EUREF Regional Broadcasters – Redundancy and Monitoring Concepts

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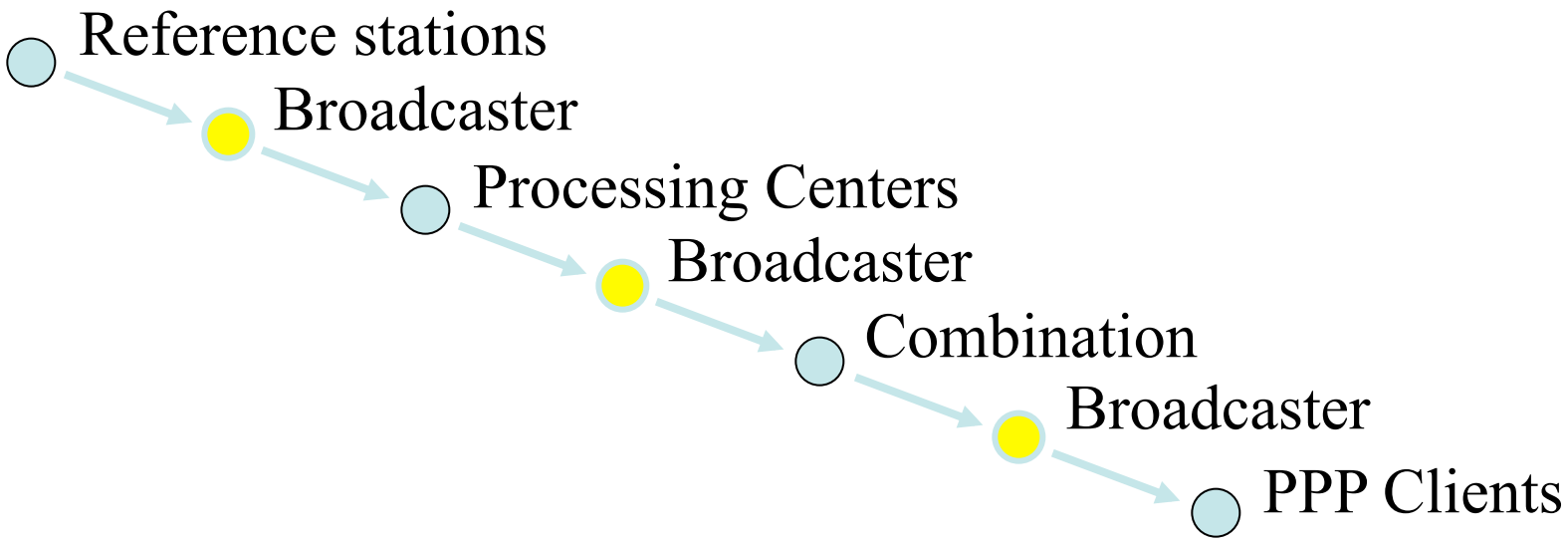
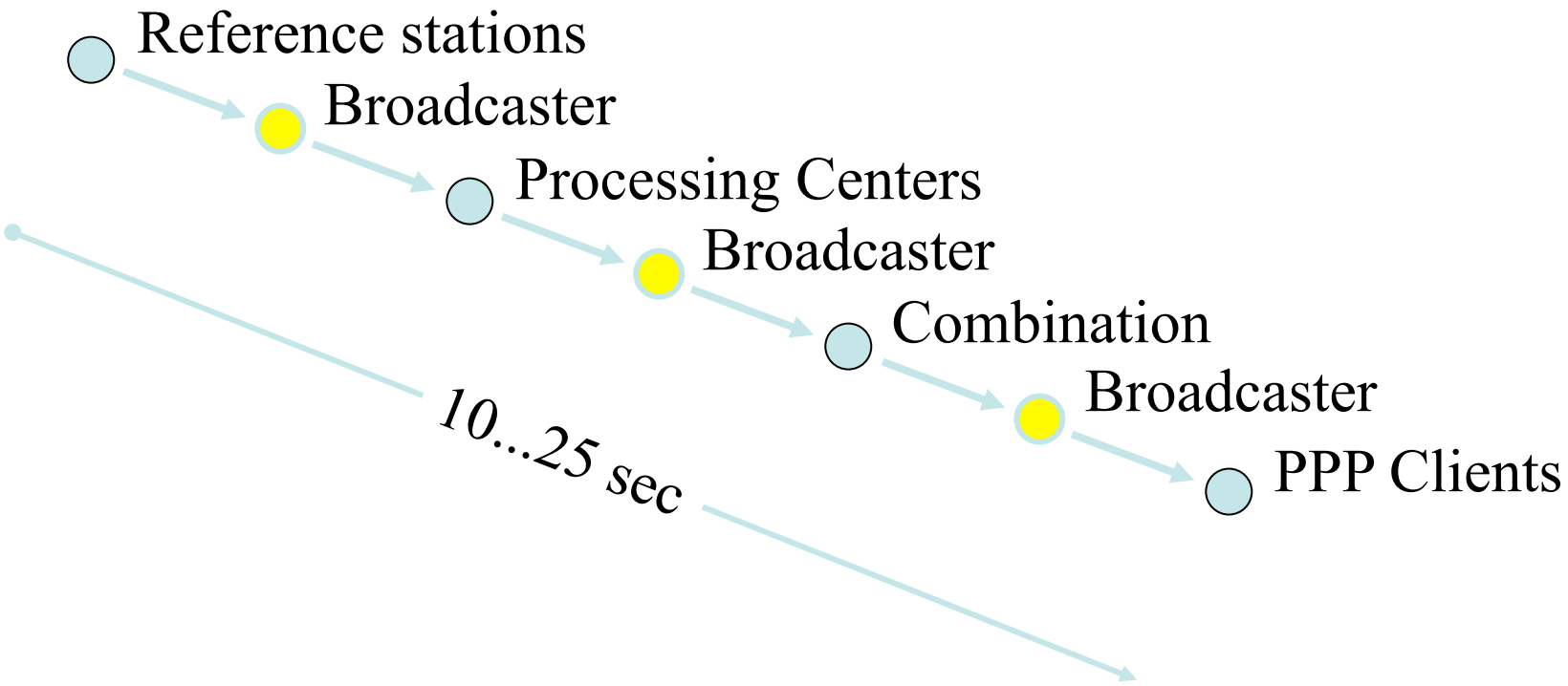
Important aspects for real-time service (OBServations, PRODucts)

- **Latency**
  - **Waiting for latest observation before processing (PROD)**
  - **Each caster adding ~ 0.2-0.3 sec**
- **Redundancy**
  - **Each stream independently available from at least two different broadcasters (OBS, PROD)**
- **Workload**
  - **Homogeneous distribution between broadcasters acting on the same level**
- **Monitoring**
  - **Availability, continuity (e.g. no interruptions), completeness and correctness of streams**

