Federal Agency for
Cartography and Geodesy

# Report on EPN Real-Time Analysis

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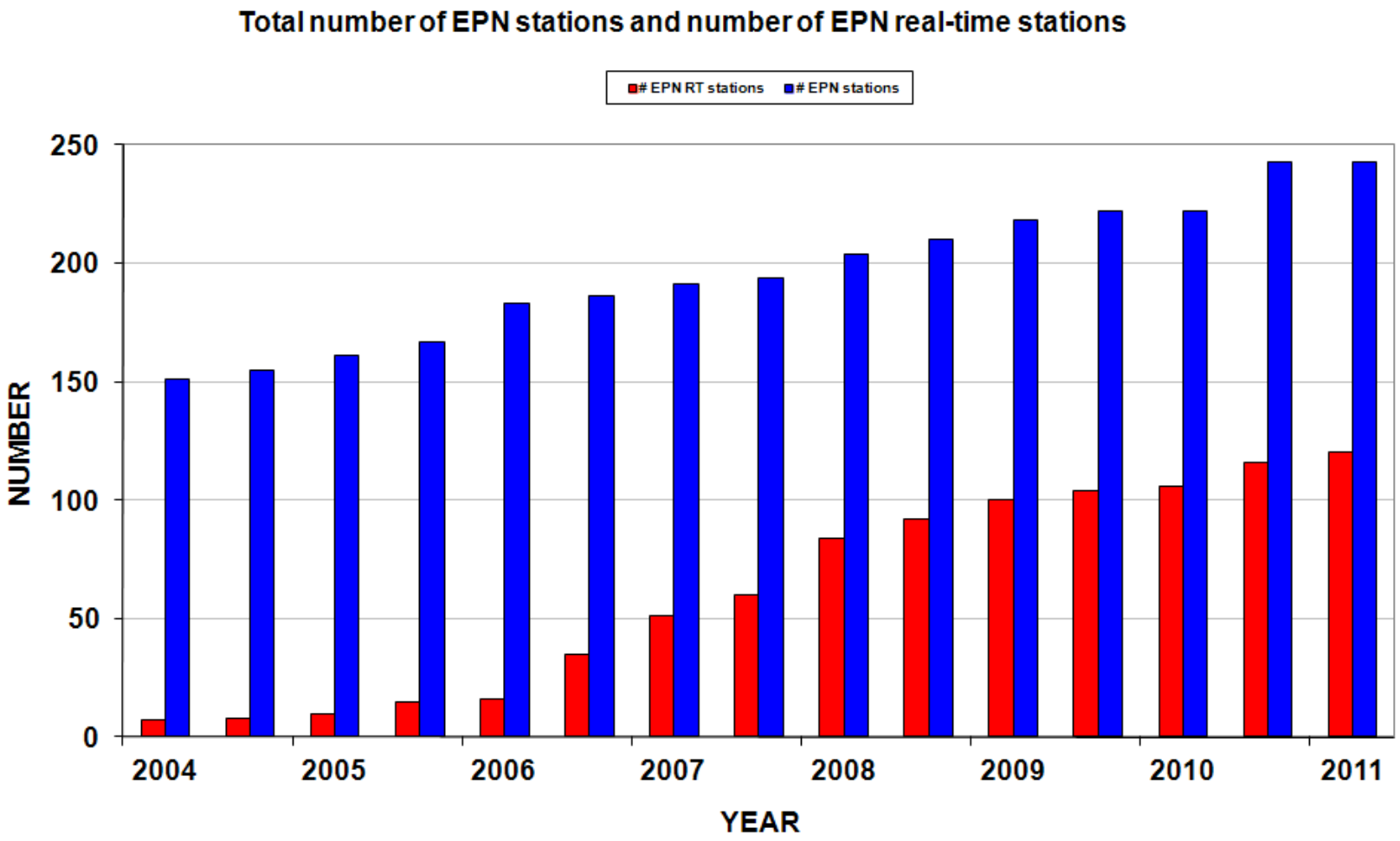
Federal Agency for Cartography and Geodesy

# IGS real-time activities
# Overview

- IGS real-time pilot project (IGS-RT PP) Call for Participation (CfP) in 2007
- (EUREF-IP started in 2002)
- CfP included 7 sections
  - Tracking Stations
  - Data Centres
  - Analysis Centres
  - Associate Analysis Centres
  - Analysis Center Coordinator
  - Network Management and Monitoring
  - Users
- Officially launched as a service (RTS) March, 31, 2013

# Real-time data
# Status of the real-time network



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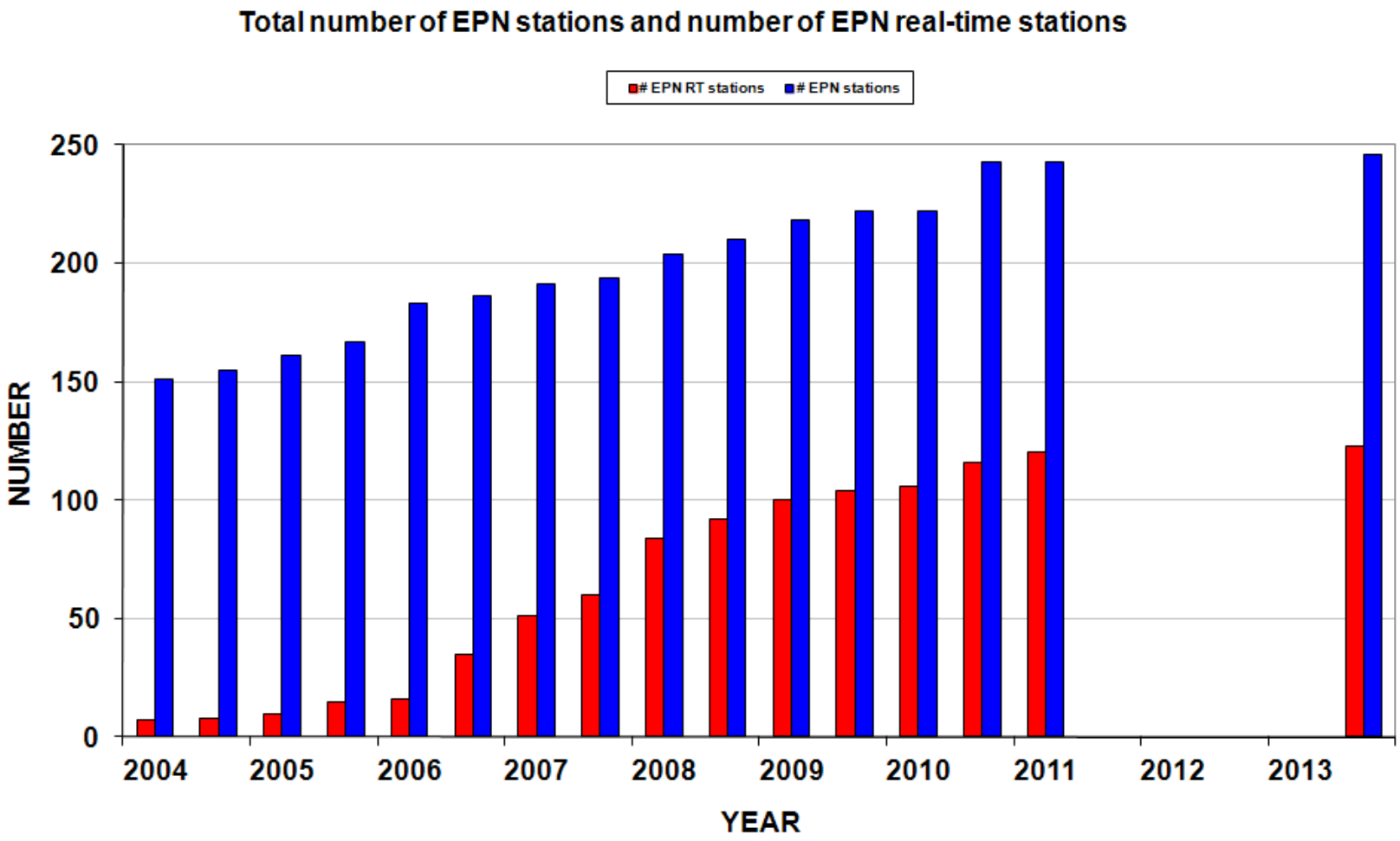
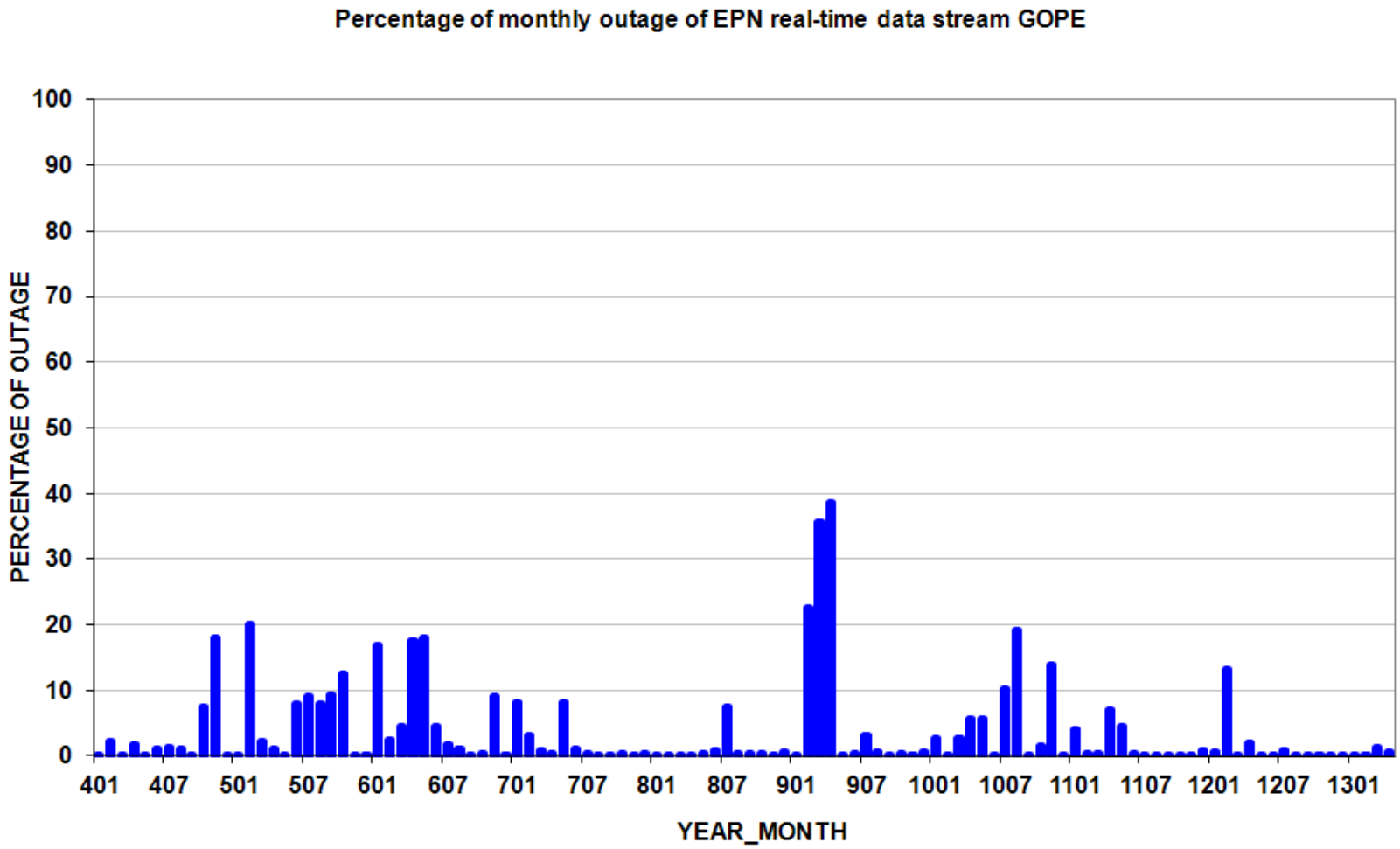


