Alberding solutions for GNSS infrastructure operators

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Outline

About Alberding GmbH

Alberding software products

Alberding manyRINEX

Alberding A10-RTK GNSS receiver

Alberding GmbH

German GNSS software and hardware development company

- Founded in 1994
- Based in Wildau (near Berlin)
- 14 employees (12 engineers)
- Independent from GNSS receiver manufacturers
- Specialised in GNSS data communication, data management, processing and monitoring

Range of services (portfolio)

Adaptable **software**, **sensors**, **systems** and **services**
for automated applications of precise (mm-cm) satellite-based positioning, monitoring and data transmission

Agriculture/Forestry

Construction/Mining

Geo-monitoring

GIS/Surveying

Traffic/Transportation

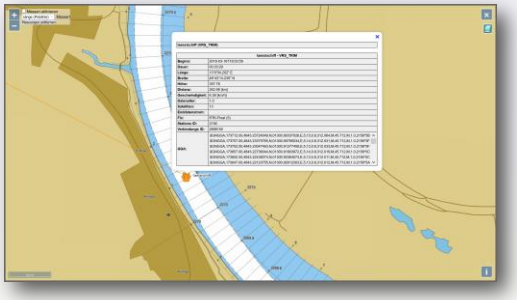
Maritime/IWW Navigation

System approach of Alberding GmbH

- Adaptable web-based server software for (GNSS) position based **applications** and **services** (cloud solution)
- "Intelligent telemetry & positioning sensors" (Alberding A07 and A10) for **automated operation** in the field with
  - High integration level
  - Standalone operation
  - Flexible configuration (data flow)
  - Use of low(er)-cost GNSS receivers
- Mobile positioning solutions adapted to customer needs in terms of data flow, special calculations, sensor integration
- **Advantages of this approach**:
  - Attractive sensor prices
  - Automation of solution adapted to customer needs

Alberding GmbH products

- **Beacon.net**: DGNSS infrastructure solution for AtoN service providers
  - Integrity checked DGNSS corrections (pre-broadcast monitoring)
  - Combination of DGNSS/RTK and waterway information



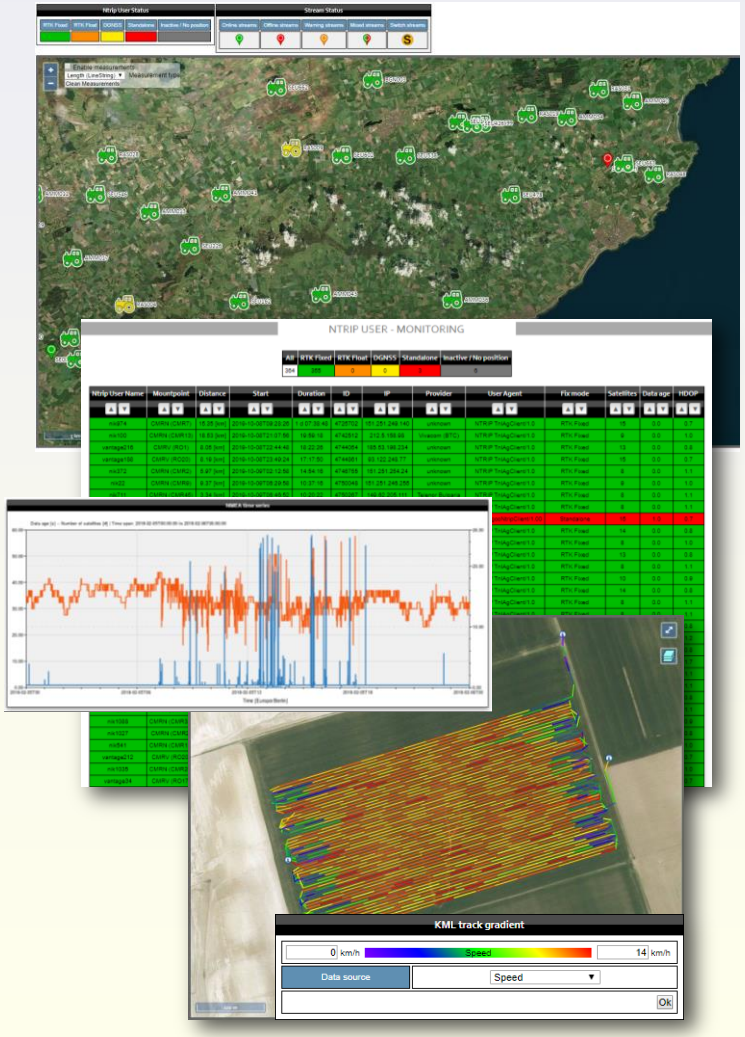
- **Alberding Ntrip Caster**: RTK corrections via the Internet
  - Designed for mass usage (mountpoints, users)
  - Map display of user positions (WMS, Sentinel maps, iECDIS, etc.)