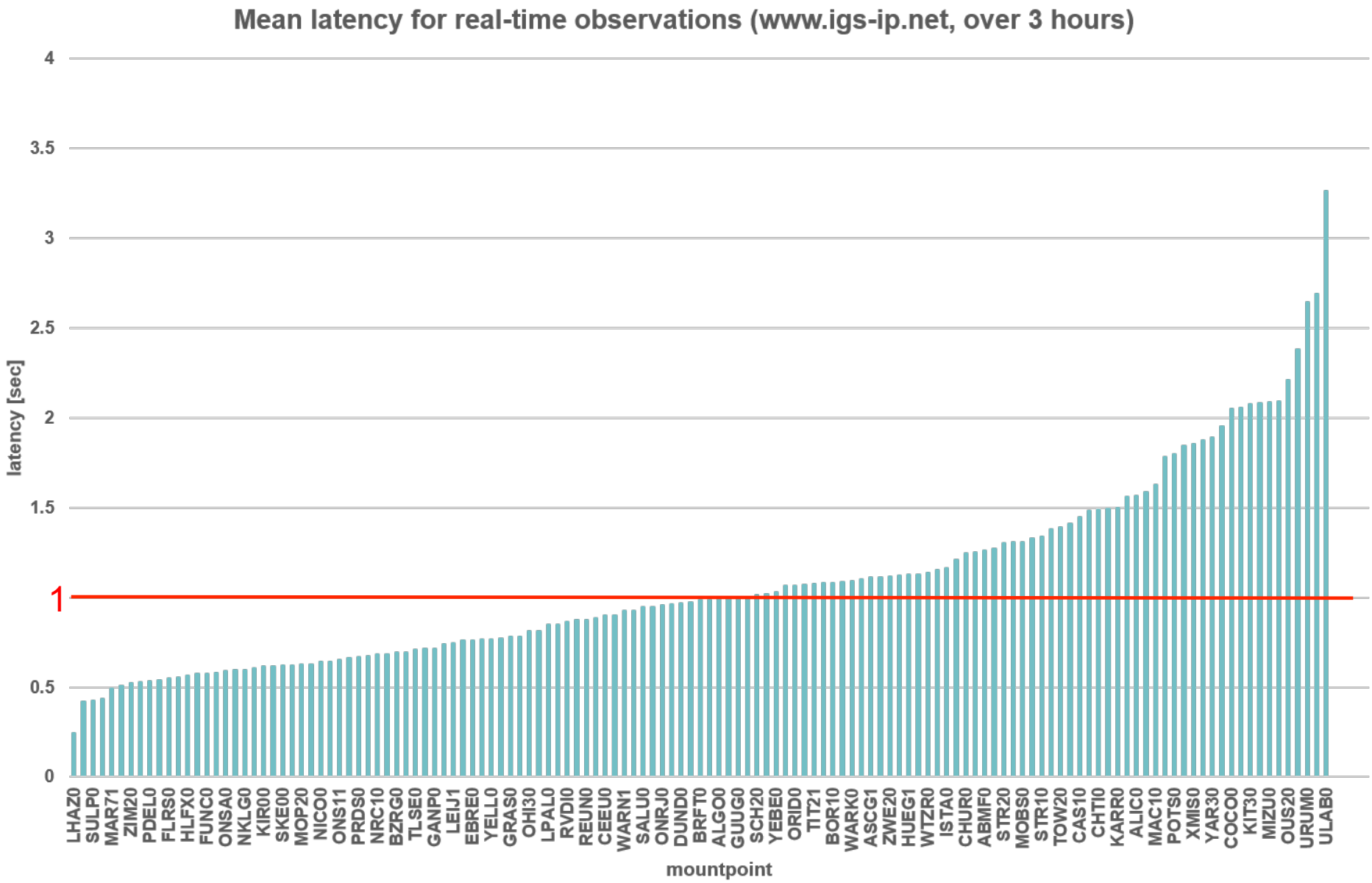
Important aspects for real-time service (OBServations, PRODucts)



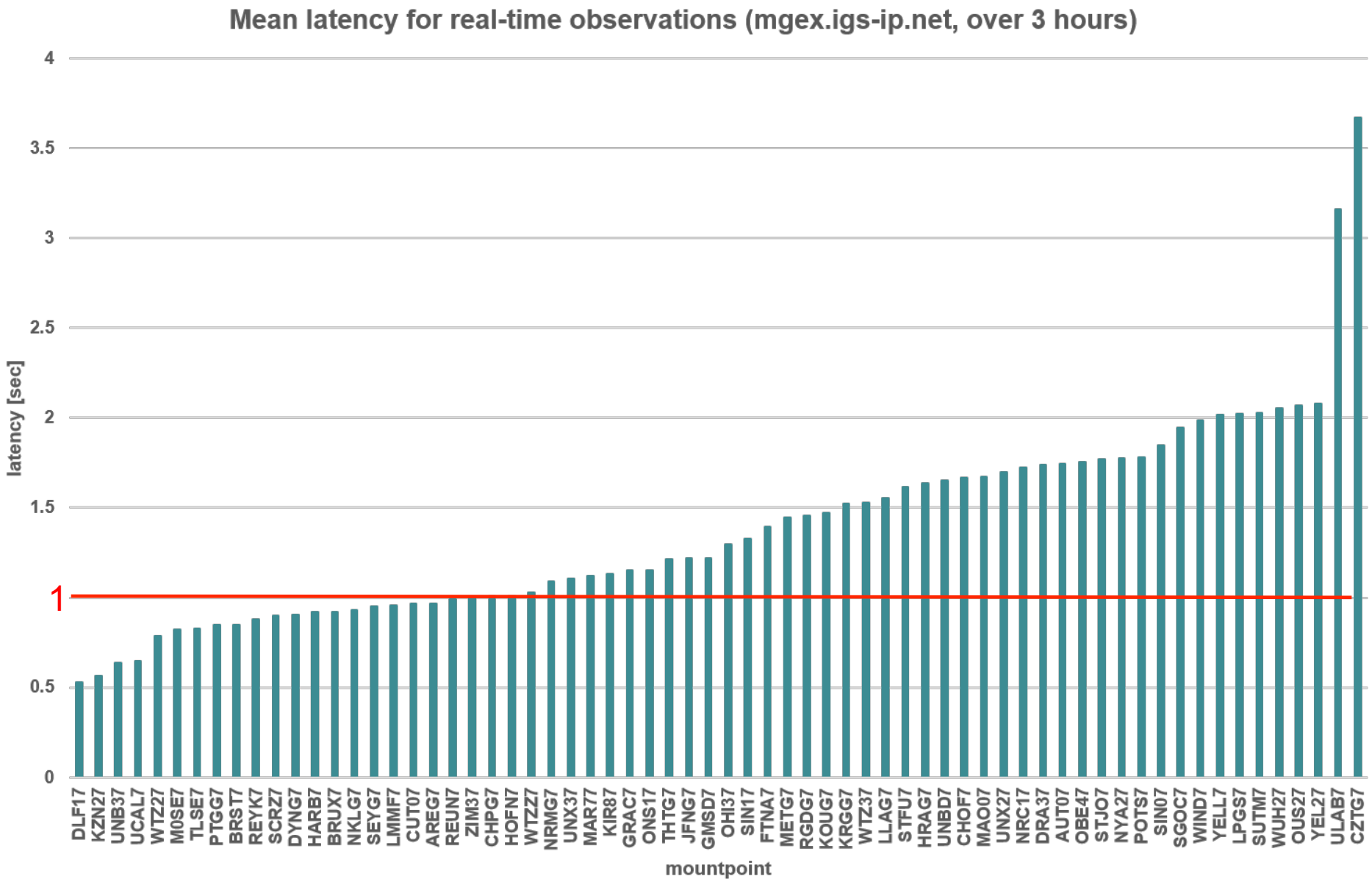
Important aspects for real-time service (OBServations, PRODucts)