# Real-time data Availability



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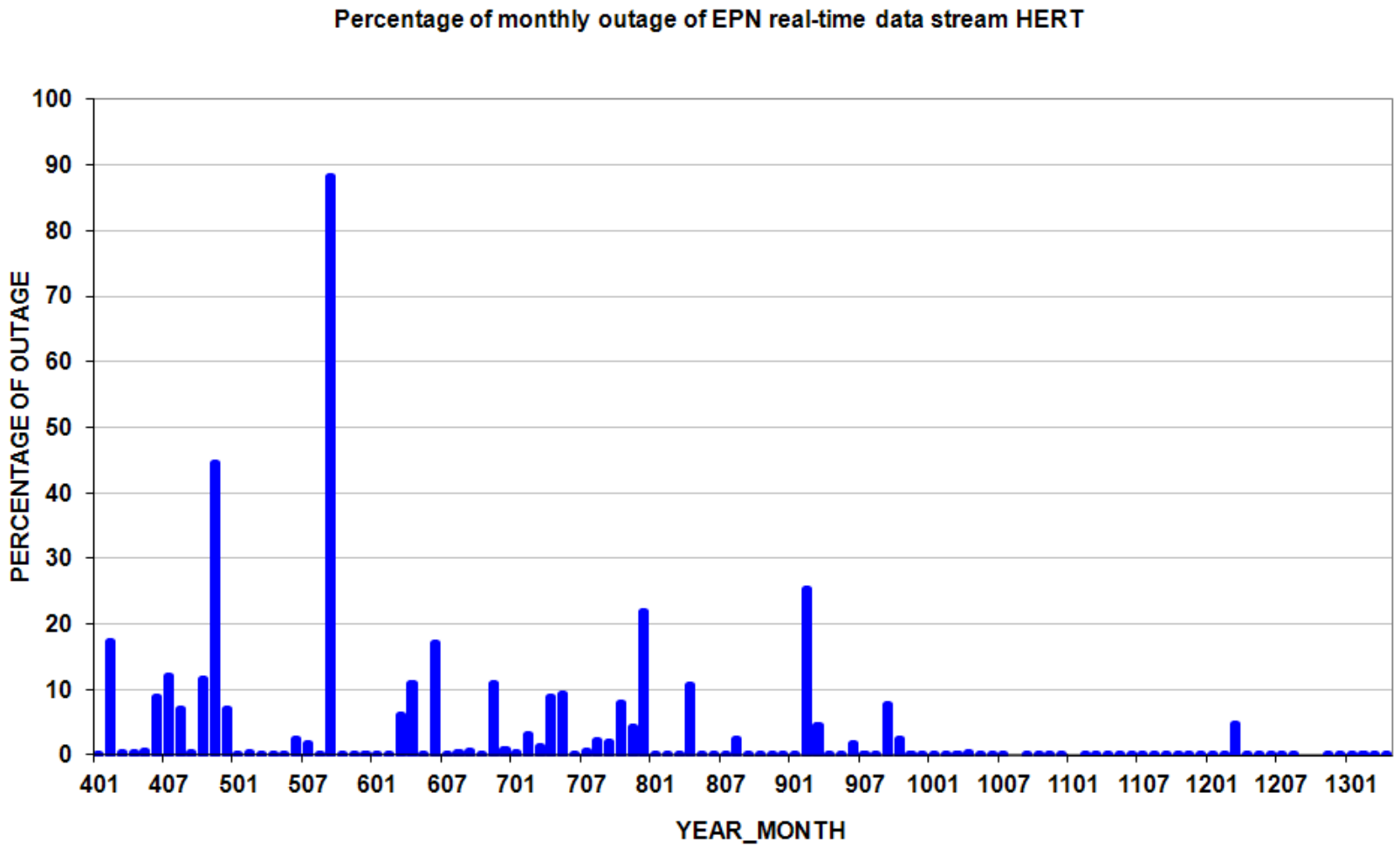

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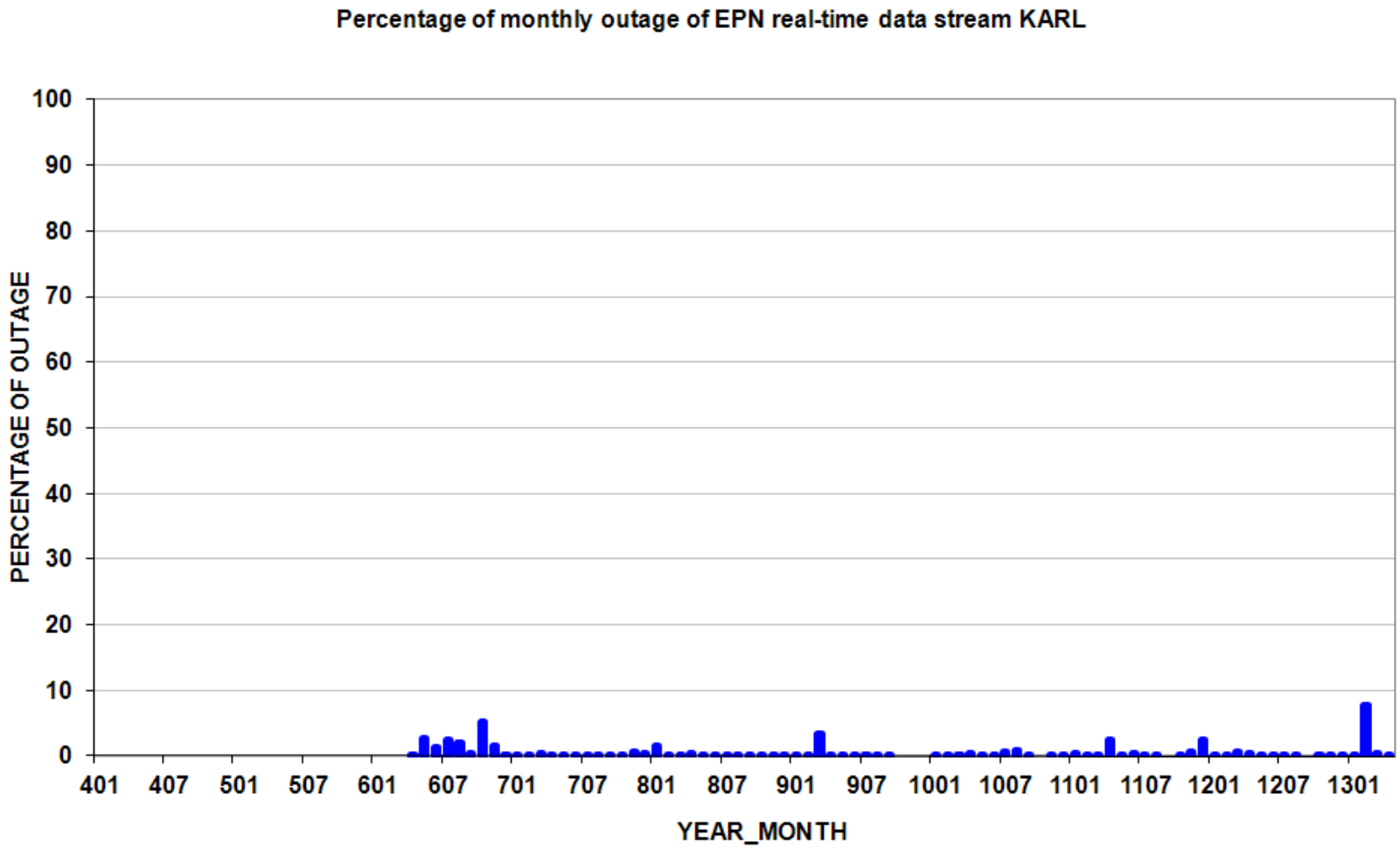

# Real-time data
# Redundancy concept

- **Starting point: upload from each station to one single regional caster**
- **Next: upload from several stations to local/national caster → pulling all streams to the regional caster**
- **Next: introduction of three regional casters → pulling all streams either from prime regional caster or from the local/national casters**
- **Next: streaming from each station to two different casters → under development for the IGS RTS**
- **Next: regional casters pulling from two different global casters**
- **Goal: 24/7 real-time data flow to the user w/o outages**

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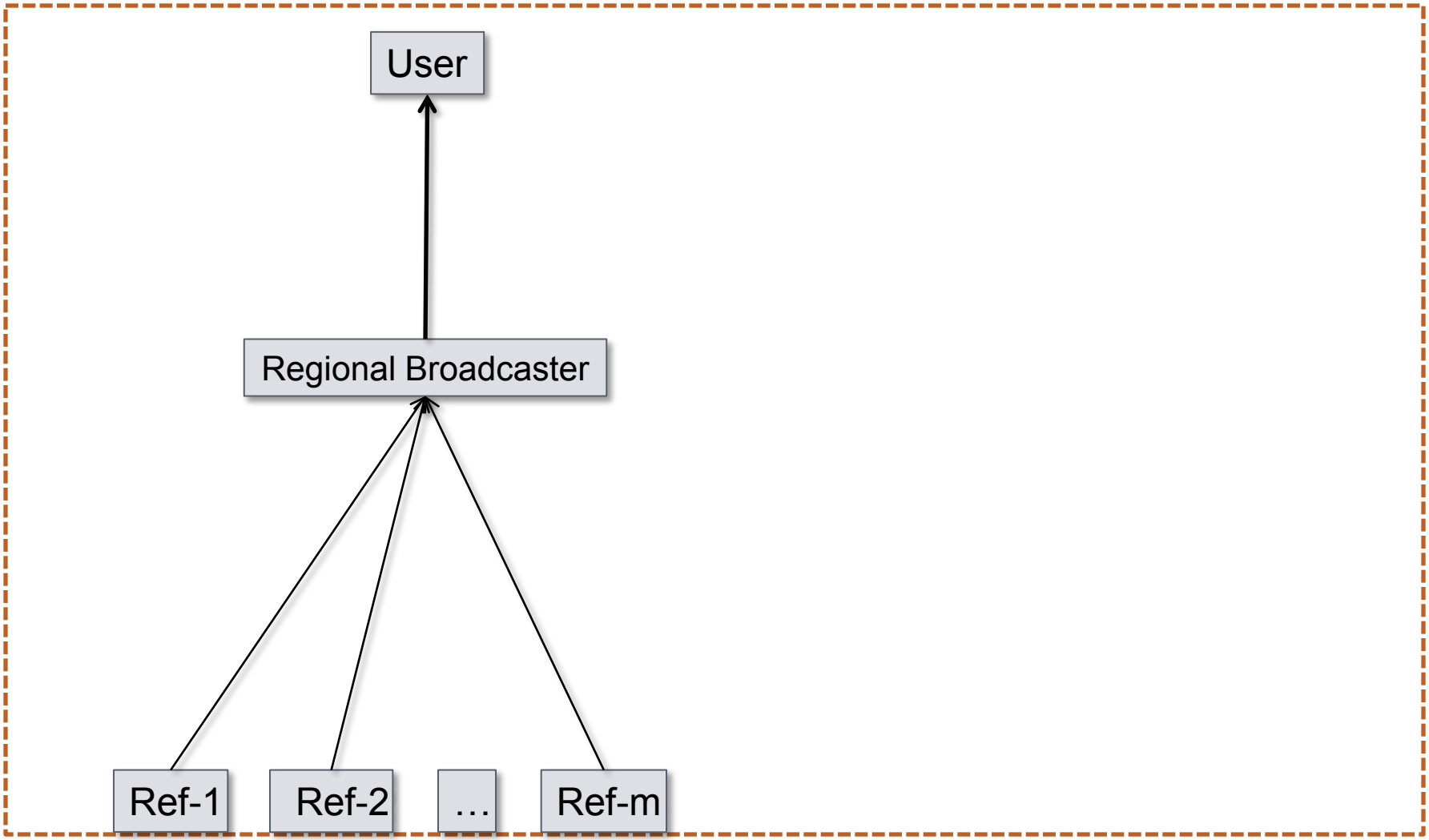

