELINE	PUB	Maximum baseline distance to closest GMS	200	350
CFG-NAVSPG-OUTFIL_PACC	PUB	Output filter position accuracy mask (threshold)	100	30

4.2.2.3 Removed configuration keys

These are the config keys that are no longer available due to deprecated features.

Message	Audience	Description/Comment	FW510
CFG-ITFM-BBTHRESHOLD	PUB	Broadband jamming detection threshold	•
CFG-ITFM-CWTHRESHOLD	PUB	CW jamming detection threshold	•

5 Removed limitations compared to ROM firmware SPG 5.10

5.1 System

- SPG 5.10 limitation is "*Under certain rare circumstances during startup, the receiver may output a false warning "Reboot reason: V_CORE_HIGH undervoltage".*
  This warning message doesn't appear in SPG 5.30 when instructions from the Integration manual are followed.

5.2 Power save mode (PSM)

- SPG 5.10 limitation is "*PSM cannot be used with BeiDou B1C. Configuration combinations of PSM (both CT and OO) and GNSS configuration which include B1C will be rejected by the receiver and an explanatory ERROR message will be output.*".
  You can remove the proposed workaround to only use BeiDou B1I in combination with PSM, as you can now also use Beidou B1C.
- SPG 5.10 limitation is "*The CS pin (PIO3) is not available as a wake-up source in PSM and some UBX messages. Due to this, the PSM involving software backup does not work reliably with the SPI interface.*".
  You can remove the proposed workaround to use a different pin as a wake-up source, as you can now use the CS pin (PIO3) as well.

5.3 Acquisition and tracking

- SPG 5.10 limitation is "*For operations with only BeiDou B1I signal, the receiver reacquisition sensitivity is degraded after ~1min of no signal.*"
  You can remove the proposed workaround. Using only BeiDou B1I only doesn't degrade the receiver reacquisition sensitivity any longer.
- SPG 5.10 limitation is "*For operations with only GLO or GAL signals, high C/N0 degradation can occur when using a passive antenna setup.*"
  You can remove the workaround to use an active antenna setup for GLO or GAL signals only operation.
- SPG 5.10 limitation is "*For Some BeiDou B1C related values are not correctly reported in NMEA GBS message, they are reported with incorrect signal ID value 0. NMEA GSV and GRS messages do not support BeiDou B1C signals, the C/N0 level and residual data are not reported at all.*"
  You can remove the workaround to use the UBX-NAV-SAT message to obtain the C/N0 and residual data for BeiDou B1C signals, as you can now use NMEA GBS, NMEA GSV and NMEA GRS messages instead.
- SPG 5.10 limitation is "*After a coldstart QZSS satellites will not be used for navigation if AssistNow Autonomous is enabled.*"
  You can remove the workaround to disable AssistNow Autonomous. QZSS satellites can now be used for navigation with the AssistNow Autonomous enabled.

5.4 Navigation

- SPG 5.10 limitation is "*The receiver may rarely emit warning messages in the form of e.g., "`SF ov SV G13[43]:0`". Users can safely ignore the warning if it is seen sporadically. No degradation of performance expected.*"
  These warning messages don't appear in SPG 5.30.

6 Known limitations

- Using the power save mode on/off (PSMOO) might cause a reset of the receiver.
  Workaround: Do not enable the PSMOO mode. Instead the receiver can be put into software standby mode for the desired time interval.
- AssistNow Live Orbit (ANO) data transfer to flash memory might fail when LEAP mode is enabled.
  Workaround: disable the LEAP mode before uploading AssistNow aiding data
- When many debug messages are enabled and AssistNow Autonomous orbit Prediction (AOP) is enabled as parallel, the receiver might sporadically output a "tx buf alloc" or "malloc" error message and some output messages might get lost.
  Workaround: Disable AssistNow Autonomous Orbit Prediction (AOP) when enabling many debug messages.
- Time to first fix (TTFF) might not be as low as expected with AssistNow Live Orbits, if the GPS constellation is disabled.
  Workaround: Enable GPS to get the lowest TTFF with AssistNow Live Orbits.
- If the receiver runs for ~49 days without a reset in the GPS/Galileo/Beidou/SBAS/QZSS (default) configuration, the power consumption might increase.
  Workaround: Perform a restart at least every 49 days.
- When both Timepulse and LEAP mode are enabled, the timepulse might not work properly.
  Workaround: Disable the LEAP mode when using the timepulse functionality.
- When both the odometer and the LEAP mode are enabled, the odometer is inaccurate.
  Workaround: disable the LEAP mode when using the odometer functionality.