- **Alberding-QC**: Quality control for GNSS services
  - Checkstream, RTK-Check, InspectRTCM
- **GNSS Status Sw**: Multi-purpose GNSS monitoring
  - Observation data quality, positioning accuracy, atmosphere

- **MaPos**: Software for machine positioning
  - Positioning of excavators with RTK receivers and tilt sensors
- **Alberding Monitor**: Geo-monitoring solution
  - GNSS monitoring (post-processing, near real-time processing, RTK, PPP)
  - Other sensors (total stations, geotechnical sensors, etc.)

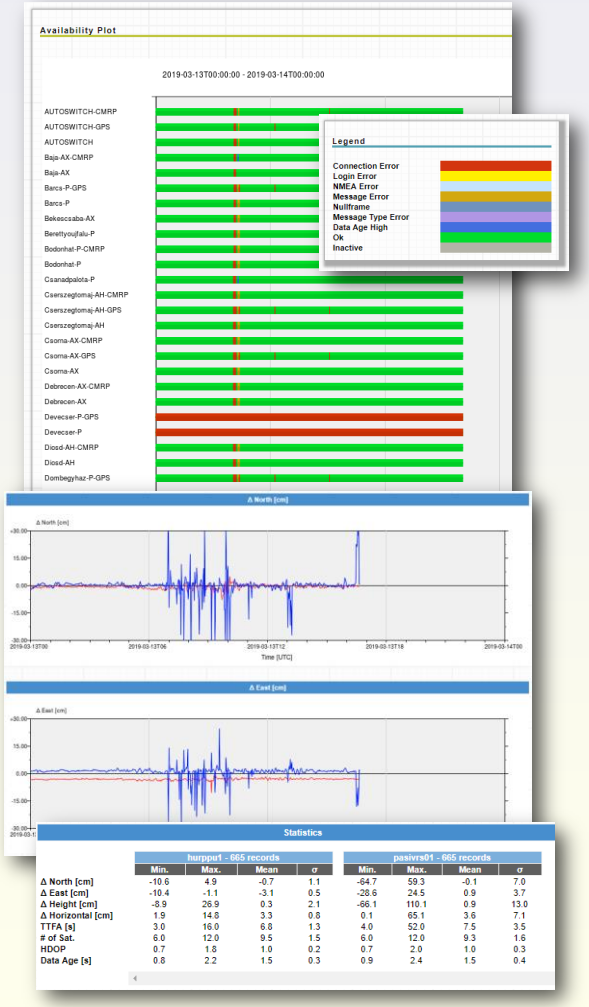
Alberding Ntrip Caster

- Professional Ntrip broadcaster with user-friendly web interface
- Permanent software licence or service
- Numerous advanced features:
  - Different access levels to web interface (admin, subadmin, basic)
  - Rebroadcasting 3rd party VRS corrections
  - Geofencing
  - WMS/TMS/WMTS and Sentinel map layers
  - Detailed rover performance analysis
  - Backup caster for redundancy (or load balancing)
  - TLS encryption for data security