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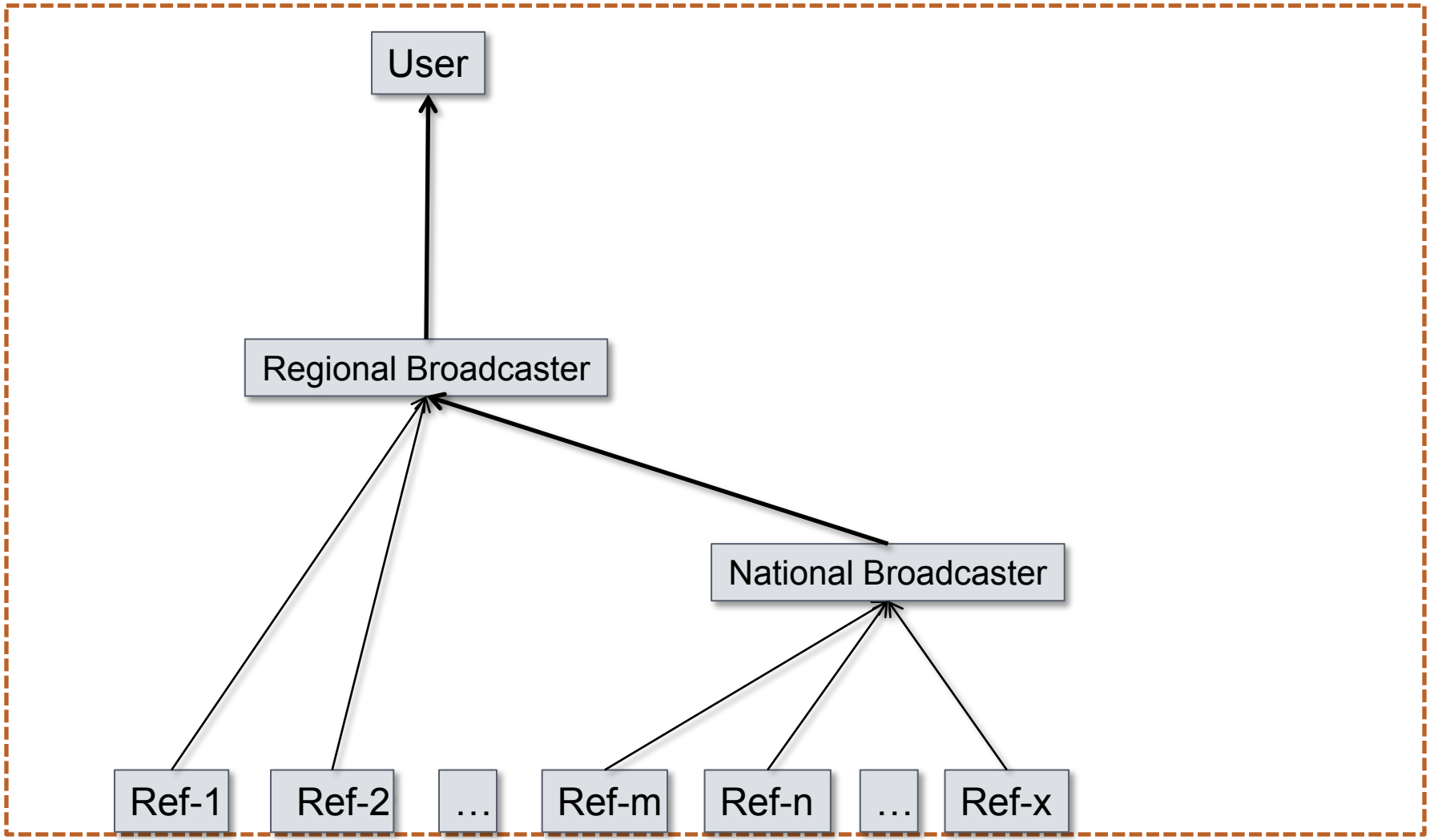

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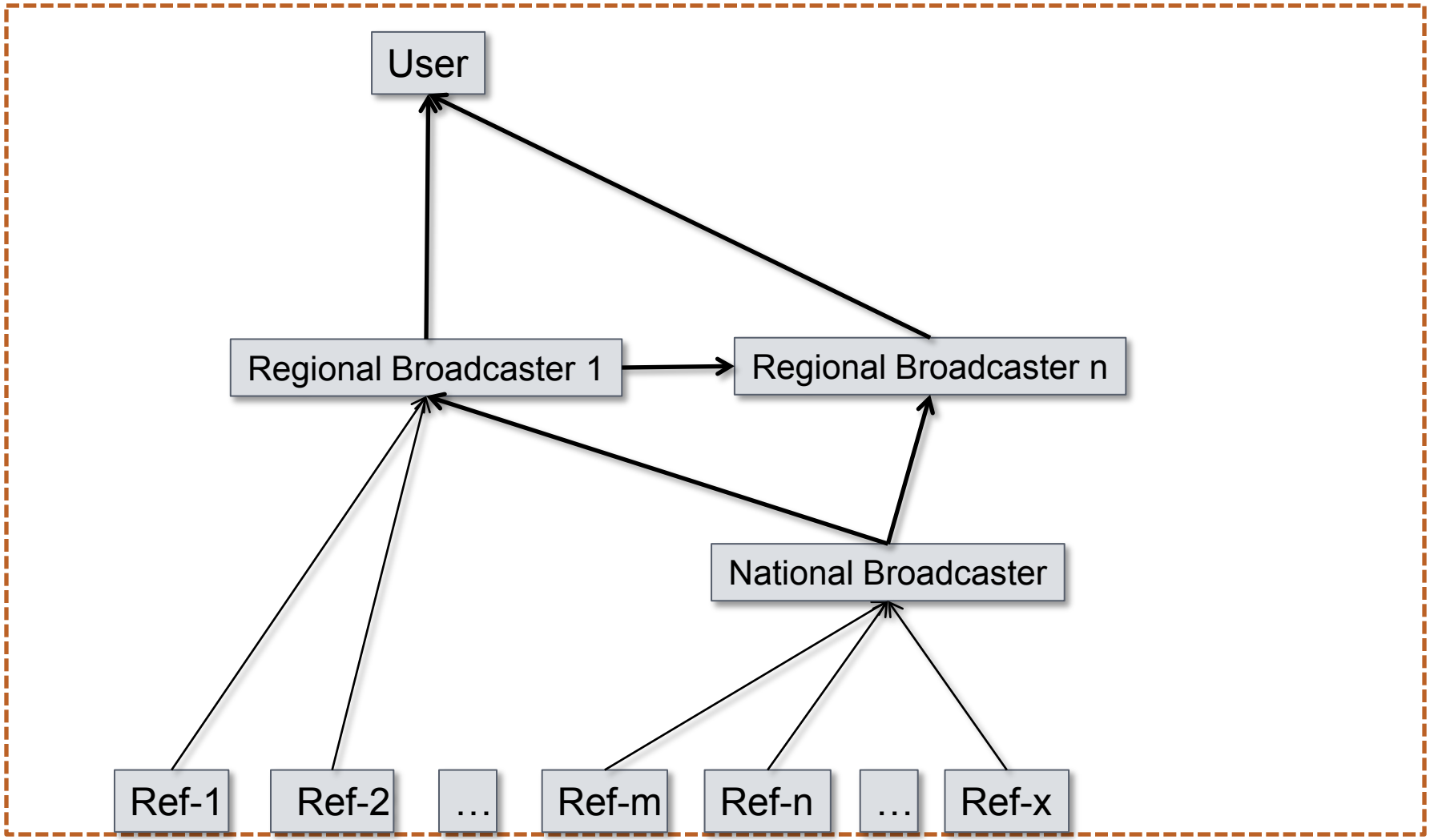

