Europe’s Premier Professional GNSS Receiver Manufacturer

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Ir. Peter A. GROGNARD
Founder & CEO, Septentrio
Septentrio Company Introduction

- Europe’s leading manufacturer of professional OEM receivers
- Privately-held company with headquarters in the heart of Europe, and offices in Los Angeles and Beijing.
- Recognized Pioneer & World Leader for Galileo Receiver R&D

MISSION

Design, develop & commercialize
High-end OEM satellite navigation products
Based on the Company’s proprietary satellite navigation technology
Septentrio Group – Global Presence

- Septentrio NV
  - Belgian Company based in Leuven (near Brussels)

- Septentrio Inc
  - California Corporation
  - Majority-Owned by Septentrio nv

- Altus Inc
  - California Corporation
  - Manufacturer of Survey Equipment
  - Majority-Owned by Septentrio Inc

- Office in Beijing, China

- Worldwide dealership
GNSS receivers and applications: high-precision and high-integrity applications
Product Lines - Overview

- **AsteRx**
  Compact low power high-update rate rover receivers
  - AsteRx-m: Ultra low power GPS/GLO RTK receiver
  - AsteRx2eL: RTK/PPP receiver
  - AsteRxi: GNSS/INS integrated solutions
  - AsteRx2eH: Dual Antenna receiver for heading applications

- **PolaRx**
  High-quality multi-constellation reference station/scientific

- **AiRx**
  FAA certifiable receiver for avionics

- **PPSDK**
  Development kit for integration of positioning/ navigation algorithms and post-processing
The AsteRx family

AsteRx2eL
GPS/GLO
L1/L2/L-band
RTK/TerraStar

AsteRx3
GPS/GLO/GAL
L1/L2/L5/E5
RTK

AsteRxi
GPS/GLO
L1/L2
GNSS/INS

AsteRx2e
GPS/GLO
L1/L2 RTK

AsteRx-m
GPS/GLO
L1/L2 RTK
@ 0.5 W

AsteRx2eH
GPS/GLO
L1/L2
Dual-antenna
RTK+heading
The PolaRx family

**PolaRx4**
272 Channels
GPS/GLO/GAL/COMP
L1/L2/L5/E5
Webserver
Rinex Logging
FTP Push...

**PolaRx4 TR**
272 channels
GPS/GLO/GAL/COMP
L1/L2/L5/E5
Webserver
Rinex Logging
FTP Push...

**PolaRxS**
136 channels
GPS/GLO/GAL/COMP
L1/L2/L5/E5
Ultra low noise OCXO
100 Hz measurements

*Ionospheric monitoring*

*Precise timing applications*
AiRx2: upgradable dual-frequency BETA-3 receiver

- 16 channels GPS L1 C/A code/cARRIER
- 4 channels L1 SBAS
- In-the-field upgrade paths for GPS L5 and Galileo
- DO229 / DO-160 /DO178 level B
- Compact and low power
  - 60 x 100 mm ~ 4W

- Embedded independent health processor
- Maintenance port for in-the-field maintenance
- Raw data output
- RAIM and pRAIM
- Fault Detection/Exclusion
- Continuous and initiated BIT
- Multiple data and signalling outputs
  - RS233/422, but also upgrade paths for ARINC 429 and AFDX
  - Incl. health bit, DO-229 bit, reset pin, maintenance pin
- Recalculate position solutions offline with different assumptions
- Based on receiver positioning algorithms
- Post-processing: Measure without base station, then calculate offline
- SDK for integration in 3rd party applications
Major Trends – Mega Tendências

- #1 - Low-power high-precision RTK
- #2 – PPP - Decimeter-precision worldwide
- #3 - Deployment of new GNSS systems/satellites
  - Galileo and Beidou
  - More interference – need for interference mitigation
- #4 - Ionospherical effects – Septentrio solutions
- #5 – Septentrio and UAVs
#1 Low-Power High-Precision RTK
AsteRx-m Compact Low Power High Precision GPS receiver module

- (R)evolution:
  GPS Rx + data collector           precision GPS integrated in PDA

- AsteRx-m: world-leading high-precision GPS/GLO RTK receiver with lowest power consumption
- Integration in industrial tablet and other low-power platforms for multitude of applications:
  - All-in-one Agriculture screen
  - Construction work management
  - Ship piloting
  - GIS/Survey tablet
General purpose dual frequency GPS/GLONASS receiver
- Common interface with AsteRx2e and AsteRx3 family
  - RTK incl. RTK moving base
  - L-band receiver on-board for Terrastar-D
    - **Worldwide decimeter accuracy without local infrastructure**
  - Seeding of Terrastar-D for instantaneous convergence
  - Extremely reliable network for correction generation and distribution (common with offshore operations)
  - Over-the-air service commissioning

- Ethernet interface, WebGUI
- OEM or hardplastic housing
Deployment of new GNSS systems/satellites

PolaRx4 Multi-GNSS reference station

- Signals support
  - GPS L1, L2, L5
  - GLO L1, L2, L3 RF ready
  - GAL E1/E5a/E5b/E5ab (inc AltBOC)
  - COMPASS Ready – Beidou build available
  - Real all in view (4 constellations x 12 sats, all signal)

- Advanced Interference Mitigation (digital, in-band)

- 100Hz Measurement output

- Integrated webserver/ftp

- Clock Steering + Disciplined Ref out (VCTCXO)

- Compatible with Geo++ GNSmart

- Special time transfer variant PolaRx4TR
#4 - Ionospherical effects – Septentrio solutions
PolaRxS Scintillation monitor

- Multi-frequency, multi-constellation receiver dedicated to ionospheric monitoring and space weather applications

- Successfully developed in cooperation with UNESP – Prof Galera

- Key features:
  - Triple frequency GPS, GLO, GAL
  - Up to 100Hz MEAS output (signal phase + intensity)
  - Lock+ for tracking high dynamics
  - Ultra-low phase noise oscillator (OCXO) – lowest noise observations on the market
  - Modern connectivity (Ethernet, WebGUI, ftp)
Maintaining reliable tracking during strong scintillations

Mitigating the impact of the degraded measurement on high precision positioning (RTK, PPP)
CIGALA/CALIBRA Network

- 8 ISMR Stations spread across whole Brazil
- Full operational since more than 2 years
- 3 new stations to be deployed
- Powered by PolaRxS

gege@fct.unesp.br
CIGALA continuous monitoring network in Brazil

- 8 stations in Brazil
- Two stations at São José dos Campos and Pres. Prudente
- Data stored locally and sent to repository at UNESP, Pres. Prudente
- Data mirrored at INGV, Rome
- http://cigala.galileoic.org/
#5 – Septentrio and UAVs

- High-precision GNSS receivers for demanding UAV navigation
  - Stabilizing cameras
  - No-drift hovering
  - Hi-precision landing
  - 10cm everywhere
  - Relative navigation
  - Bad visibility Nav.
Flying in Civil Airspace

  - Fully integrate UAVs into national airspace by September 2015
  - FAA-certifiable GNSS OEM receivers is an answer to facilitate

AiRx2 with Advanced Interference Mitigation & safety processor meets relevant safety criteria.
### Your Navigation Situations

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### Ask About Our Navigation Whitepapers

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Muito Obrigado!

Check out our products at

http://www.septentrio.com/products