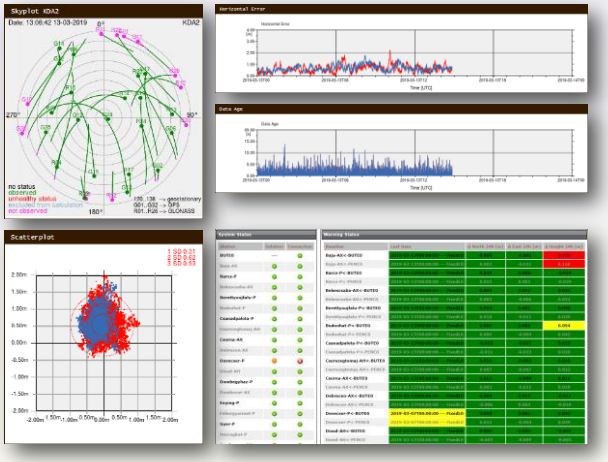
Alberding-QC

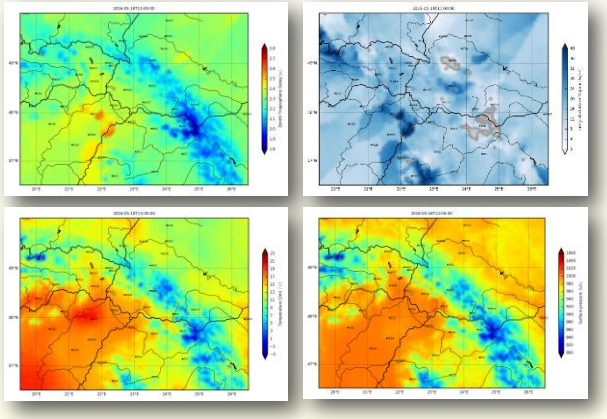
- Web-based quality control software for DGNSS, RTK and PPP service providers
- Available as a permanent software licence or as a service
- Checkstream
  - Ntrip stream availability and data content monitoring
  - Automatic email/SMS alarming
- RTK-Check
  - Positioning accuracy and RTK fixing time monitoring
  - GNSS receiver or software-based calculations
- InspectRTCM
  - GNSS binary data decoding and visualisation



Alberding GNSS Status Software

- Central data management and processing software for monitoring GNSS reference station networks and positioning services
- Interface to external processing modules
  - RTK and PPP positioning
  - Atmosphere modelling
- Quality control and monitoring
  - GNSS observation data quality (dual frequency GPS, GLONASS, Galileo, BeiDou)
  - Reference station antenna stability
  - DGNSS/RTK/PPP service quality
  - External sensor data
  - Troposphere
- Web interface for visualisation, alarming and logging





Alberding manyRINEX

- Automated RINEX generation software

- Supports many different GNSS binary raw data formats:
  - Trimble, Leica, Topcon, Javad, NovAtel, Septentrio, Ashtech, Hemisphere, u-blox, Sirf, etc.
  - RTCM 2.x, RTCM 3.x
- Supports all RINEX versions from 2.10 to 3.04
- Supports all GNSS constellations

Alberding manyRINEX features

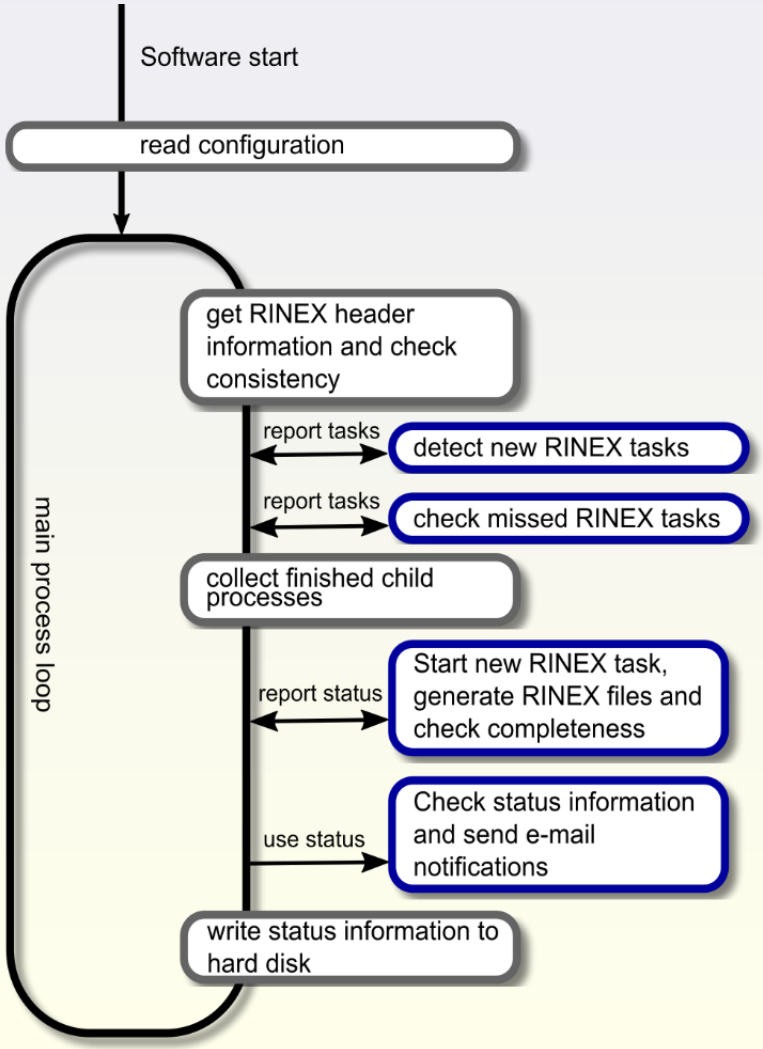
- RINEX generation for hundreds of reference stations
- Generation of daily and hourly RINEX files
- Observation interval: depends on input (1 Hz, 10 s, 30 s, ...)
- High system performance due to multi CPU core usage
- RINEX data compression (Hatanaka, GNU gzip)