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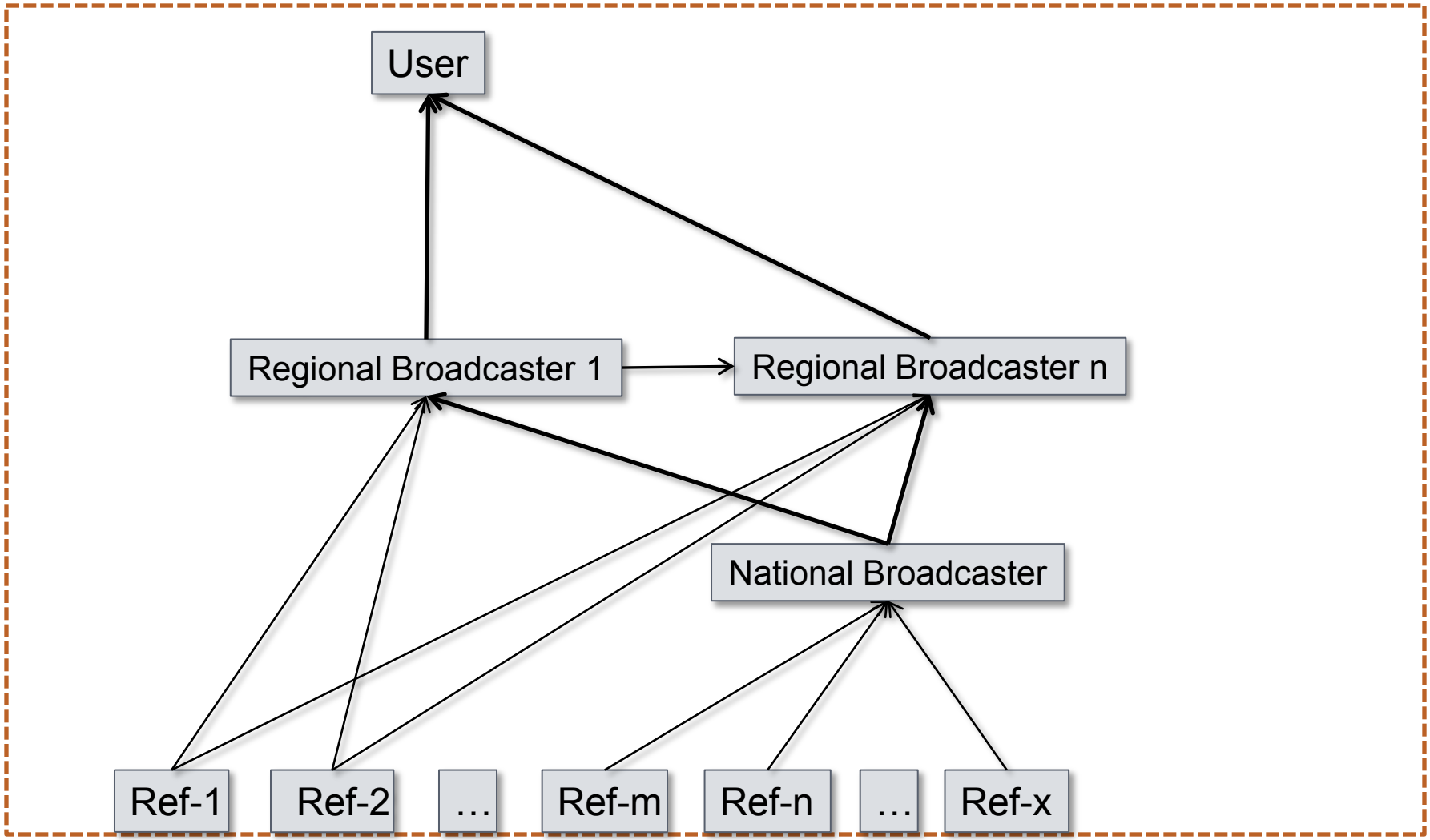
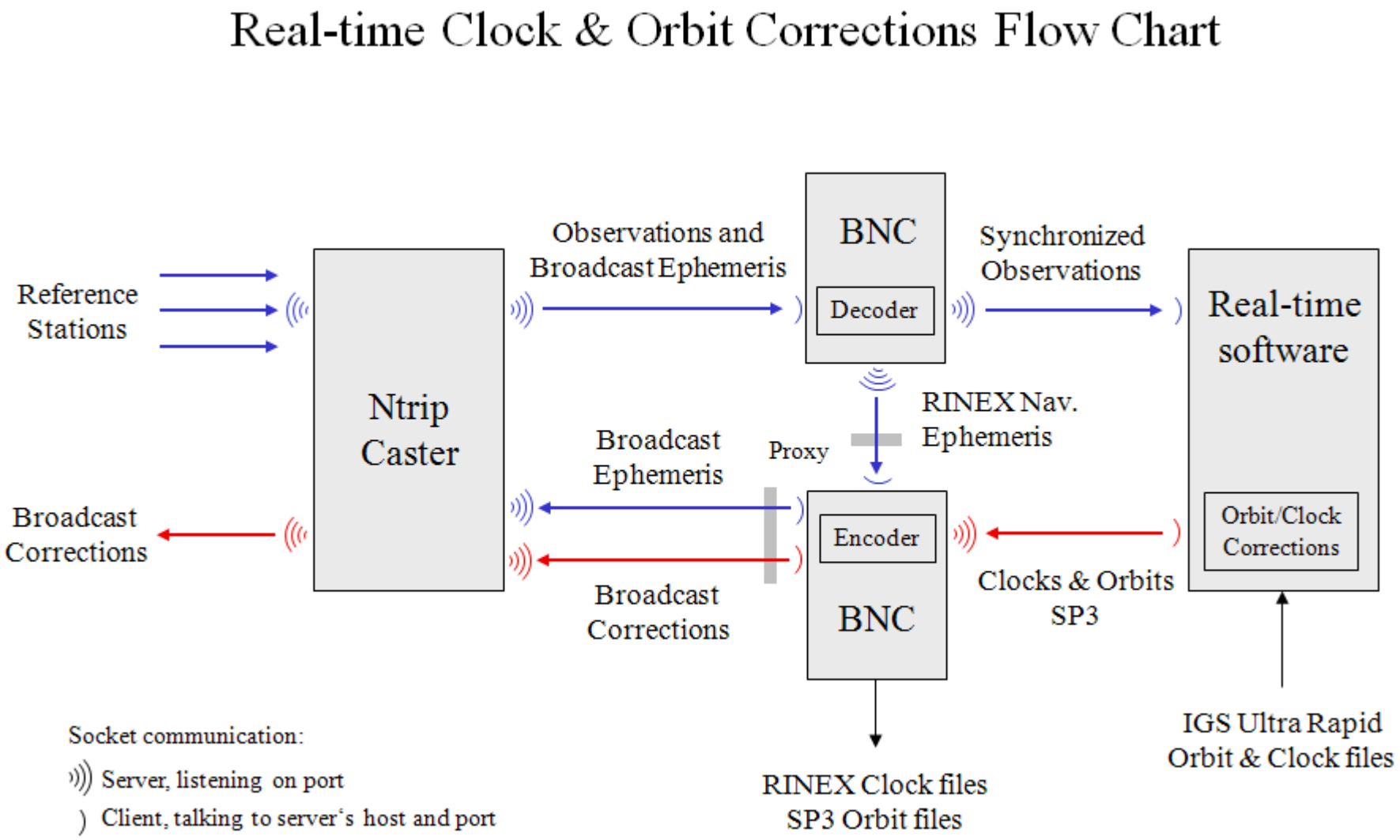


# Real-time analysis centres processing scheme



# Real-time analysis centres

| BKG/CTU | CNES | DLR | ESA | GFZ | GMV | NRCan | Wuhan |
|---|---|---|---|---|---|---|---|

# Real-time analysis centres

| BKG/CTU (RTNet) | CNES (PPP Wizard) | DLR (RETICLE) | ESA (RETINA) | GFZ (EPOS RT) | GMV (magicGNSS) | NRCan (HPGNSSC) | Wuhan (PANDA) |
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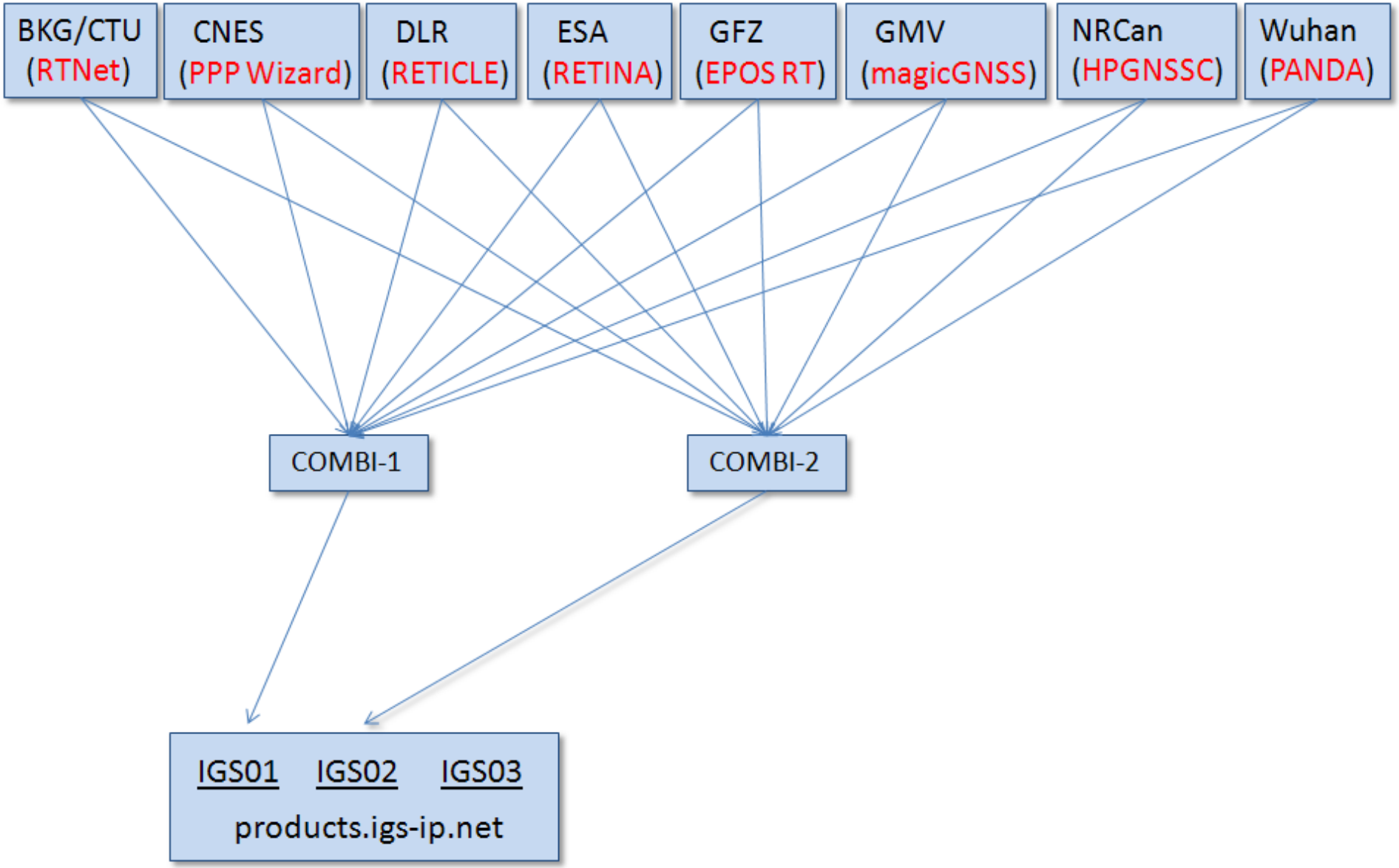
|---|---|---|---|---|---|---|---|

→ **BKG/CTU, CNES, DLR and GMV with additional GPS+GLO solution**

# Real-time analysis centres combination



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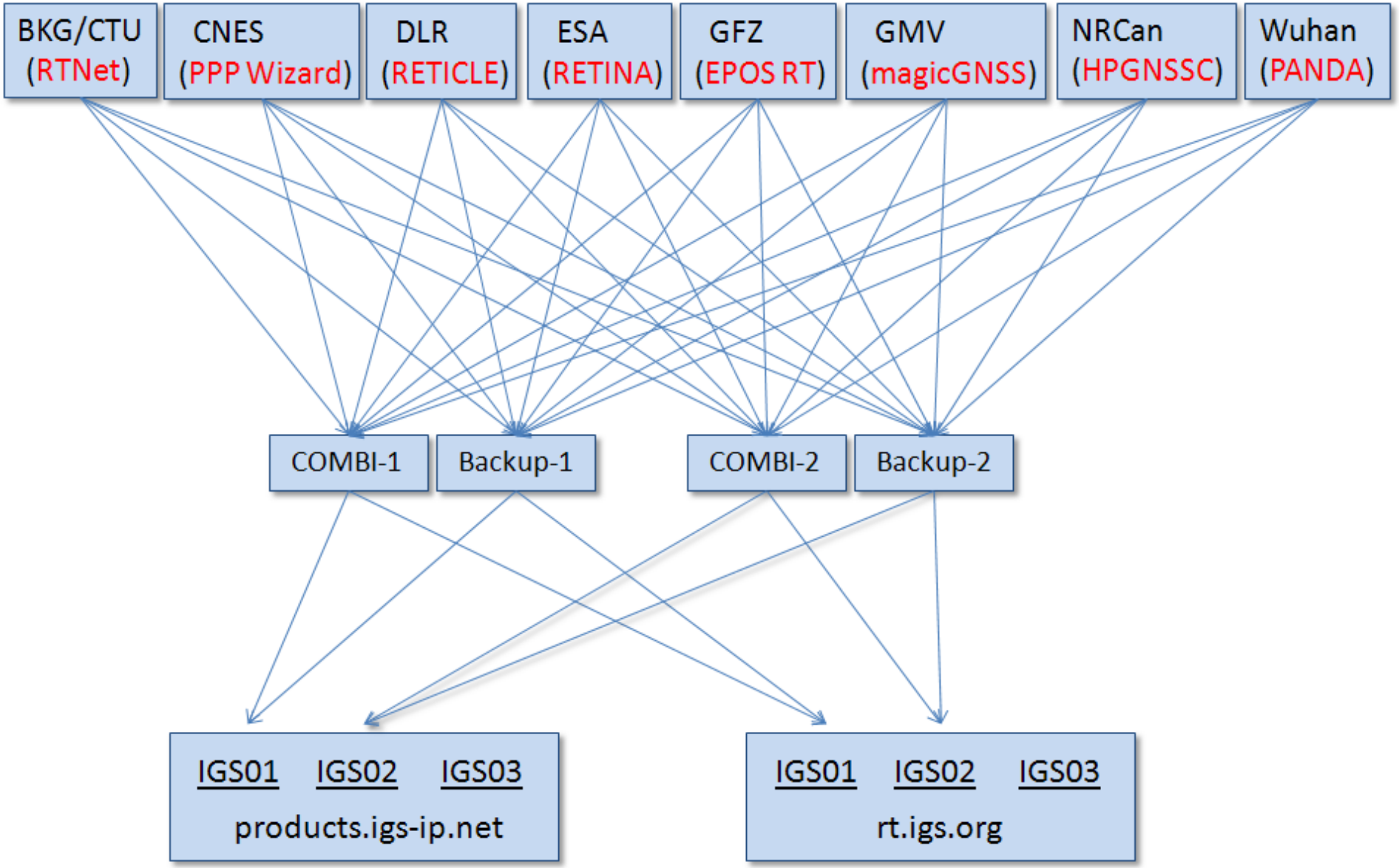