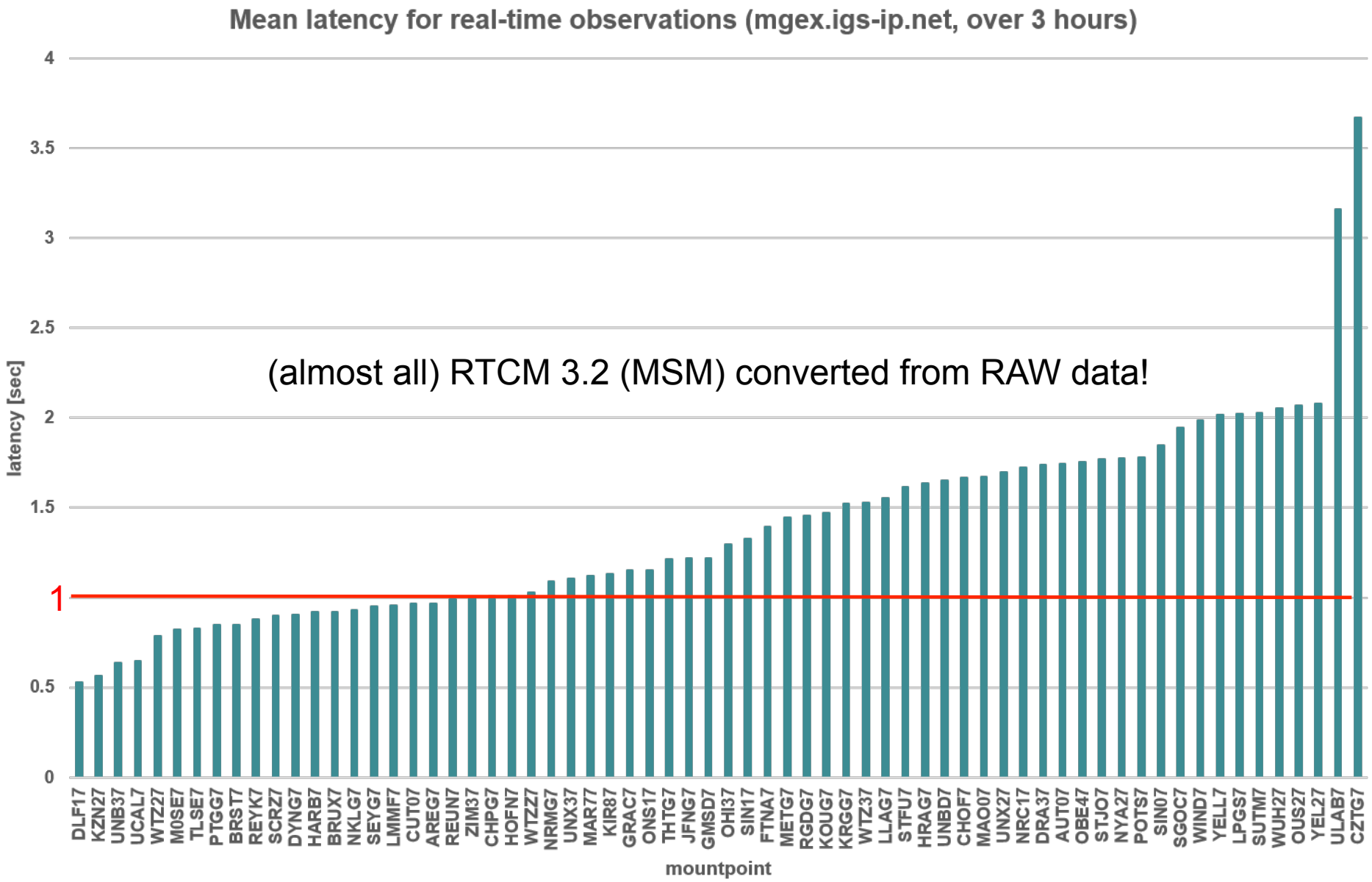
Latency (OBS)


Mean latency for real-time observations (www.igs-ip.net, over 3 hours)
latency [sec]
4
3.5
3
2.5
2
1.5
1
0.5
0
mountpoint
LHAZ0 SULP0 MAR71 ZIM20 PDEL0 FLRS0 HLFX0 FUNC0 ONSA0 NKLG0 KIR00 SKE00 MOP20 NICO0 ONS11 PRDS0 NRC10 BZRG0 TLSE0 GANP0 LEIJ1 EBRE0 YELL0 GRAS0 OHI30 LPAL0 RVDI0 REUN0 CEEU0 WARN1 SALU0 ONRJ0 DUND0 BRFT0 ALGO0 GUUG0 SCH20 YEBE0 ORID0 TIT21 BOR10 WARK0 ASCG1 ZWE20 HUEG1 WTZR0 ISTA0 CHUR0 ABMF0 STR20 MOBS0 STR10 TOW20 CAS10 CHTI0 KARR0 ALIC0 MAC10 POTS0 XMIS0 YAR30 COCO0 KIT30 MIZU0 OUS20 URUM0 ULAB0

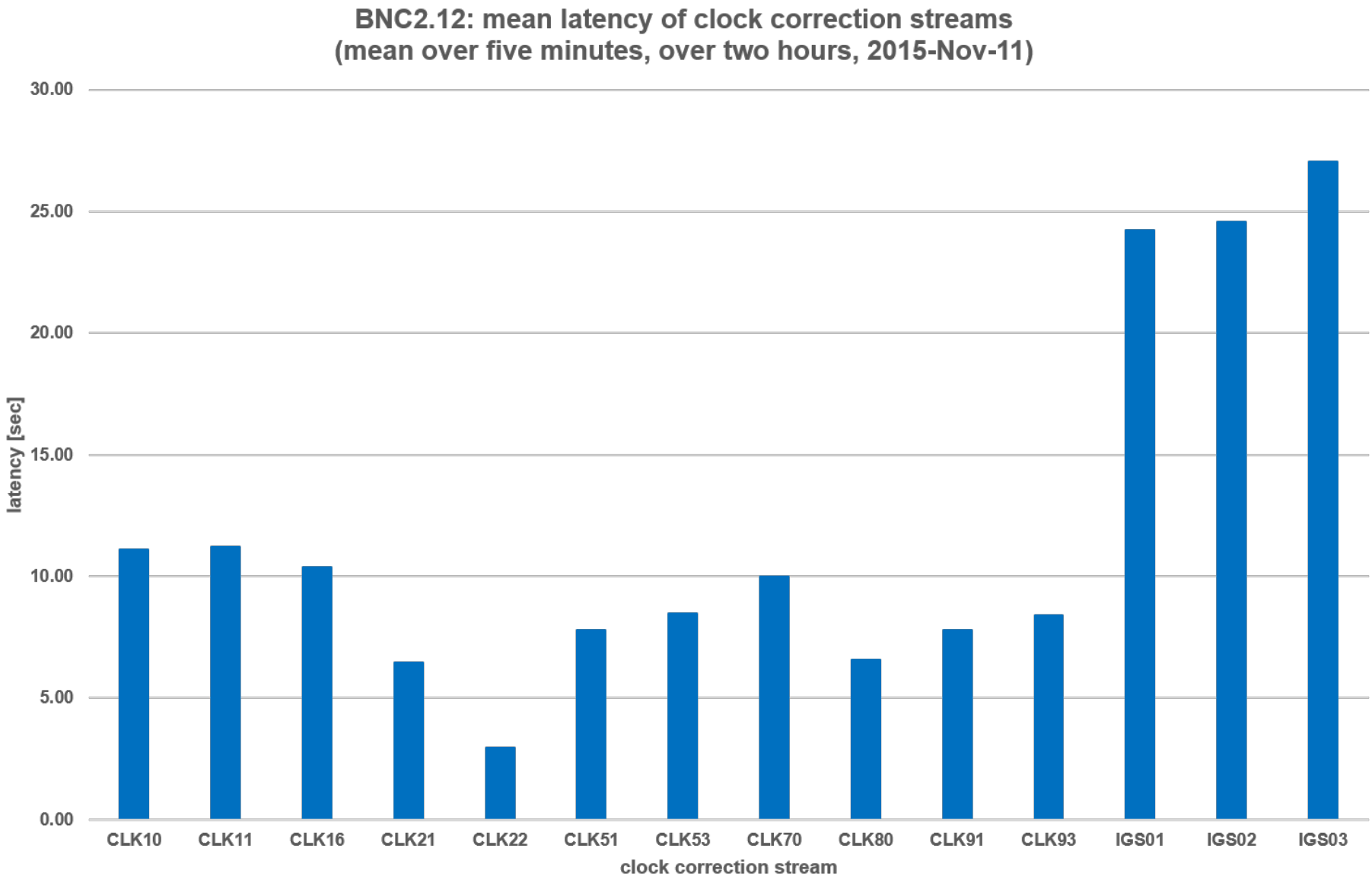
Latency (OBS)


