LeoRx

Early research receiver for Xona LEO PNT signals

Scientific

The LeoRx is an early development multi-frequency GNSS reference receiver with Xona LEO PNT signal support. It provides measurements with the lowest noise and cycle slip rate on the market while continuously monitoring and protecting against interference, multipath and other environmental effects.

KEY FEATURES

- **Tracking and decryption of X1 and X5 Xona signals**
- **Tracks all visible GNSS signals (GPS, GLONASS, Galileo, BeiDou, NAVIC, QZSS and SBAS)**
- **High precision, low noise measurements**
- **AIM+ interference monitoring and mitigation system**
- **Smart telemetry system (SYNC+)**

Tracking all visible MEO signals

The LeoRx tracks all visible GNSS signals, generating low noise measurements. It produced the lowest number of cycle slips to offer the highest number of observations per slip during independent competitive testing.

Xona signal support

Data demodulation and decryption of Xona X1 and X5 signals for one satellite with user-specified PRN. This early-adopter receiver is designed to analyze and evaluate Xona signals in their early availability stage. The receiver provides pseudo-range, carrier-phase, doppler, C/No and decrypted navigation data from both signals simultaneously.

Networking, remote operations and data logging

Receiver configuration and data analysis is easy with RxTools software which shows receiver status, visualizes data and enables receiver communication.
SBF, RINEX, BINEX, MSM and NMEA data logging is possible on both the internal 16 GB memory and to an externally connected device. Up to 40 data jobs can be defined and logged data can be accessed via the Web UI or automatically pushed to an FTP server.

LeoRx

FEATURES

XONA technology
X1 and X5 raw navigation bits output, after decryption
Pseudo-range, carrier-phase, doppler, C/No

GNSS technology
789 Hardware channels for simultaneous tracking of all visible satellite signals
P-code tracking on L1 and L2 to avoid C/A-P biases
Independent tracking of L2C (GPS)
Up to 50 Hz raw data output (code, carrier, navigation data) (optional feature)

Septentrio's patented GNSS+ technologies
- **AIM+** industry leading anti-jamming, anti-spoofing interference monitoring and mitigation technology
- **APME+** a posteriori multipath estimator for code and phase multipath mitigation
- **LOCK+** superior tracking robustness under heavy mechanical shocks or vibrations
- **IONO+** advanced scintillation mitigation
- **RAIM+** (Receiver Autonomous Integrity Monitoring)

OSNMA Support
Spectrum analyser

Data formats and storage
Septentrio Binary Format (SBF), fully documented with sample parsing tools
For MEO GNSS data only:
- RINEX (obs, nav, meteo) v2.x, 3.05, 4.00
- BINEX
- NMEA v2.30 and v4.10 output
- RTCM output (All MSM messages supported)
- CMR 2.0 output

Connectivity
10 MHz reference input
10 MHz reference output
x PPS output (max 100 Hz)
4 Hi-speed serial ports
1 Ethernet port (100 Mbps)
Power over ethernet
1 Full-speed USB port
HTTP/HTTPS
Advanced Web UI providing all receiver controls, and status monitoring. Alternatively, a light Web UI for low bandwidth connections
FTP server, FTP push, SFTP, SYNC+
NTRIP (v1 and v2) client, server and caster

INCLUDING

RxTools, a complete and intuitive GUI tool set for receiver control, monitoring, data analysis and conversion.

GNSS receiver communication SDK. Available for both Windows and Linux.

PERFORMANCE

Measurement precision [1,2]

		Unsmoothed pseudorange (cm)
GPS	L1C/A, L2C	16
	P code	10
	L1C	8
	L5	6
GLONASS	L1C/A, L2C/A	25
	P code	10
	L3	6
Galileo	E1	8
	E5A, E5B	6
	E5AltBOC	1.5
	E6	7
BeiDou	B1I, B1C, B2I	8
	B2a, B2b, B3I	6
NavIC	L5	16
QZSS	L1C/A, L2C, L1S	16
	L1C	8
	L5	6
		Carrier phase
All signals		1- 1.3 mm

GNSS Static performance (RMS)

Static and rapid static	
Horizontal	3 mm + 0.5 ppm
Vertical	5 mm + 0.5 ppm
Static high precision	
Horizontal	3 mm + 0.1 ppm
Vertical	3.5 mm + 0.4 ppm

Maximum update rate

Measurements	50 Hz

Time accuracy (MEO)

1 PPS out[3]	5 ns
1 PPS out rise time	< 2 ns
Events	< 3 ns

Time to first fix

Cold start[4]	< 45 s
Warm start[5]	< 20 s
Re-acquisition	Avg 1.2 s

MEO GNSS Tracking performance (C/N0 threshold)[4,7]

Tracking	20 dB-Hz
Acquisition	33 dB-Hz

PHYSICAL AND ENVIRONMENTAL

Power consumption	3 W
Size	235 x 140 x 47 mm
Weight	1.05 kg
Humidity	5 % to 95 % (non-condensing)
Operating temperature	-40 °C to +65 °C
Storage temperature	-40 °C to +85 °C
Input voltage	9-30 VDC

Antenna LNA power output on TNC

Output voltage	+5 VDC
Maximum current	200 mA

Connectors

Antenna	TNC
REF IN	BNC female
REF OUT	BNC female
PPS OUT	BNC female
Power	ODU 3 pins female
COM1	ODU 7 pins female
COM2	ODU 7 pins female
COM3/4/USB	ODU 7 pins female
Ethernet	ODU 4 pins female

Certification
RoHS, WEEE, CE, FCC

[1] 1σ level
[2] C/N0 = 45dB-Hz
[3] Includes software compensation of sawtooth effect
[4] No information (almanac, approx., position) available
[5] Ephemeris and approximate position known
[6] Max speed 600m/s
[7] Depends on user settings of tracking loop parameters

BBr 04/2026

EMEA
Greenhill Campus (HQ)
Interleuvenlaan 15i
3001 Leuven, **Belgium**

Espoo, **Finland**

Americas
2601 Airport Drive,
Suite 360
Torrance, CA 90505, **USA**

septentrio.com/contact

Asia-Pacific
Shanghai, **China**
Yokohama, **Japan**
Seoul, **Korea**

septentrio.com