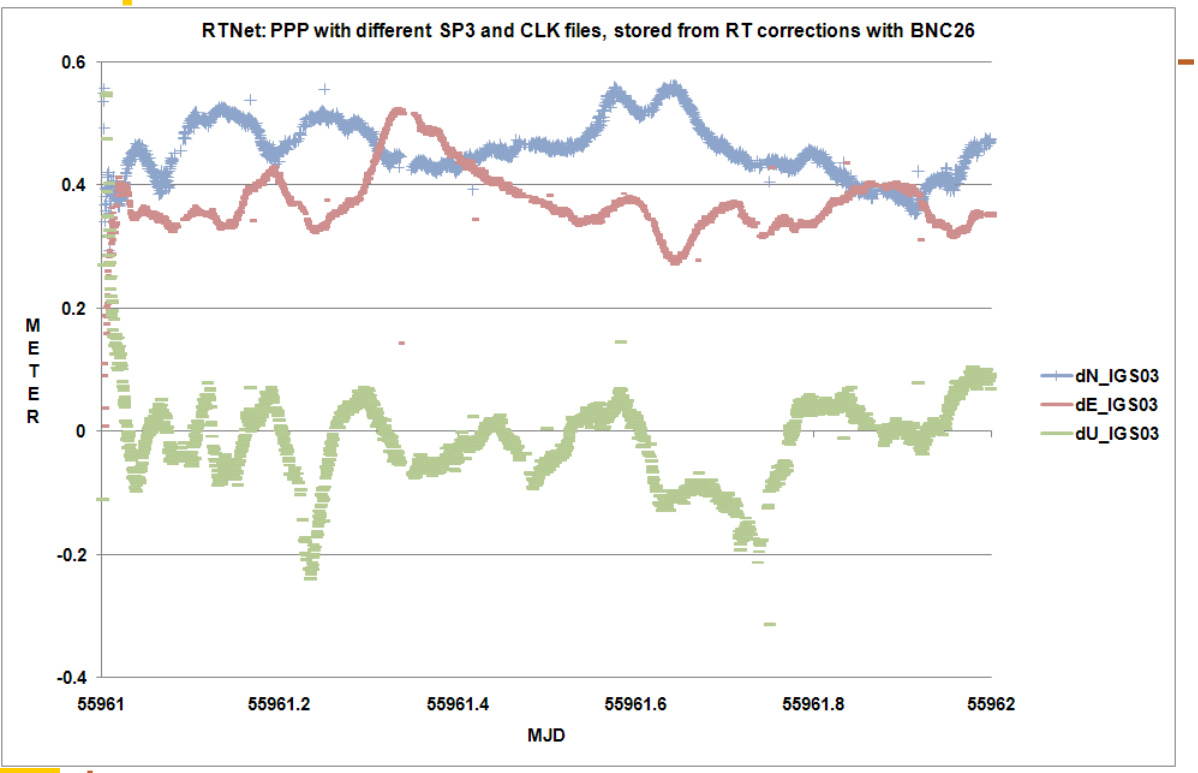
# Real-time analysis centres
# IGS combination products

- IGS01 (GPS-only; single epoch combination)
- IGS02 (GPS-only; Kalman filter combination)
- IGS03 (GPS+GLO; Kalman filter combination of BKG/CTU, CNES, DLR and GMV)

# EUREF real-time products

- EUREF orbit & clock solution referred to ETRS89
- Orbit and clock transformation implemented in BNC
- EUREF01 (GPS-only; combination of BKG/CTU, CNES, DLR and GMV)
- EUREF02 (GPS+GLO; combination of BKG/CTU, CNES, DLR and GMV)
- Future: EUREF03 (GPS+GLO+GAL)
  - Standardisation of broadcast ephemeris neccessary

# EUREF real-time products



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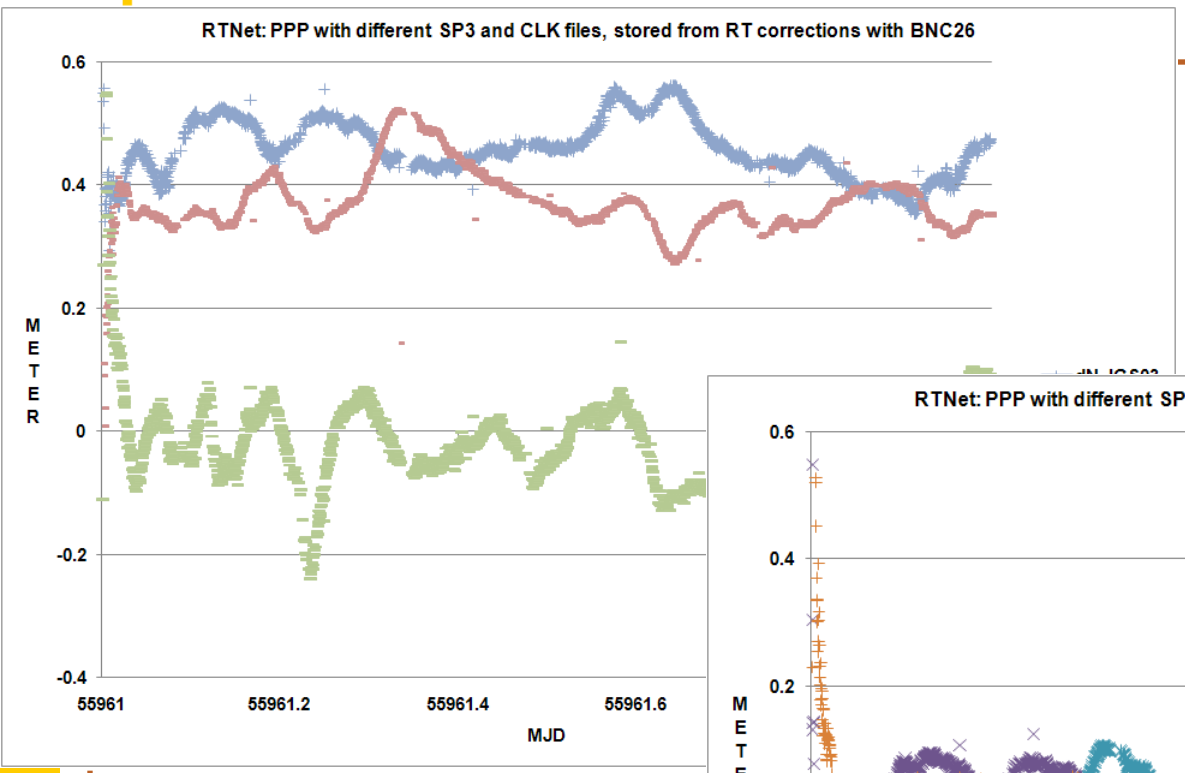