Mean latency for real-time observations (mgex.igs-ip.net, over 3 hours)
latency [sec]
4
3.5
3
2.5
2
1.5
1
0.5
0
DLF17 KZN27 UNB37 UCAL7 WTZ27 M0SE7 TLSE7 PTGG7 BRST7 REYK7 SCRZ7 DYNG7 HARB7 BRUX7 NKLG7 SEYG7 LMMF7 CUT07 AREG7 REUN7 ZIM37 CHPG7 HOFN7 WTZZ7 NRMG7 UNX37 MAR77 KIR87 GRAC7 ONS17 THTG7 JFNG7 GMSD7 OHI37 SIN17 FTNA7 METG7 RGDG7 KOUG7 KRGG7 WTZ37 LLAG7 STFU7 HRAG7 UNBD7 CHOF7 MAO07 UNX27 NRC17 DRA37 AUT07 OBE47 STJO7 NYA27 POTS7 SIN07 SGOC7 WIND7 YELL7 LPGS7 SUTM7 WUH27 OUS27 YEL27 ULAB7 CZTG7
mountpoint

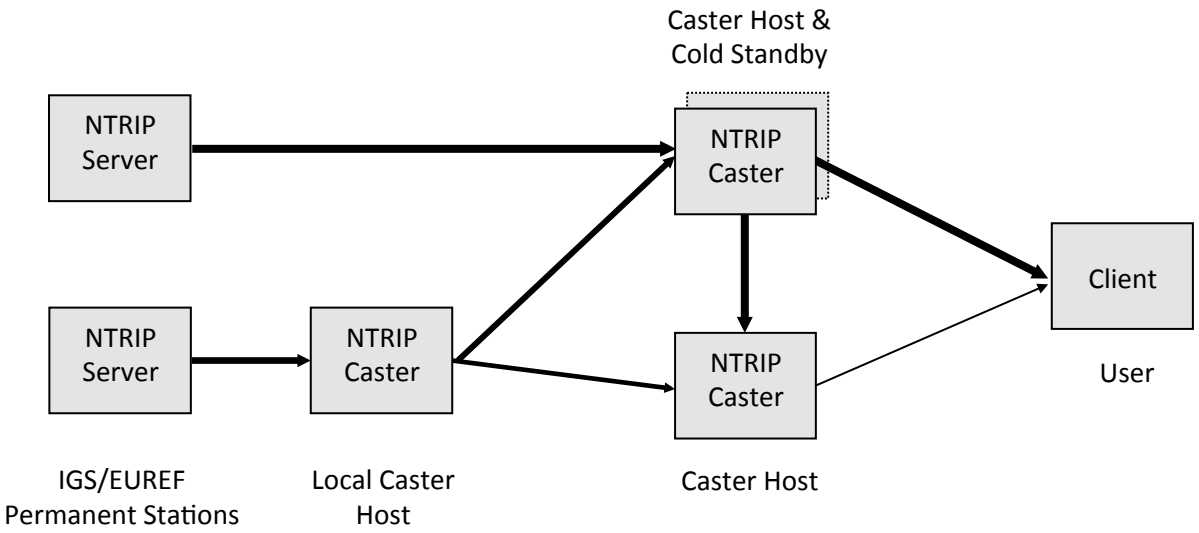
Latency (OBS)


Mean latency for real-time observations (mgex.igs-ip.net, over 3 hours)
(almost all) RTCM 3.2 (MSM) converted from RAW data!
latency [sec]
4
3.5
3
2.5
2
1.5
1
0.5
0
DLF17 KZN27 UNB37 UCAL7 WTZ27 M0SE7 TLSE7 PTGG7 BRST7 REYK7 SCRZ7 DYNG7 HARB7 BRUX7 NKLG7 SEYG7 LMMF7 CUT07 AREG7 REUN7 ZIM37 CHPG7 HOFN7 WTZZ7 NRMG7 UNX37 MAR77 KIR87 GRAC7 ONS17 THTG7 JFNG7 GMSD7 OHI37 SIN17 FTNA7 METG7 RGDG7 KOUG7 KRGG7 WTZ37 LLAG7 STFU7 HRAG7 UNBD7 CHOF7 MAO07 UNX27 NRC17 DRA37 AUT07 OBE47 STJO7 NYA27 POTS7 SIN07 SGOC7 WIND7 YELL7 LPGS7 SUTM7 WUH27 OUS27 YEL27 ULAB7 CZTG7
mountpoint

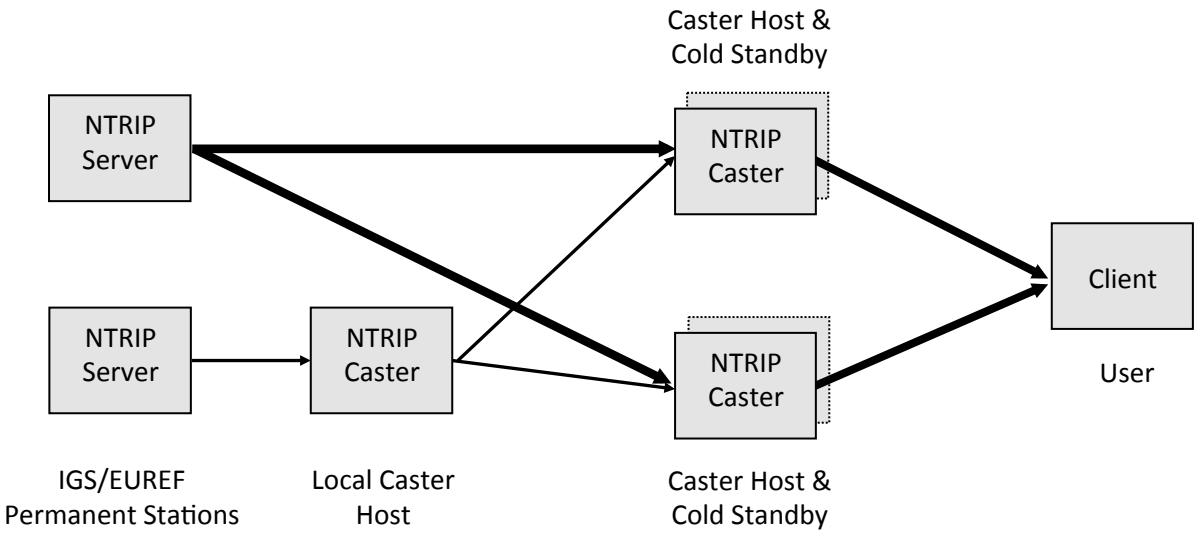
Latency (PROD)



Redundancy (OBS) – current situation



Redundancy (OBS) – target situation



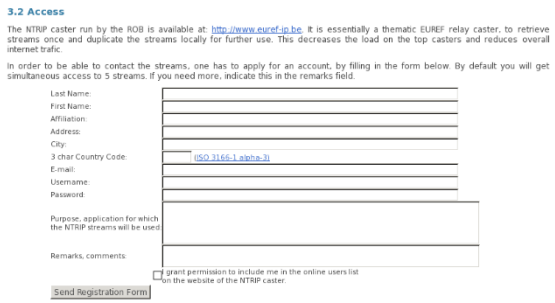
Redundancy (OBS, PROD)

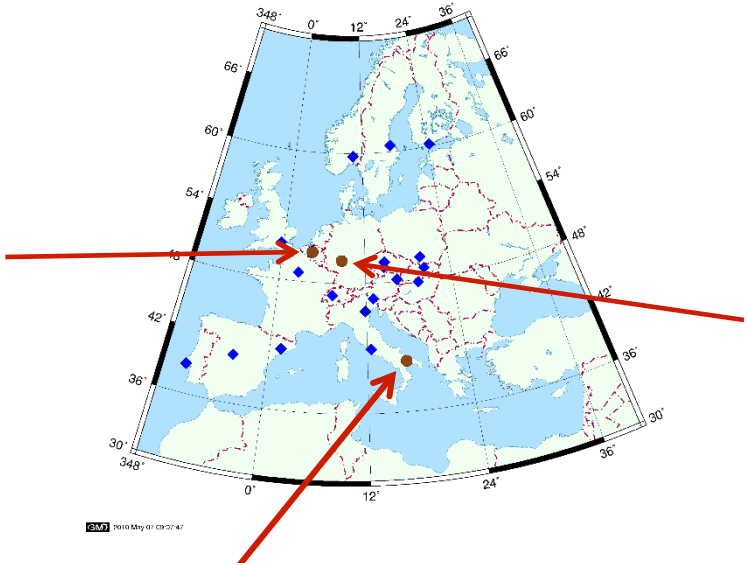
- Observations
  - Uploading (streaming) real-time data to (at least) two different casters in parallel
  - Necessary bandwidth
    - RTCM 3.1: 1.5-2.5 GB per stream and month
    - RTCM 3.2: 4.5-7.0 GB per stream and month
- Local / national broadcaster
  - Allow access to all regional / global casters
- Regional / global broadcaster
  - Identical set of (core) stations
  - Identical mountpoint names
  - Identical sourcetables settings
- User
  - Mixing data from different broadcasters
  - Switching between casters without problems (degradation, jumps, outages)

