# RTKLIB ver.2.4.0 Release Notes

## New Features in ver.2.4.0

(1) PPP-kinematic and PPP-static modes are added for both real-time and post-processing
(2) Long baseline RTK is supported with automatic FTP download of precise ephemerides
(3) RINEX 2.12, 3.00, OBS/NAV for Galileo/QZSS, NAV for SBAS and RINEX CLK are supported
(4) RTCM v.3 SSR messages (MT 1057-1068) are supported for real-time PPP
(5) Real-time and remote visualization of solutions are supported by RTKPLOT

## Supported RTCM and Receivers' Proprietary Messages

| RTCM version /Receiver | Data Message Types | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | GPS Raw Meas Data | GLONASS Raw Meas | GPS Ephemeris | GLONASS Ephemeris | ION/UTC Parameters | Antenna Info | SBAS Messages | Others |
| RTCM v.2.3 [1] | Type 18, 19 | Type 18, 19 | Type 17 | - | - | Type 3, 22 | - | Type 1, 9, 14, 16 |
| RTCM v.3.1 [1] | Type 1002, 1004 | Type 1010, 1012 | Type 1019 | Type 1020 | - | Type 1005, 1006, 1007, 1008, 1033 | - | SSR corrections (9) |
| NovAtel OEM4/V, OEMStar [2] | RANGEB, RANGECMPB | RANGEB, RANGECMPB | RAWEPHEMB | GLO-EPHEMERISB | IONUTCB | - | RAWWAAS-FRAMEB | - |
| NovAtel OEM3 [2] | RGEB, RGED | - | REPB | - | IONB, UTCB | - | FRMB | - |
| NovAtel Superstar II [2] | ID#23 | - | ID#22 | - | - | - | ID#67 | ID#20, #21 (8) |
| u-blox LEA-4T, [3] LEA-5T [3] [5] | UBX RXM-RAW | - | UBX RXM-SFRB | - | UBX RXM-SFRB | - | UBX RXM-SFRB | - |
| Hemisphere Crescent, Eclipse [4] | bin 96 | - | bin 95 | - | bin 94 | - | bin 80 | - |
| SkyTraq S1315F [6] [7] | msg 0xDD (221) | - | msg 0xE0 (224) | - | msg 0xE0 (224) | - | - | msg 0xDC (220) (8) |

(1) http://www.rtcm.org/, (2) http://www.novatel.com/, (3) http://u-blox.com/, (4) http://www.hemispheregps.com/
(5) F/W 6.02 (6) http://www.skytraq.com.tw/ (7) F/W 1.8.23-091106 or later (8) need the messages to get the measurement time for other messages (9) Type 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068 (based on 2010-4-12 version draft)

## Supported RINEX Files

| RINEX Version | Observation Data | | | | | | Navigation Messages | | | | | | Met. | Clock |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GPS | GLO | GAL | QZSS | CMP | SBAS | GPS | GLO | GAL | QZSS | CMP | SBAS | | |
| 2.10, 2.11, 2.12 | O | O | O | O* | - | O | N | G | L* | J* | - | H | - | - |
| 3.00 | O | O | O | O* | - | O | N | N | N | N* | - | N | - | C ** |

O, N, G, H, C, L: RINEX file type, GLO: GLONASS, GAL: Galileo, CMP: Compass, * extension, ** read only, - not supported

## Changes: ver.2.3.0 -> ver.2.4.0

(1) The following patches for ver.2.3.0 are included.

rtklib_2.3.0_p1, rtklib_2.3.0_p2, rtklib_2.3.0_p3, rtklib_2.4.0_p4

(2) The following problems are fixed.

(a) No.32 NMEA GPGGA quality indicator is not compliant with NMEA 0183 v.2.3
(b) No.35 Some default options are not consistent with help or manual
(c) No.40 Invalid input of deg-min-sec format solutions in west longitude or south latitude

(3) The following APIs are added, deleted or changed.

