Septentrio European receivers development

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Agenda

❖ Septentrio Galileo Receivers
  ❖ GSTB-V2 Experimental Test Receiver
    (ESA, GSTB-V2 EIOT & GSTB-V2 ME)
  ❖ Galileo Test User Receiver
    (ESA, Galileo Phase CDE1)
  ❖ Galileo Professional Receiver Development
    (GJU FP6 2nd call)
❖ Receiver development tools and facilities
GSTB-V2 Experimental Test Receiver

Target: Testing of GSTB-V2 signals (GIOVE-A, GIOVE-B, GSVF)

GSTB-V2 / A
- Lift-off mass: 600 kg
- Power demand: 700 W
- Stowed Dimensions: 1.3 m x 1.8 m x 1.65 m

GSTB-V2 / B
- Lift-off mass: 495 kg
- Power demand: 760 W
- Stowed Dimensions: 1.0 m x 1.0 m x 2.4 m
GETR: Specifications

- Simultaneous acquisition and tracking of
  - GPS CA and P modulations on L1, L2 and L5
  - All GSTB-V2 signals (E5a, E5b, E5, E6BC, L1BC)
- Tracking of all modulations
- Multiplexing, modulation type (sin/cos), pilot/data are selectable
- Channels: 6 GSTB-V2 (+1 AltBOC), 9 GPS
- GUI and advanced user and development tools (incl. IF sampling and Correlation peak monitoring)
- Upgradeable to IOV constellation
- 1PPS in & out (GPS synchronised)
GETR: Architecture

RF Splitter + Clock Distribution

RF IN

AUX IN

REF IN

MAINS

Power Supply Distribution

E5 Frontend

E6 Frontend

L1 Frontend

L1-P(Y) Frontend

E5 Baseband

E6 Baseband

L1 Baseband

L1-P(Y) Baseband

L2-P(Y) Baseband

Receiver Control

Input/Output

MAIN LAN

COM

PPS IN/OUT
GETR: Development Status

GETR Extended In-Orbit Testing receivers:
- used in 2005 & 2006 by SSTL & ESA for
- first ever GIOVE-A reception and
- Galileo frequency filing support

GETR Mission Experimentation (ME) receivers:
- deployed in 2006 & 2007 by INDRA / ESOC / GFZ
- in world-wide GSTB-V2 reference station network

Commercial Version available: GeNeRx
Galileo TUR: Test User Receiver

Target: Early Available Galileo User Receiver for the IOV phase:

- Verification of Galileo system requirements IOV phase
- Verify User Reqs for all the services
- Emulate all kinds of Galileo receivers
- Verify positioning accuracy, ephemerides, iono-model, etc
TUR: Specifications

- Simultaneous acquisition and tracking
  - GPS CA on L1 and GPS L5
  - EGNOS L1
  - All Galileo signals (E5a, E5b, E5, E6BC, E6A, L1BC, L1A)
  - in various modulation schemes (BOC(m,n), BPSK(n) and AltBOC)
- Channels: 72 generic single channels
- Precise timing transfer interface (1PPS output)
- High Speed I/F (USB, Ethernet, Wireless)
- GUI and advanced user and development tools
- Extended output of internal parameters
TUR: Architecture

- 19” rack box
- 6 separate U-board
- CompactPCI
- Backplane
- Powerful CP6000 6U compactPCI controller
- Single stage heterodyning AFEs
- 3 tracking modules (FAU, Viterbi Unit, 24 channels)
TUR: Development Status

- TUR CDR: July 2006
- TUR Qualification Review: October 2007
FP6 2nd call: SWIRLS

- Project Target: to build the prototype of a Galileo/GPS receiver for the professional market
- Market: professional and industrial markets
SWIRLS Specifications

- Dual-frequency dual constellation
- High accuracy absolute and relative positioning (incl. RTK)
- Static and kinematic applications
- Full receiver prototype
  - # channels
  - PVT
  - interfacing
SWIRLS: Architecture

- Multi Frequency and multi-constellation AFE
- Baseband: FPGA and processor
SWIRLS: Development Status

 Qué KO end October 2005
 Québec Requirements will be consolidated end April 2006
 Québec CDR scheduled April 2007
 Québec Prototype ready for summer 2007
Receiver development tools and facilities

Receiver Development Life cycle

- User Requirements
- Specifications
- Design
- Implementation
- Integration Test
- Unit or Module Test
- System Test
- Acceptance Test
- User Level

External Simulation Tools
- SSN Simulation Tools
- SSN HW platform

Supplementary Tools
- Real constellation
- Constellation Simulator
- Post-processing tool

Signal Simulator

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ESTEC workshop
Receiver development tools and facilities

- User Requirement external verifications: external simulations tools
  - GSRLab from Skysoft
  - GRANADA From Deimos

- Design Tools:
  - Internal Simulation tools (Matlab/Simulink/C)
  - HW Flexible FPGA test platform

- Integration and system tests: SSN Signal Simulator

- Integration to Acceptance tests:
  - Constellation Simulator (e.g. Spirent, GSVF, GATE (TBD))
  - Post-processing tools internal or external (e.g. GRAFNAV)
  - Real constellation (GPS, Giove, IOV)
Thank you!

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