Redundancy (OBS, PROD) – EUREF

Regional Broadcaster: ROB
Link: http://www.euref-ip.be
Located: Royal Observatory of Belgium
Number of mountpoints at all: 146

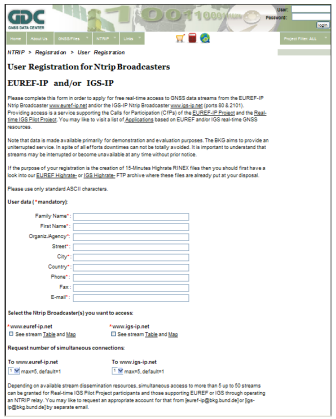
Registration Link:
http://www.gnss.be/data.php#NTRIPaccess





Blue diamonds: Local, national or other (e.g.,IGS) Ntrip Broadcaster supporting EUREF activities
Red dots: EPN Regional Broadcaster (see http://www.epncb.oma.be/_dataproducts/data_access/real_time/ broadcasters.php for a complete list of Ntrip Broadcasters)

Regional Broadcaster: BKG
Link: http://www.euref-ip.net
Located: external provider
Number of mountpoints at all: 145



Regional Broadcaster: ASI
Link: http://192.106.234.7:2101/
Located: ASI/CGS Centro di Geodesia Spaziale
Number of mountpoints at all: 137

Registration mail: geodaf@hp835.mt.asi.it

- **Guidelines**
  - **“EPN Stations and Operational Centres” (http://www.epncb.oma.be/_documentation/guidelines/guidelines_station_operationalcentre.pdf)**
  - **“EPN Data Centres & EPN Broadcasters” (http://www.epncb.oma.be/_documentation/guidelines/guidelines_data_centres.pdf)**

Redundancy (OBS)

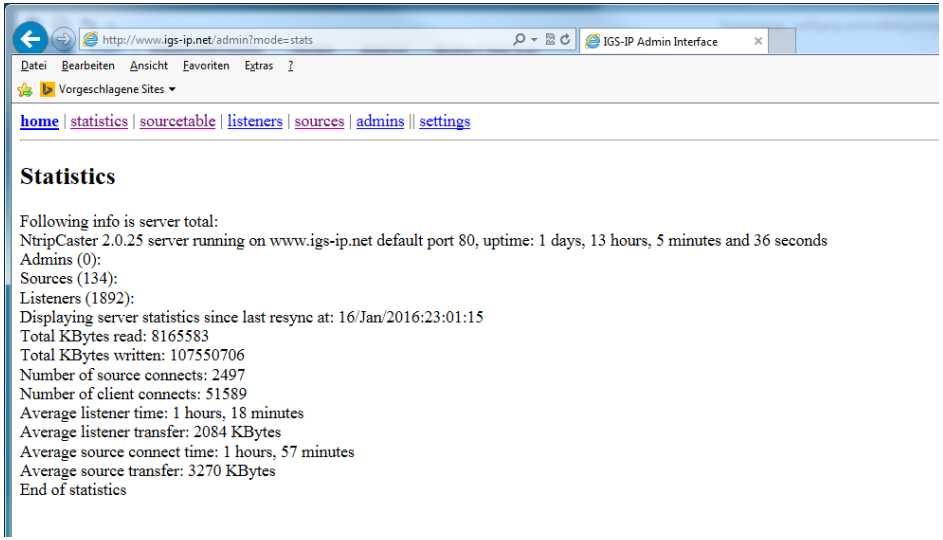
- Streaming data directly from station to caster
  - ASI: 5 (LAMP, MATG, MATE, USAL, VEN1)
  - BKG (EPN): ~ 53 (e.g. BRUX, DENT, DOUR, WARE)
  - ROB: 4 (BRUX, DENT, DOUR, WARE)
  - BKG (IGS): ~ 35 (e.g. ADIS, LHAZ, OHI3, POTS)
  - IGS: ~ 30 (e.g. ADIS, LHAZ, OHI3, POTS)
- Pulling data directly from station to caster
  - EPN: MOP2, TORI; M0SE?
  - IGS: DAEJ
- Pulling from other broadcasters (local, national)
  - ASI: ~ 35*
  - BKG: ~ 65
  - ROB: ~ 80*
  - from approx. 25 local or national casters in Europe

* w/o pulling from BKG broadcasters

Redundancy & Workload (OBS, PROD)

- **Number of registered users**
  - **ASI: 96 (~ 31 new in 2015)**
  - **BKG: ~ 3300 (~ 550 requests in 2015)**
  - **ROB: 132 (~ 50 new in 2015)**
  - **(JPL: ~ 120 requests in 2015)**
- **Registration procedure**
  - **Separately for each provider / broadcaster**
  - **Common / centralized registration process not implemented / agreed**

Workload (OBS, PROD)



http://www.igs-ip.net/admin?mode=stats — IGS-IP Admin Interface

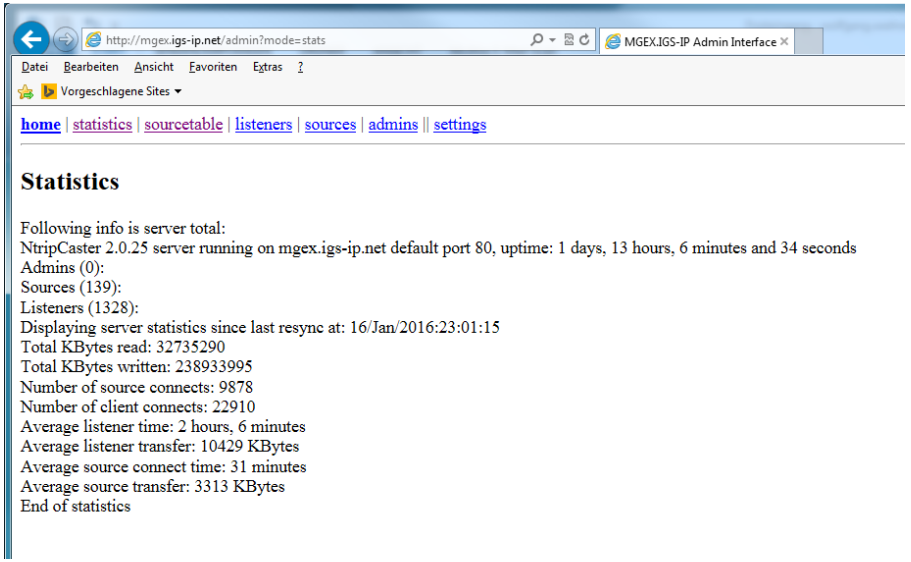
Datei Bearbeiten Ansicht Favoriten Extras ?

