Challenges and Upgrades of the EPN Central Bureau Information System

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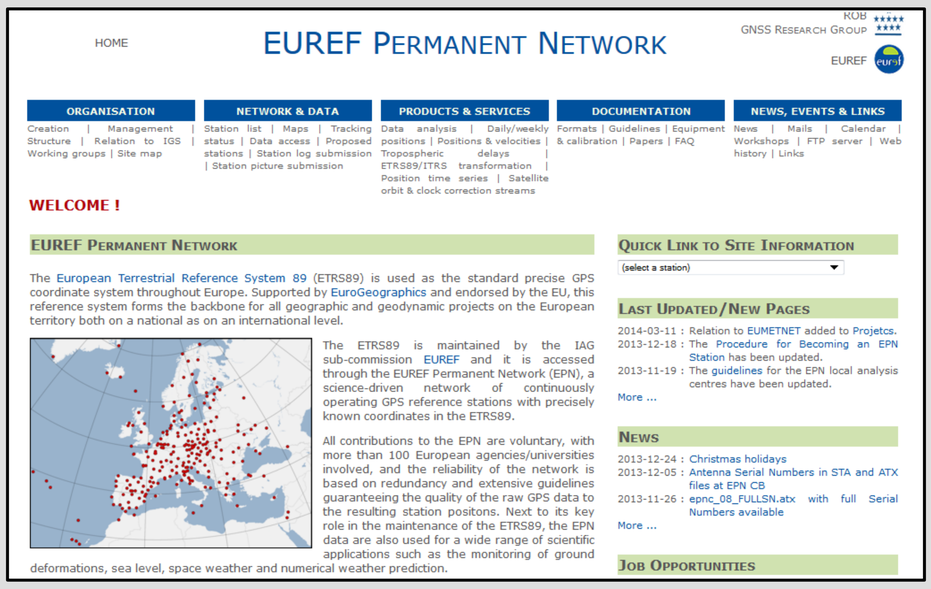


Introduction

The EUREF Permanent Network (EPN) Central Bureau (CB) is responsible for the daily management of the EPN (http://www.epncb.oma.be/):

- Gateway to all EPN observation data, meta-data and products
- Monitoring and validation of EPN data and meta-data
- On the web since 1996, but permanently evolving

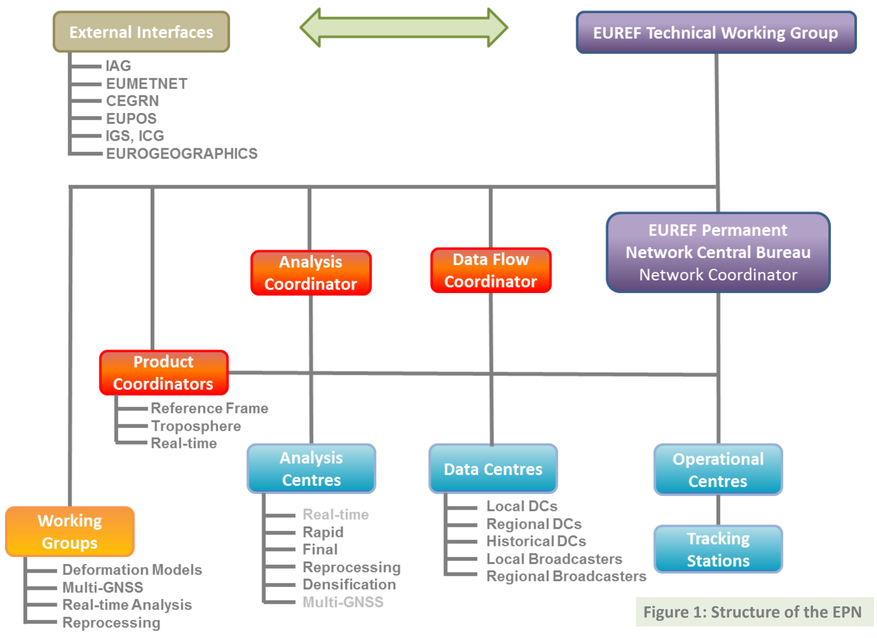


Figure 1: Structure of the EPN

Changing GNSS landscape imposes new challenges on EPN CB:

- Growing importance of real-time data distribution
- Multiple GNSS systems, new signals, RINEX v3.02 format
- European Place Observatory System (EPOS, construction phase starting 2016), with a GNSS component aiming to provide access to data and meta-data from all possible European GNSS stations

Recent Upgrades

Proactive requests for station pictures: 97% of EPN stations

Checks of availability of *RINEX v3.xx* observation data + meta-data check ; stimulate station managers to submit RINEX v3.02

Comparison of EPN Zenith Tropospheric Delays (ZTD) with ZTD from co-located radiosonde and VLBI