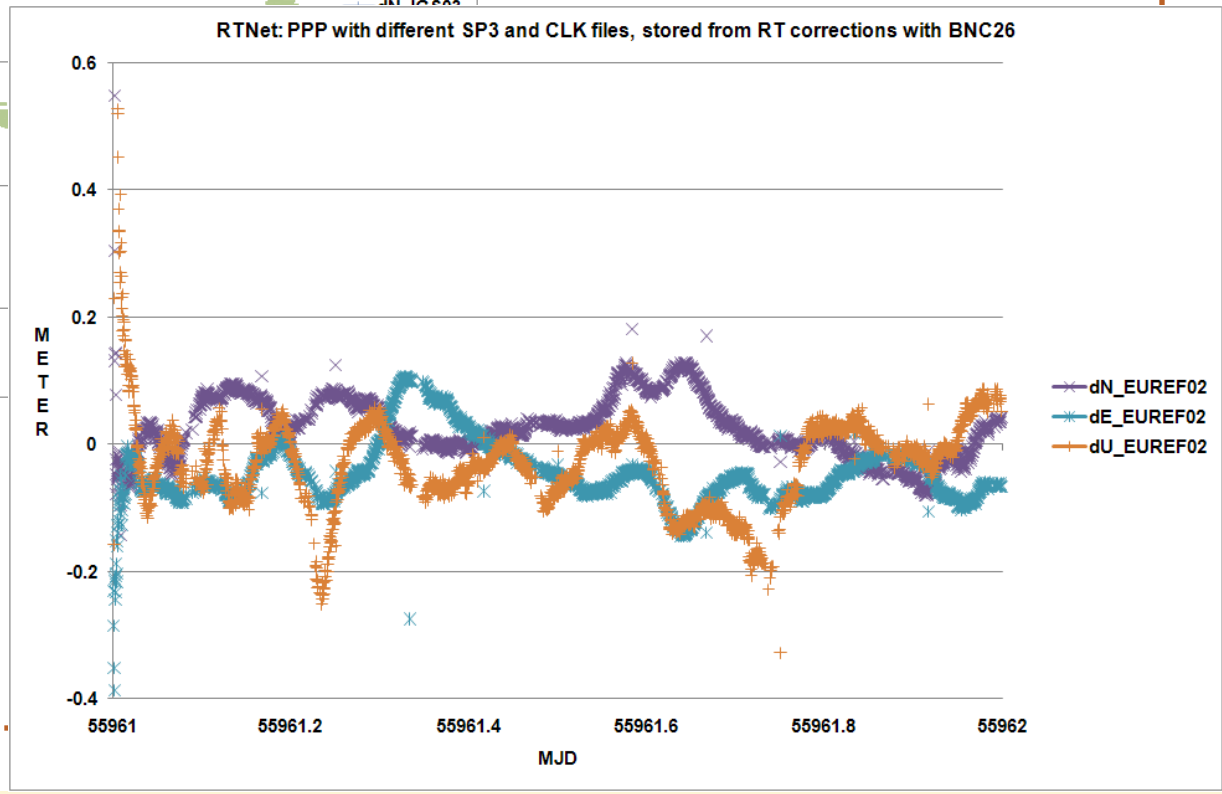

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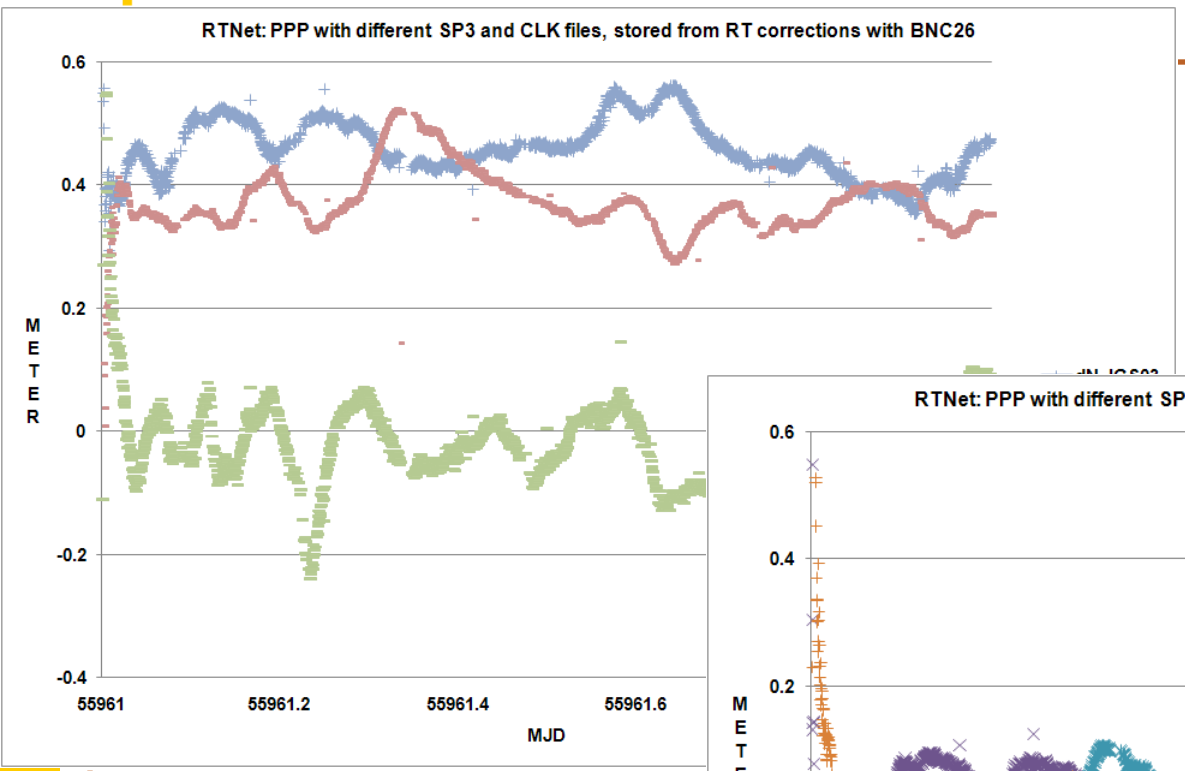
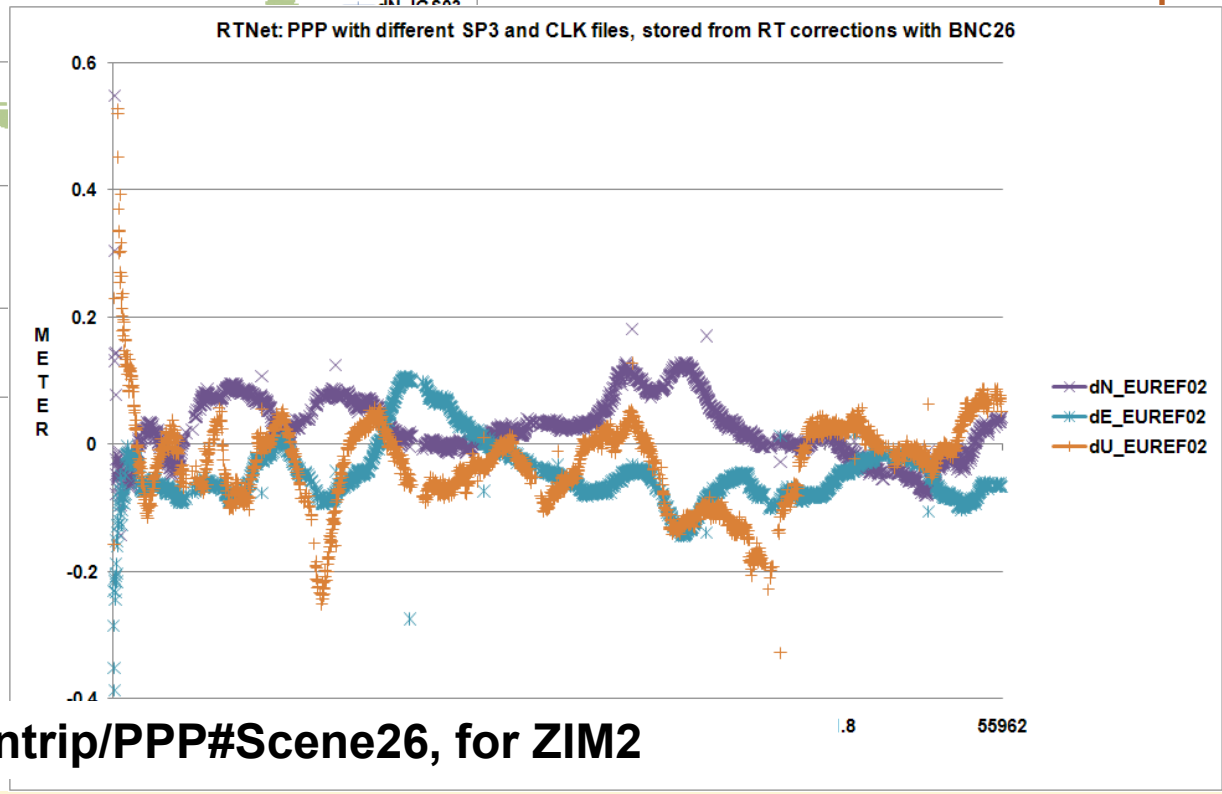


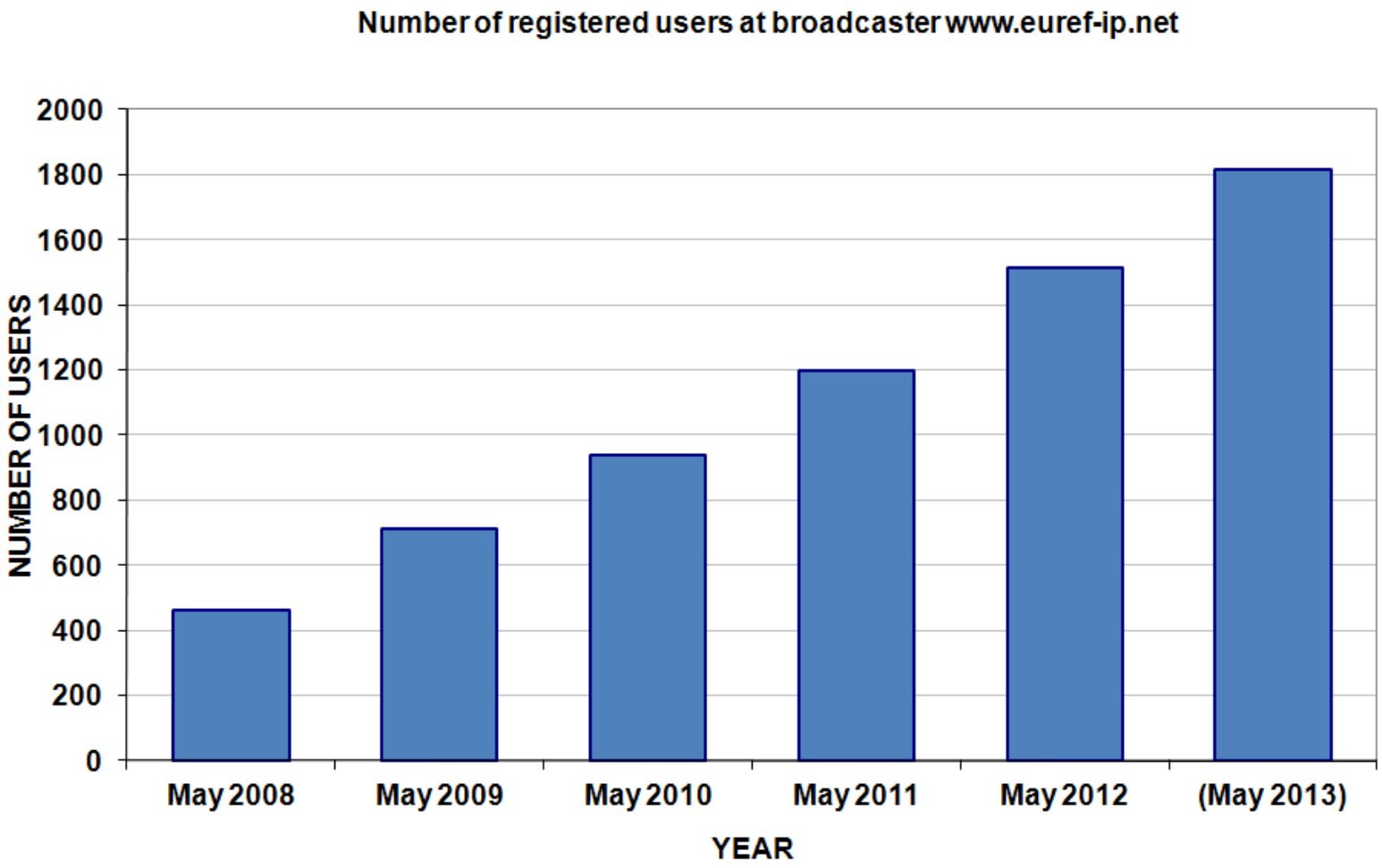




→ **http://igs.bkg.bund.de/ntrip/PPP#Scene26, for ZIM2**

# Real-time management & monitoring

- **EPN CB is hosting several web pages**
  - **Data access (http://www.epncb.oma.be/_networkdata/data_access/real_time/)**
  - **Completeness of highrate files (http://www.epncb.oma.be/_networkdata/data_access/highrate/)**
  - **Products (http://www.epncb.oma.be/_productsservices/realtimecorrections/)**
- **Monitoring of BKG broadcasters (access, usage, outages, etc.) with many, many shell and perl scripts**
- **Validation of orbit & clock products with PPP using BNC (http://igs.bkg.bund.de/ntrip/ppp)**