Vorgeschlagene Sites

home | statistics | sourcetable | listeners | sources | admins || settings

Statistics

Following info is server total:
NtripCaster 2.0.25 server running on www.igs-ip.net default port 80, uptime: 1 days, 13 hours, 5 minutes and 36 seconds
Admins (0):
Sources (134):
Listeners (1892):
Displaying server statistics since last resync at: 16/Jan/2016:23:01:15
Total KBytes read: 8165583
Total KBytes written: 107550706
Number of source connects: 2497
Number of client connects: 51589
Average listener time: 1 hours, 18 minutes
Average listener transfer: 2084 KBytes
Average source connect time: 1 hours, 57 minutes
Average source transfer: 3270 KBytes
End of statistics



http://mgex.igs-ip.net/admin?mode=stats — MGEX.IGS-IP Admin Interface

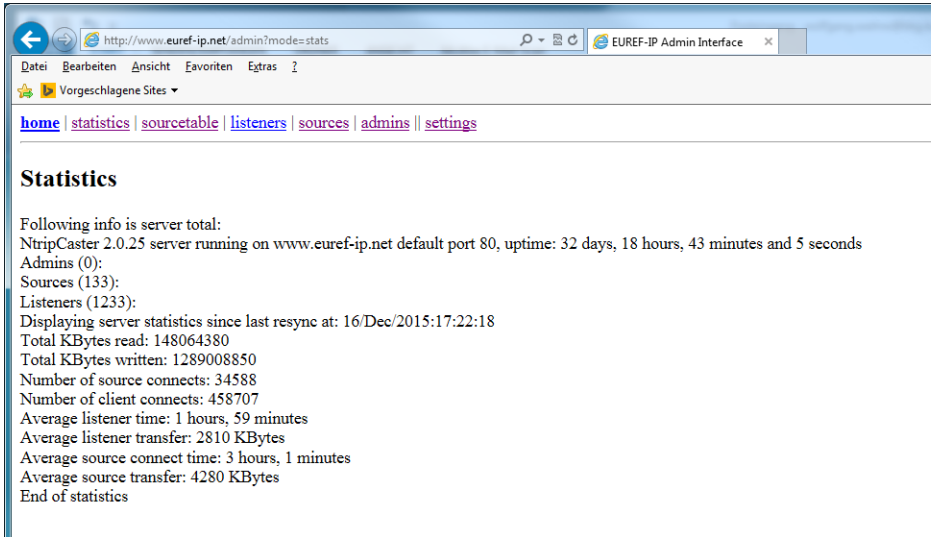
Datei Bearbeiten Ansicht Favoriten Extras ?

Vorgeschlagene Sites

home | statistics | sourcetable | listeners | sources | admins || settings

Statistics

Following info is server total:
NtripCaster 2.0.25 server running on mgex.igs-ip.net default port 80, uptime: 1 days, 13 hours, 6 minutes and 34 seconds
Admins (0):
Sources (139):
Listeners (1328):
Displaying server statistics since last resync at: 16/Jan/2016:23:01:15
Total KBytes read: 32735290
Total KBytes written: 238933995
Number of source connects: 9878
Number of client connects: 22910
Average listener time: 2 hours, 6 minutes
Average listener transfer: 10429 KBytes
Average source connect time: 31 minutes
Average source transfer: 3313 KBytes
End of statistics



http://www.euref-ip.net/admin?mode=stats — EUREF-IP Admin Interface

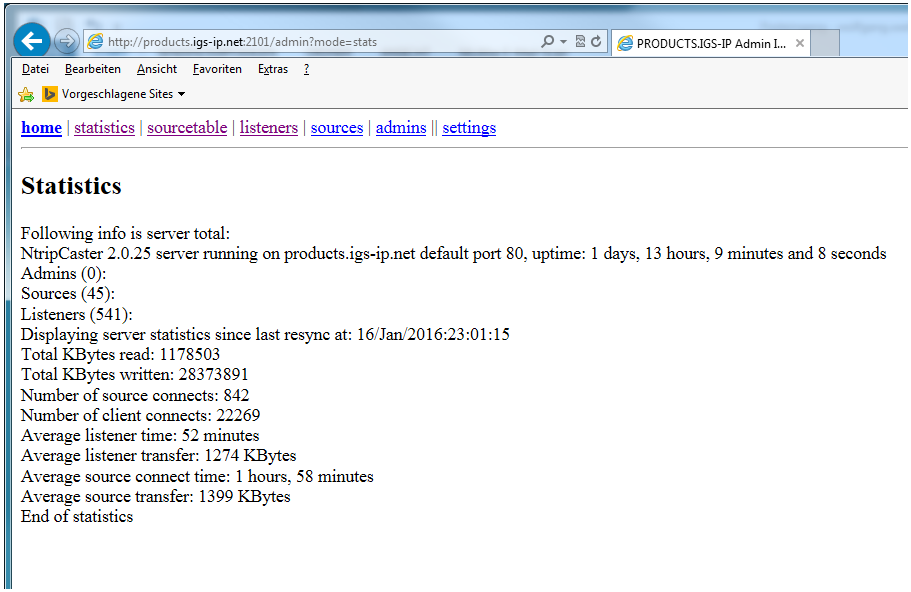
Datei Bearbeiten Ansicht Favoriten Extras ?

Vorgeschlagene Sites

home | statistics | sourcetable | listeners | sources | admins || settings

Statistics

Following info is server total:
NtripCaster 2.0.25 server running on www.euref-ip.net default port 80, uptime: 32 days, 18 hours, 43 minutes and 5 seconds
Admins (0):
Sources (133):
Listeners (1233):
Displaying server statistics since last resync at: 16/Dec/2015:17:22:18
Total KBytes read: 148064380
Total KBytes written: 1289008850
Number of source connects: 34588
Number of client connects: 458707
Average listener time: 1 hours, 59 minutes
Average listener transfer: 2810 KBytes
Average source connect time: 3 hours, 1 minutes
Average source transfer: 4280 KBytes
End of statistics



http://products.igs-ip.net:2101/admin?mode=stats — PRODUCTS.IGS-IP Admin I...

Datei Bearbeiten Ansicht Favoriten Extras ?