Daily updated residual position time series + Link to ITRF time series (if available)

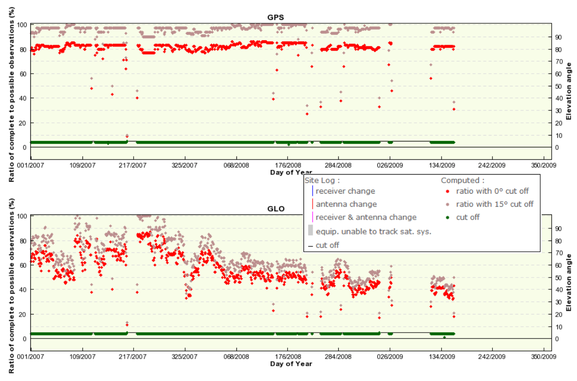


Figure 7: Percentage of complete observations

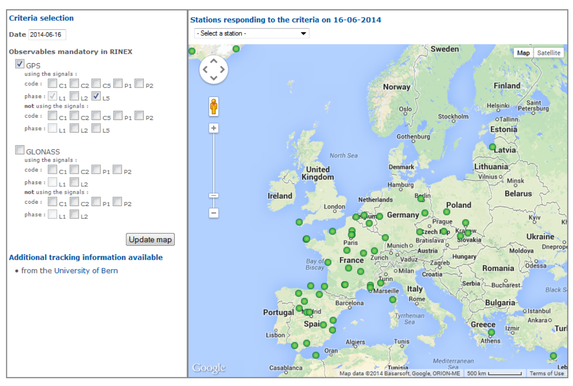


Figure 8: EPN tracked signals (RINEX V2.11 only!)

Separate data quality metrics for GPS and GLONASS tracking (Fig. 7)

All available individual antenna calibrations (multiple sources e.g. GEO++ and Uni. Bonn)

Meta-data checks of real-time data streams

Signal Tracking Map (Fig. 8)

EPN CB Information System

Continuous evaluation of functionalities and adaptation of infrastructure, internal database and software according to evolving (external and internal) user needs.

Hardware: Virtual machine on ESX server (redundancy & scalability).

OS: Linux CentOS 6.4 (stability & reliability).

Web site: Completely developed at ROB ; xhtml & css2 compliant (css3 not accepted yet by all browsers!), PHP/MySQL, Javascript, Google maps.

Relational MySQL Database (Third Normal Form) :

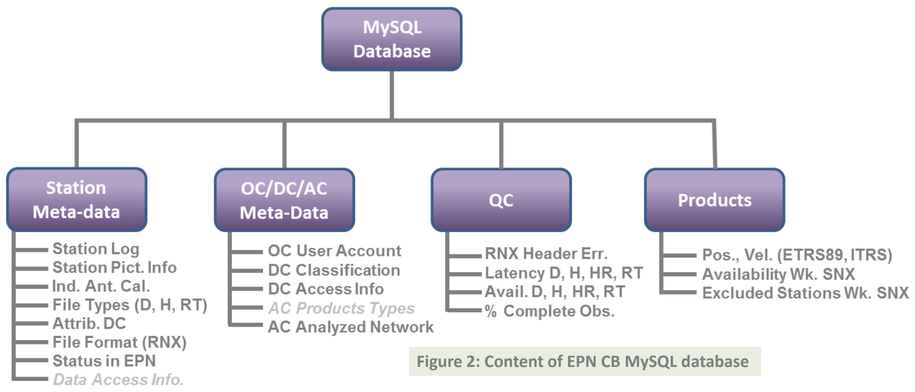


Figure 2: Content of EPN CB MySQL database

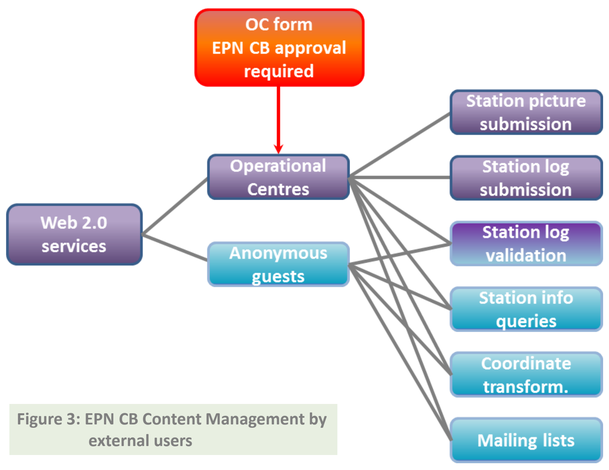


Figure 3: EPN CB Content Management by external users

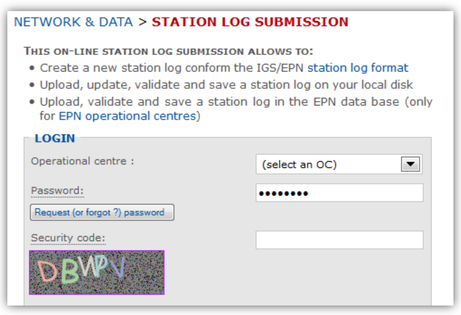


Figure 4: On-line station log submission (same principle for station picture submission, Fig. 5)

Web 2.0 enabled content management of EPN station information (station log and pictures), see Fig. 5.