# Real-time data
# User statistics



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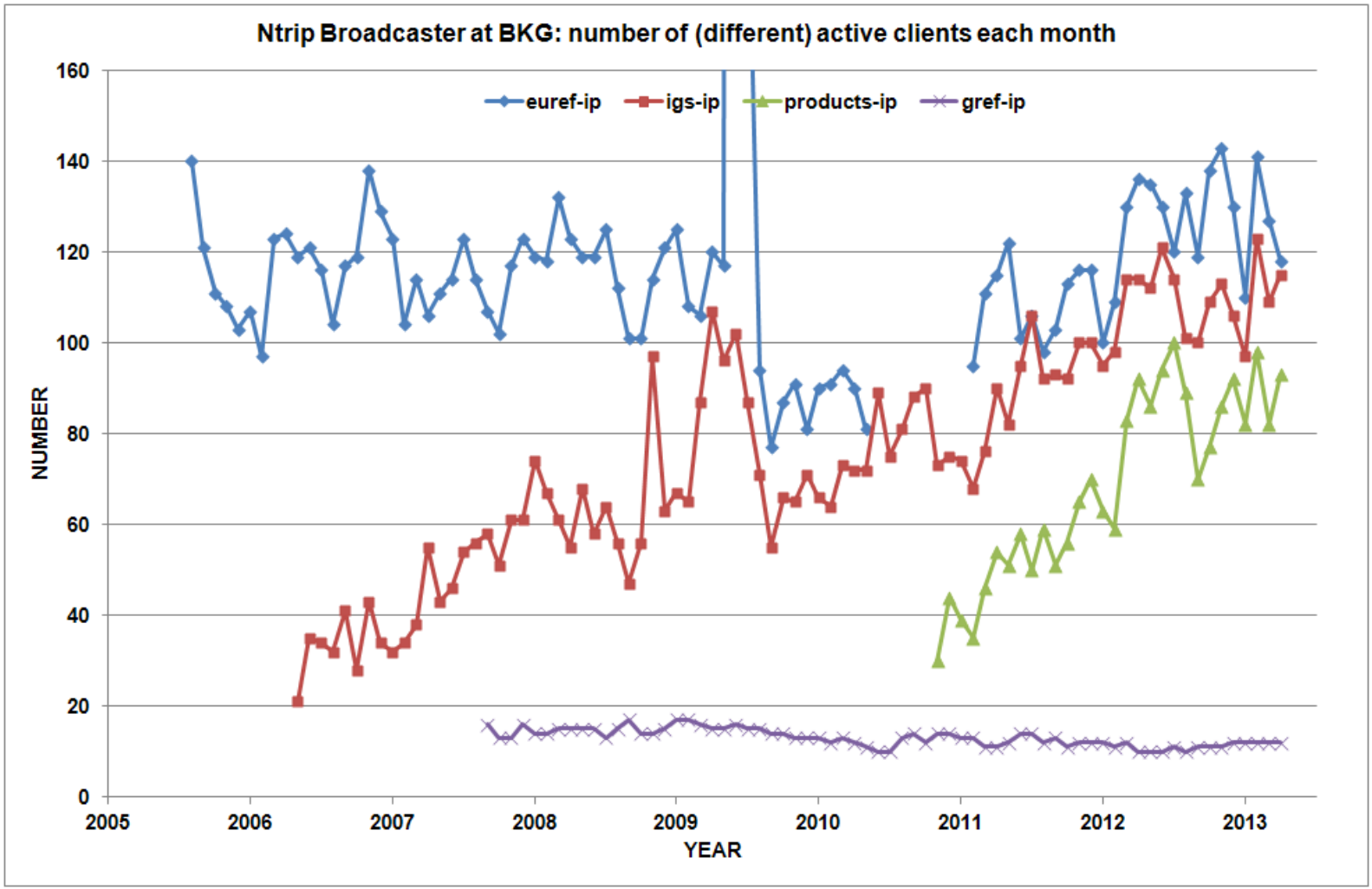

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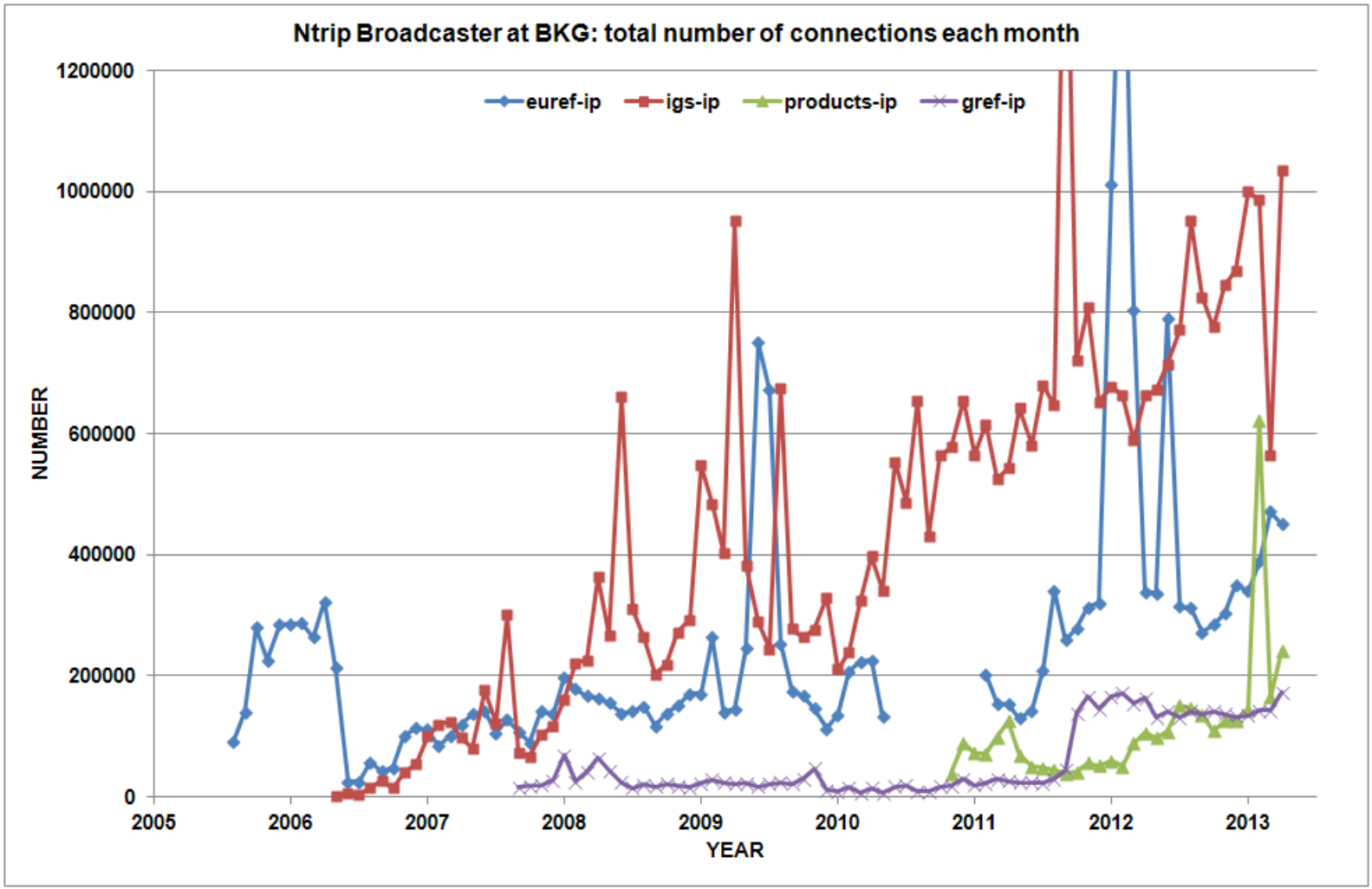

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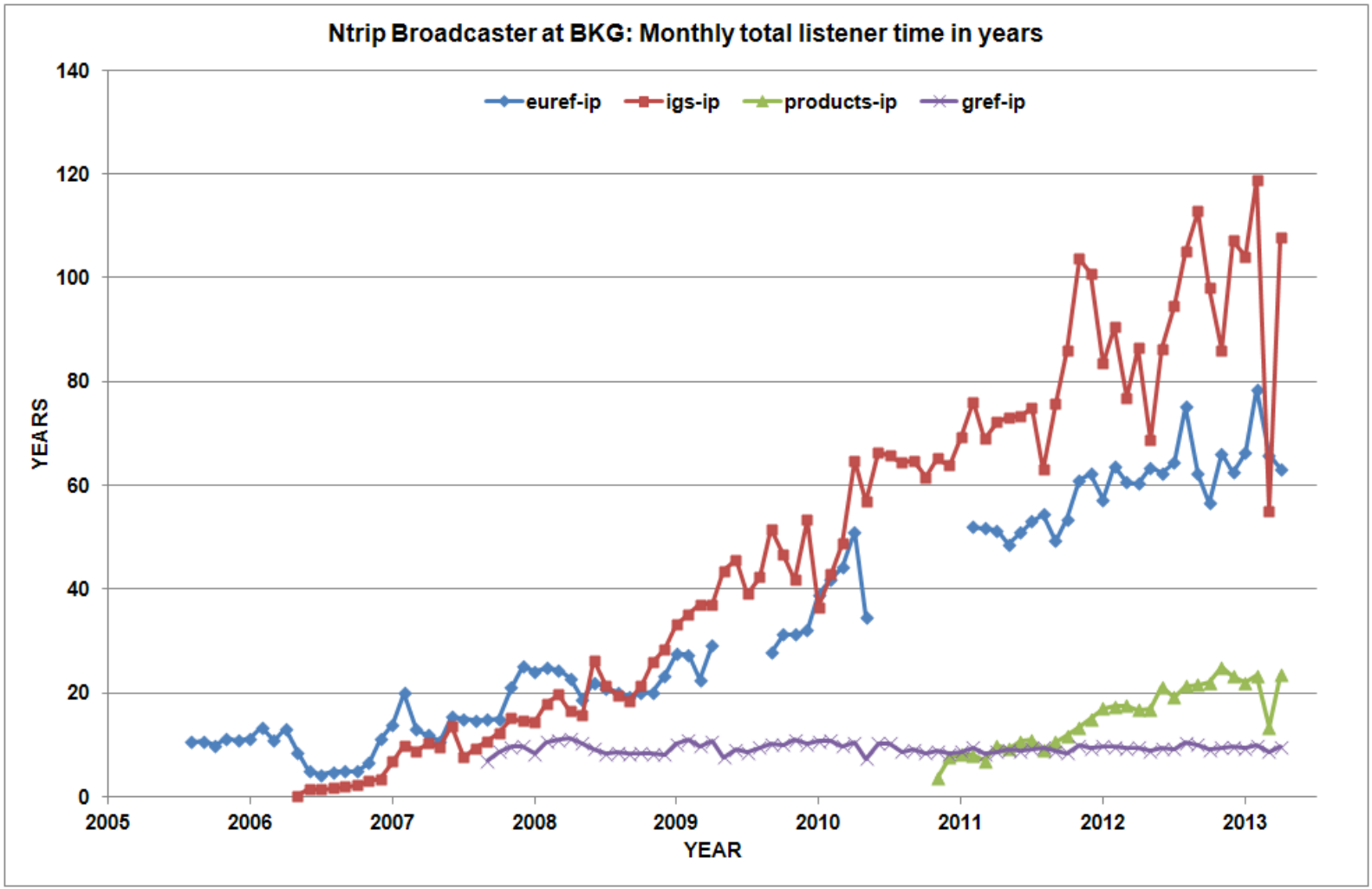