Alberding manyRINEX features

- Special features:
  - Prioritisation of RINEX tasks
  - Processing of delayed raw data inputs
  - RINEX header data import from SQL database or an ASCII CSV file
  - RINEX header data consistency check
  - Completeness check of the generated RINEX files
    - total number of epochs [%],
    - signals tracked,
    - number of signals/frequencies/constellations per epoch [min/max/mean],
    - number of satellites per constellation per epoch [min/max/mean]
    - Signal strength (C/N_0) [min/max/mean]
  - Email notification on system failures, completeness problems and RINEX header inconsistencies

Alberding manyRINEX workflow

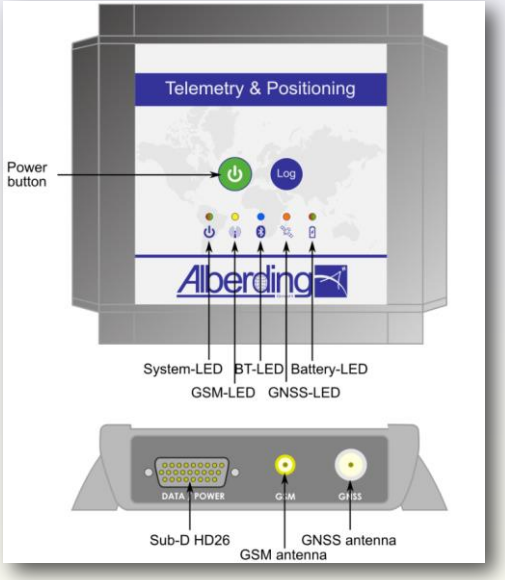
- Available for many Linux distributions
- Command line application
- Controlled by a plain text configuration file
- On-the-fly configurable
- Permanent background service
- Main process loop and child processes to optimise parallel processing of tasks



Alberding A10 - telemetry & positioning

Components of the Alberding A10-RTK:

- **L1/L2 multi-constellation GNSS** receiver (GPS, GLONASS, Galileo, BeiDou, SBAS)
  - MB-Two (Trimble)
  - NV08C-RTK-M (NVS)
  - Piksi (Swift Navigation)
  - F9 chip (u-blox)
- **Integrated LTE modem**
- Bluetooth module with external antenna
- Integrated memory (MicroSD card)
- Integrated Cortex processor (data management)
- **Optional: Integrated Linux board for application software**



Examples for A10-RTK (MB-Two):

- GNSS monitoring station (TU Dresden - Greenland)
- Monitoring station for RTK services (Swisstopo)
- Kinematic positioning (BKG project FAMOS)
- SSR2OSR (Bavarian Surveying and Mapping Authority)

Alberding A10-RTK applications

- Geo-monitoring
  - Near real-time processing
  - RTK
- Surveying / GIS
  - AGIS software
  - RTK monitoring station
- Integrated Linux board for application sw:
  - SSR2OSR data conversion
  - Own processing algorithms
  - Support of two IP addresses
  - Alarming from the A10-RTK
    - Geo-monitoring
    - Geofencing
  - Machine positioning
    - RTK + heading
    - Data transfer
    - Machine data collection (CAN bus)

Thank you for your attention!

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