Operational Centre (OC) ASCII form sent by email to be approved by EPN CB (list of stations and responsible for station log update).

For EPN stations (user account for each OC): reads station log from MySQL database, on-line changes, validates and saves in database and exports in station log format. Similar account for submission of station pictures.

For non EPN stations (guest account): reads station log from local disk, interactive on-line changes, on-line validation and saves station log on local disk.

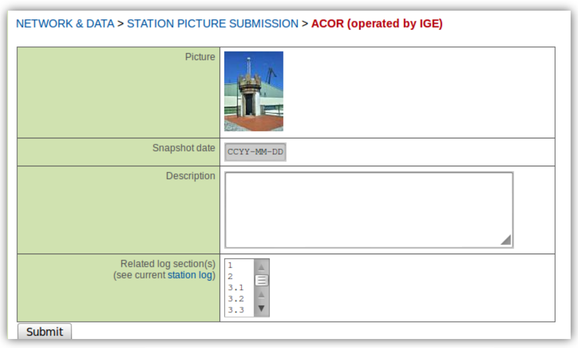


Figure 5: On-line station picture submission

On-line station log submission triggers (Fig. 6) :

- Email notification to IGS Central Bureau (only for IGS stations)
- Update of EPN CB MySQL database
- Update of meta-data files (internal and public)
- Public meta-data files are pushed to ftp
- Headers of EPN historical RINEX archive are updated (if required)

Dynamical web pages interact with updated MySQL DB and other meta-data files. Web pages will display up-to-date info with a max. latency of 5 min.

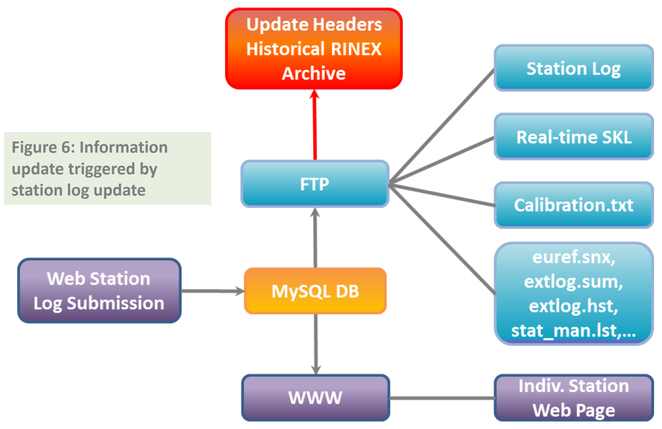
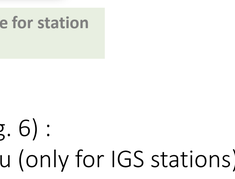


Figure 6: Information update triggered by station log update

Plans

Switch to multi-GNSS (Galileo included) data quality check software + RINEX v3.02

EPN densification stations (meta-data and data access information available and maintained)



Real-time monitoring of real-time data availability and consistency of streaming information at 3 EPN broadcasters (broadcaster guidelines under preparation), Fig.9

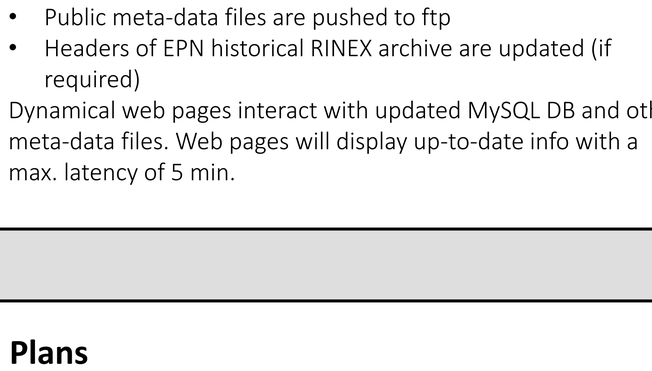


Figure 9: Draft design of new broadcaster monitoring web page

Enhanced "Quick-View" station status map (Fig. 10)

Figure 10: Draft design of new interactive EPN station status web page (Status is green when: Daily stations → data available for the last day; Hourly stations →data available for the last hour ; Real-time stations → data available now)

Re-organization of Analysis Centres (introduction of new types of Analysis Centres)

Distributed access for content management for all EUREF Working Groups and EPN Product Coordinators

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