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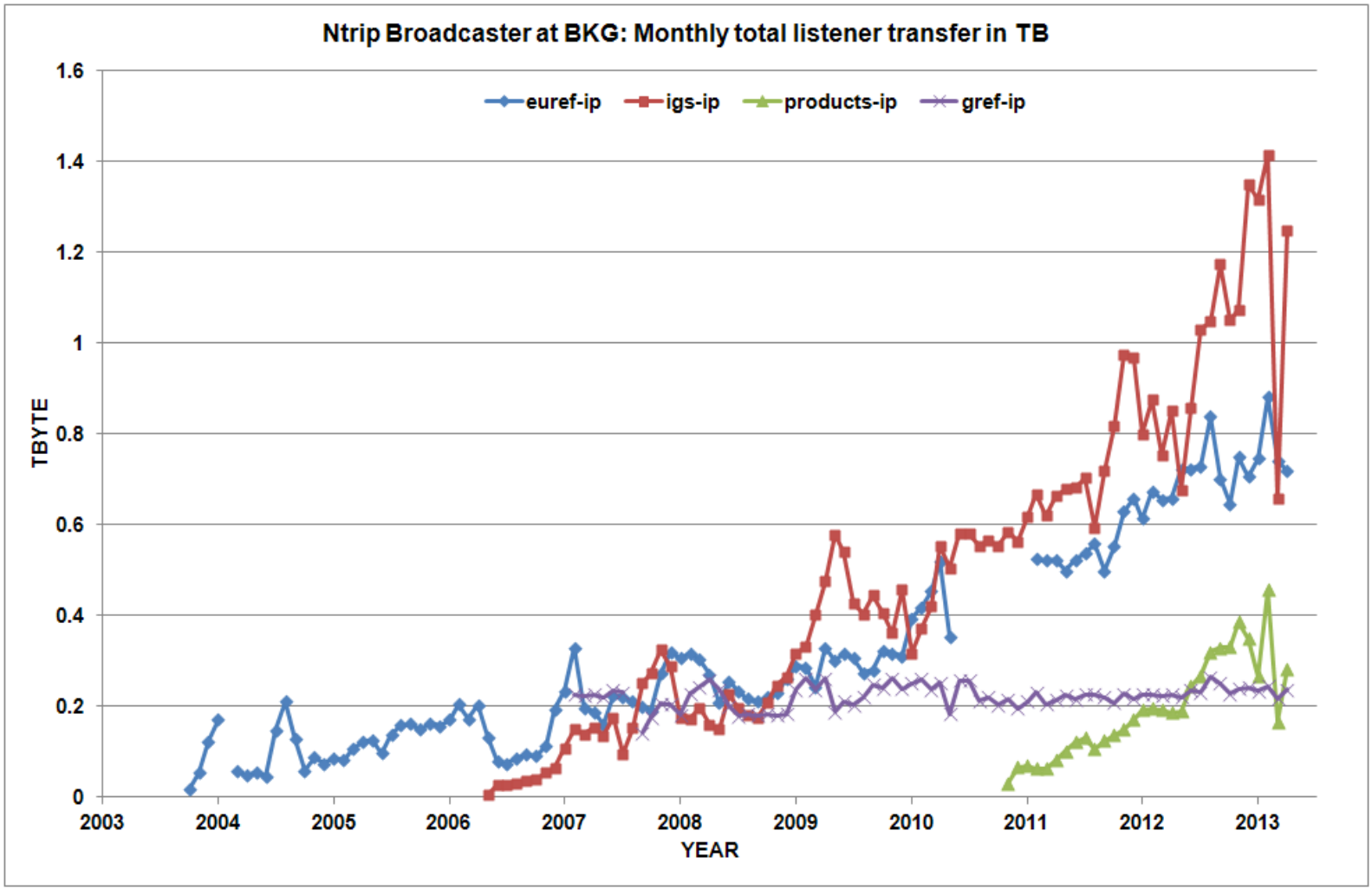
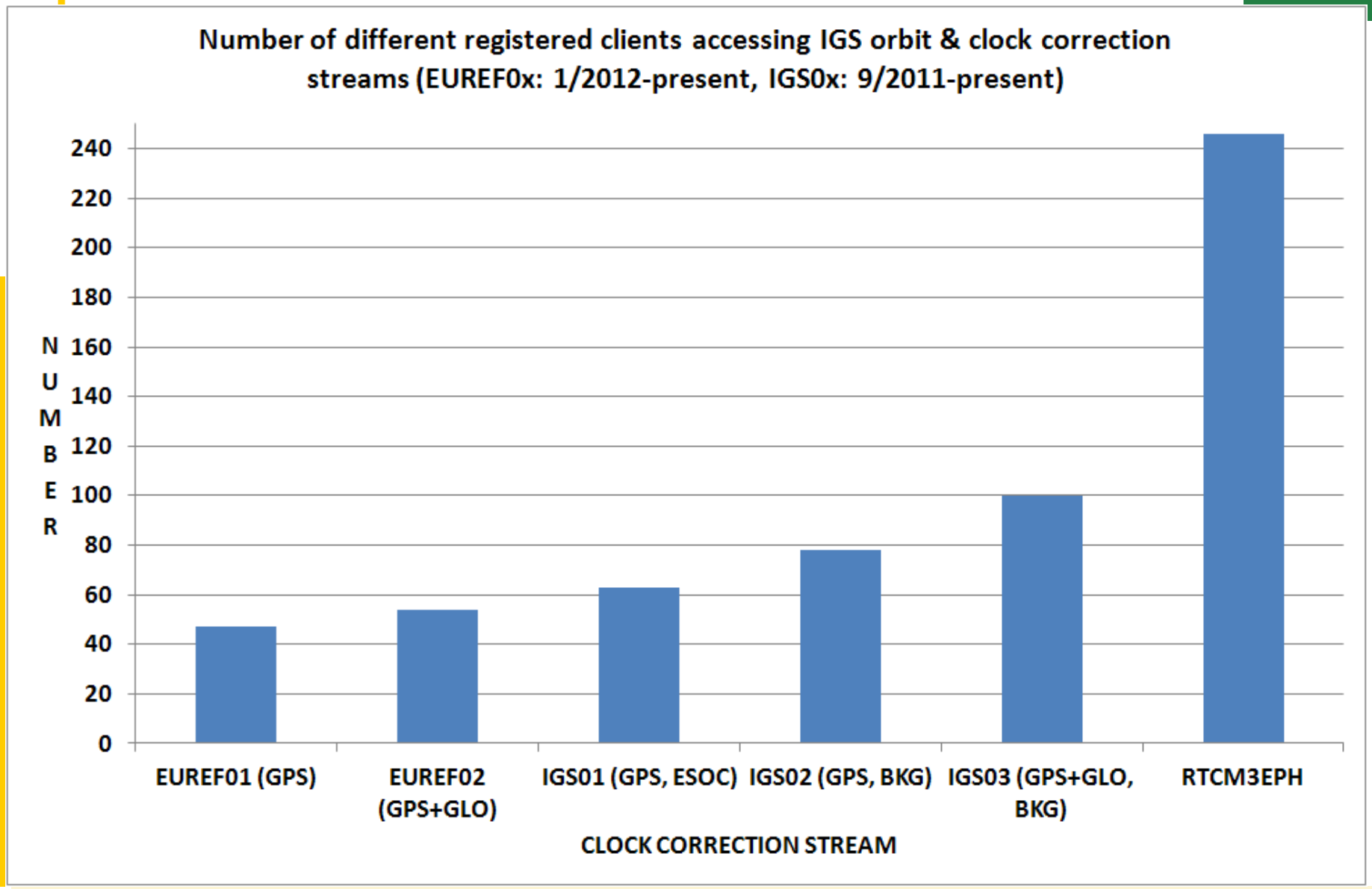


# Real-time products
# User statistics



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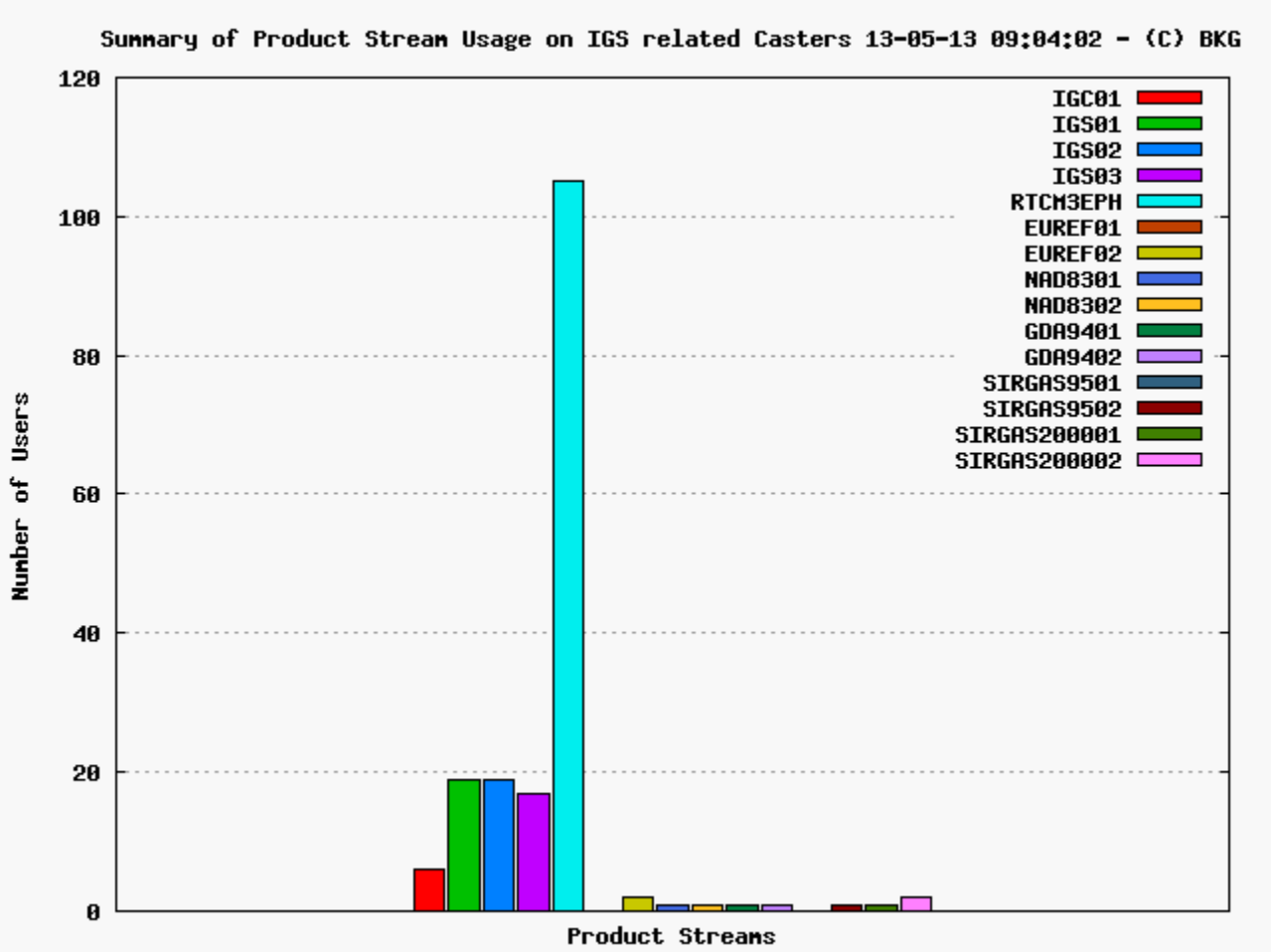

# IGS real-time activities
# Overview (2)

- Officially launched as a service March, 31, 2013
- Between March, 28, and May, 03 (5 weeks) 160 requests for user registration
- Issue with embargo list states
- Two global observations broadcasters
  - www.igs-ip.net
  - rt.igs.org
  - (igs.org:2101?)
- Two global products casters
  - products.igs-ip.net
  - rt.igs.org

# Summary & Outlook

- **Status of real-time data on a constant ~ 50 % level of all EPN stations → RT capability as requirement for new EPN stations?**
- **Real-time analysis centres not (well) represented in the EPN**
- **Usage, monitoring etc. not equally balanced between the three EUREF broadcasters**
- **First regional real-time products available (EUREF01, EUREF02)**
- **Usage (success) of real-time products depending on the implementation in receivers**