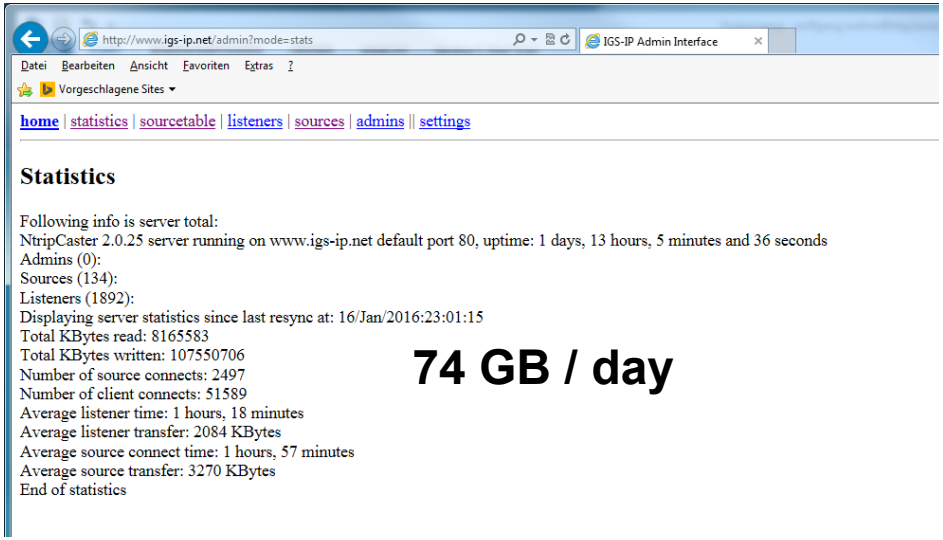
Vorgeschlagene Sites

home | statistics | sourcetable | listeners | sources | admins || settings

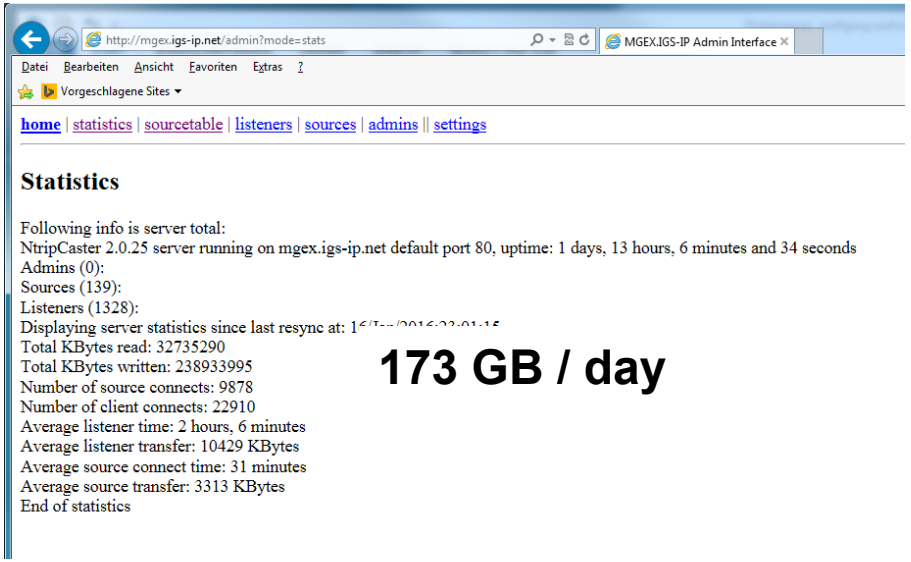
Statistics

Following info is server total:
NtripCaster 2.0.25 server running on products.igs-ip.net default port 80, uptime: 1 days, 13 hours, 9 minutes and 8 seconds
Admins (0):
Sources (45):
Listeners (541):
Displaying server statistics since last resync at: 16/Jan/2016:23:01:15
Total KBytes read: 1178503
Total KBytes written: 28373891
Number of source connects: 842
Number of client connects: 22269
Average listener time: 52 minutes
Average listener transfer: 1274 KBytes
Average source connect time: 1 hours, 58 minutes
Average source transfer: 1399 KBytes
End of statistics

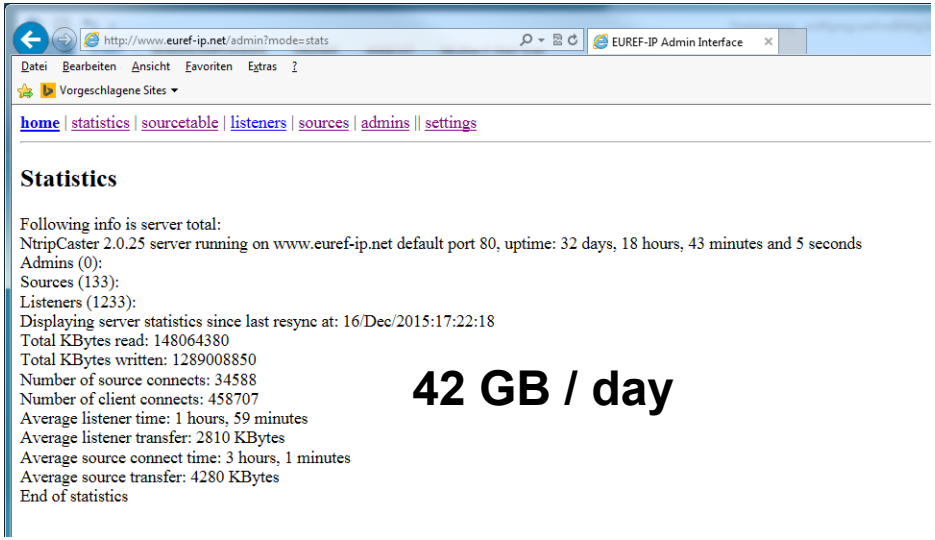
Workload (OBS, PROD)



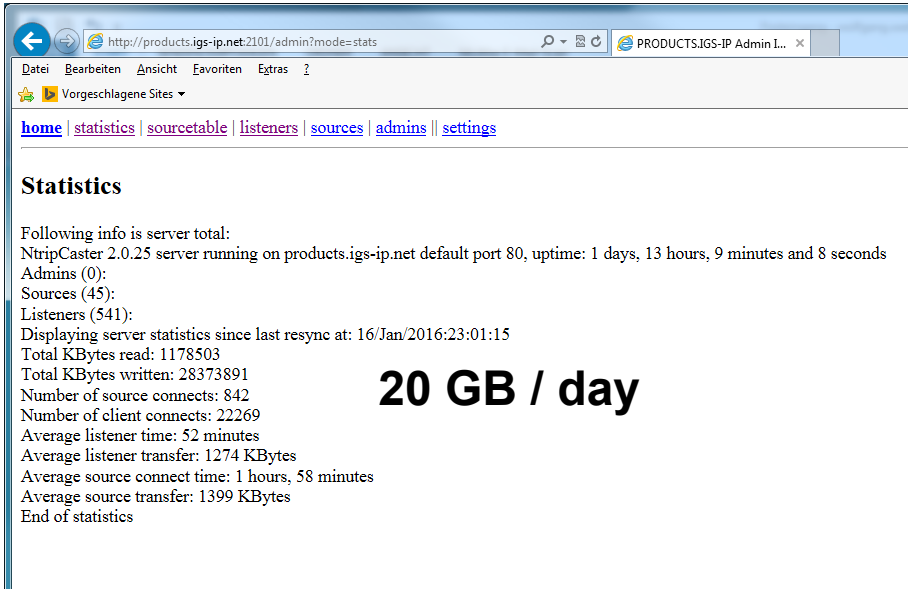
74 GB / day



173 GB / day

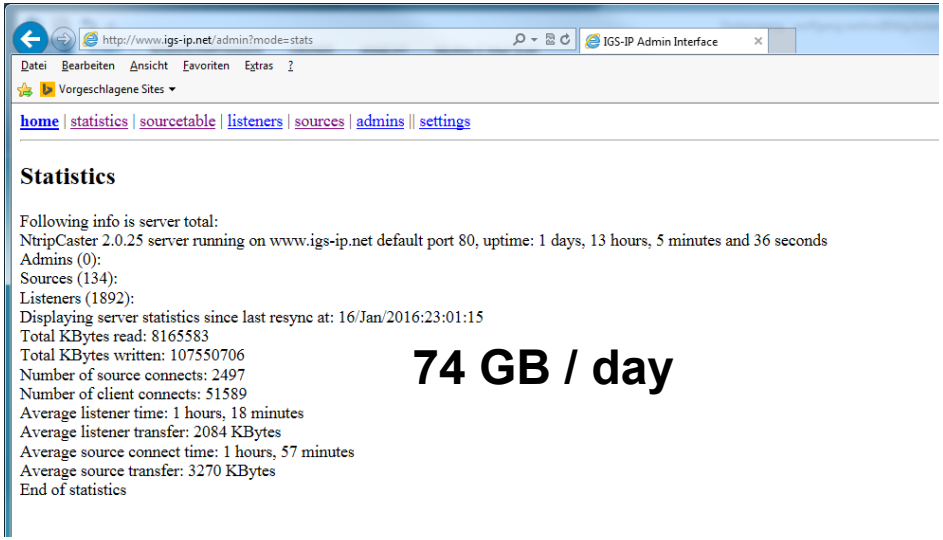


42 GB / day

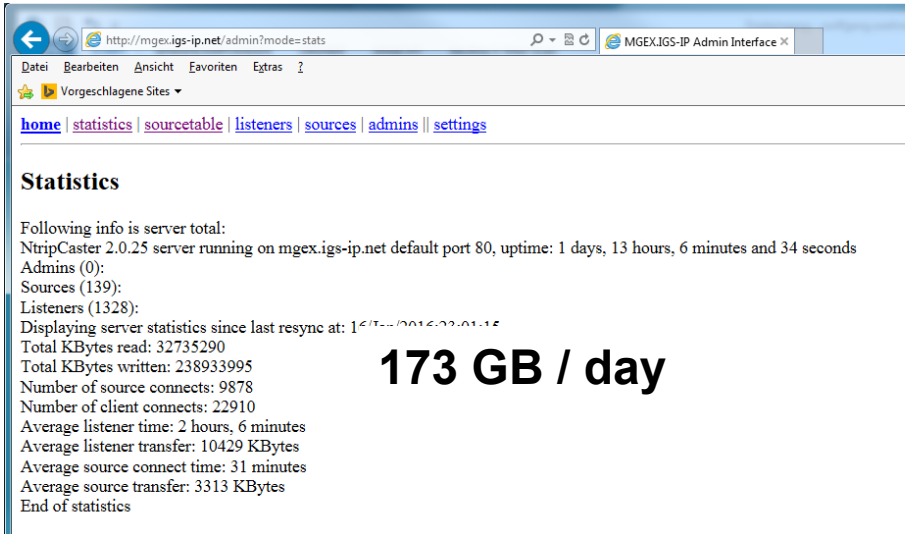


20 GB / day

Workload (OBS, PROD)