    (a) added

        obs2code(), code2obs(), cross3d(), normv3(), gst2time(), time2gst(), time_str(), timeset(), reppath(), reppaths(), eci2ecef(), deg2dms(), dms2deg(), tracehnav(), tracepclk(), searchpcv(), antmodel_s(), sunmoonpos(), tidedisp(), readrnxc(), setrnxcodepri(), outrnxhnavh(), outrnxhnavb(), eph2clk(), geph2clk(), seph2clk(), seph2pos(), peph2pos(), satantoff(), satposs(), readdcb(), initsolbuf(), freesolbuf(), getsol(), addsol(), inputsol(), outprcopts(), outprcopt(), sbsupdatecorr(), sbssatcorr(), sbstropcorr(), sbsioncorr(), searchopt(), str2opt(), opt2str(), loadopts(), saveopts(), resetsysopts(), getsysopts(), setsysopts(), strsettimeout(), strsetdir(), rtksvropenstr(), rtksvrclosestr()

    (b) deleted

        uniqeph(), satposv(), satposiode(), postposopt(), pntvel(), eph2posp(), sbspntpos(), sbsupdatestat(), setsolopt(), setsolformat()

    (c) changed

        readpcv(), readrnx(), readrnxt(), outrnxnavh(), outrnxgnavh(), convrnx(), eph2pos(), geph2pos(), satpos(), readsol(), readsolt(), readsolstat(), readsolstatt(), outsolheads(), outsols(), outsolexs(), outsolhead(), outsol(), outsolex(), outnmea_rmc(), outnmea_gga(), outnmea_gsa(), outnmea_gsv(), sbsreadmsg(), sbsreadmsgt(), pntpos(), rtkinit(), rtkpos(), postpos(), rtksvrstart()

(4) The following source codes for the library are added.

    options.c, pntpos.c, ppp.c, ephemeris.c

(5) RTKNAVI

    (a) "PPP-Kinematic" and "PPP-Static" for positioning modes are supported
    (b) "Dual-Frequency" is added for ionosphere correction
    (c) "SBAS", "Estimate ZTD" (PPP) "Estimate ZTD+Grad" (PPP) options are added for troposphere correction
    (d) "Precise", "Broadcast+SBAS", "Broadcast+SSR APC" and "Broadcast+SSR CoM" options are added for ephemeris
    (e) "# of Fix to Hold Ambiguity" option is added
    (f) ANTEX can be used for receiver antenna PCV file
    (g) earth tides correction (IERS solid earth tide model) is supported
    (h) "(3) Correction" stream is added as an input stream ("I")
    (i) "FTP" or "HTTP" type is supported as a correction stream
    (j) "Swap Intv" option is add for output and log stream to swap output files
    (k) output ("O") and log ("L") streams can be configured even when positioning active.
    (l) "Plot" button replaces "Map" button to execute RTKPLOT for real-time map and graph plot
    (m) RTCM v.3 MT 1057-1068 are supported for SSR corrections.
    (n) RTCM v.3 MT 1007, 1008 and 1033 are supported for antenna information
    (o) "RTCM SSR" monitor is added in RTK Monitor window

(6) RTKRCV

    (a) same as (a)-(j) of RTKNAVI new features
    (b) command line option -m is added for monitor port setting

(7) RTKPOST/RTKPOST_MKL

    (a) same as (a)-(g) of RTKNAVI new features
    (b) "Load" and "Save" buttons are enabled in "Options" dialog
    (c) RINEX 3.00 is supported as input of RINEX OBS/NAV files
    (d) SBAS log or EMS file is supported as input SBAS files
    (e) RINEX CLK file is supported as input precise clocks

(8) RTKCONV

    (a) "RINEX" is added as an input format
    (b) HNAV (GEO navigation message) is supported as an output file
    (c) RINEX 3.00 is supported for input or output of OBS/NAV
    (d) Galileo and QZSS is supported

(9) RTKPLOT

(a) Real-time plot function is added
(b) "Solution Source", "Obs Data Source" and "Obs Data QC" menus are added
(c) "Waypoints" and "Input Montor" menus are added
(d) "Maximum DOP", "Navigation System" and "Excluded Sats" options are added to "Options" dialog.

(10) STRSVR

(a) FTP/HTTP type is supported for input stream
(b) Connect Time indicator is added

(11) CONVBIN

(a) command line option -r rinex is added to support RINEX input
(b) command line option -v is added to support RINEX 3.00 output
(c) command line option -x is added to support excluded satellites
(d) command line option -h is added to support HNAV file output

(12) RNX2RTKP

(a) command line options -k is added to input options from an external configuration file

(13) STR2STR

(14) SBSPOS, SBSDUMP

(a) no longer supported (almost all functions are included in RTKPOST or RNX2RTKP)