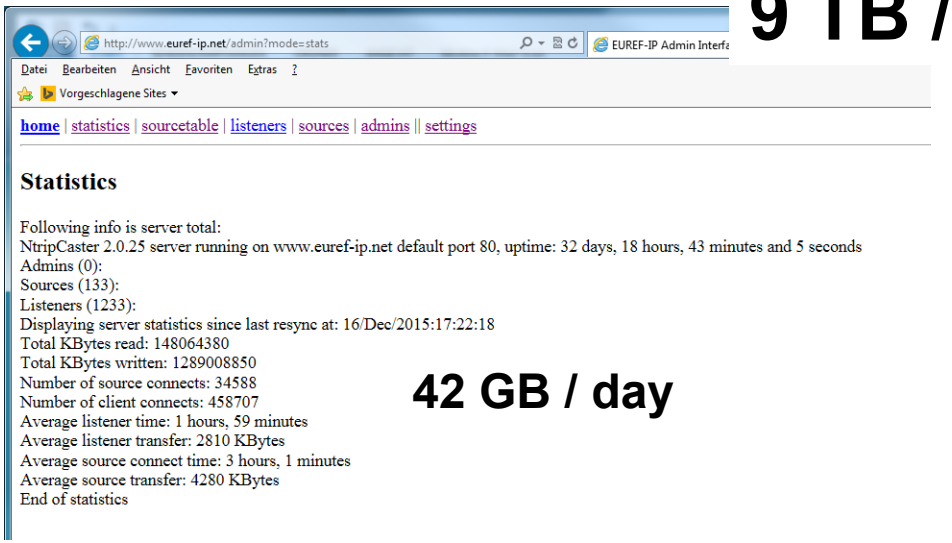


74 GB / day

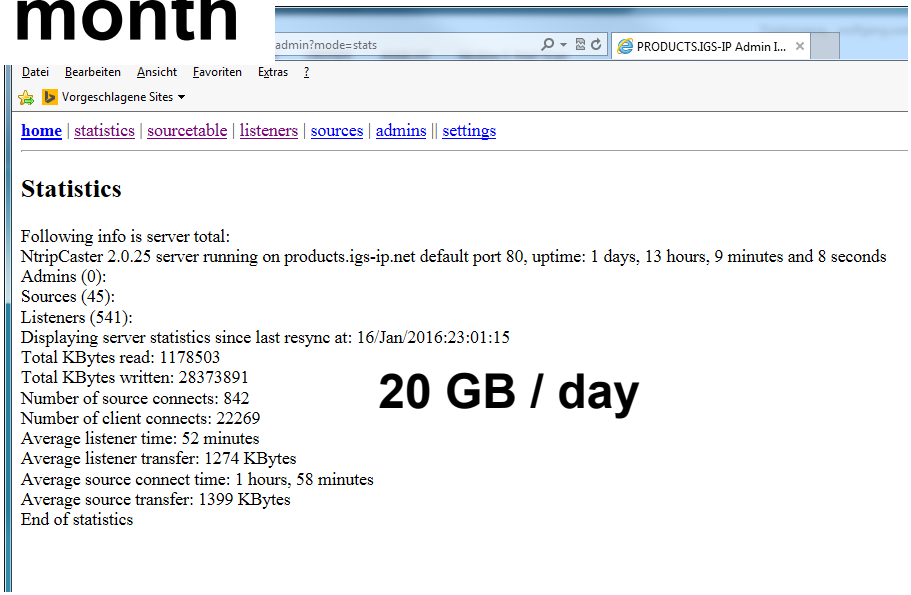


173 GB / day

9 TB / month

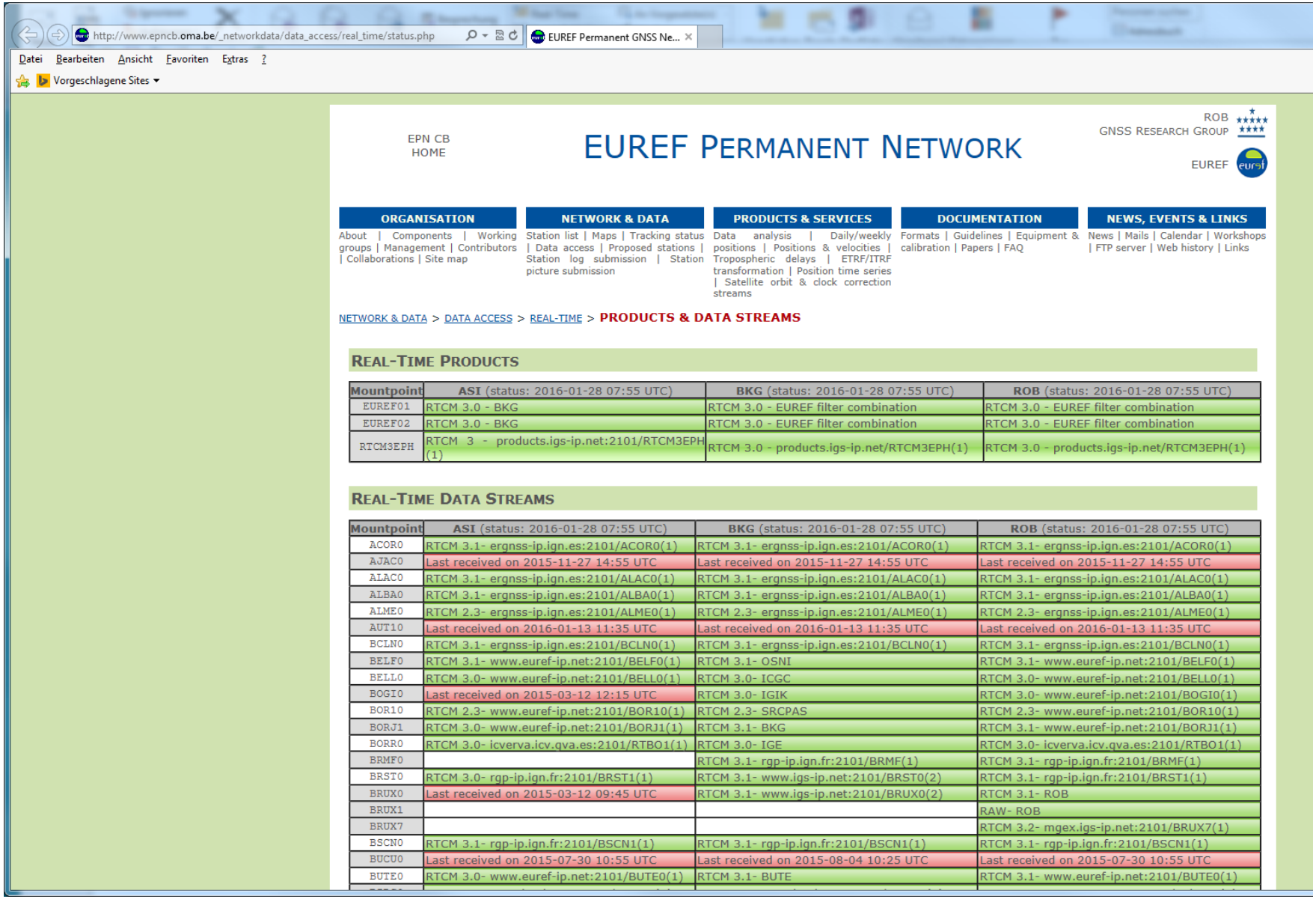


42 GB / day



20 GB / day

Monitoring (OBS, PROD)



http://www.epncb.oma.be/_networkdata/data_access/real_time/status.php

EUREF Permanent GNSS Ne...

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Vorgeschlagene Sites

EPN CB HOME

EUREF PERMANENT NETWORK

ROB GNSS RESEARCH GROUP

EUREF

ORGANISATION
About | Components | Working groups | Management | Contributors | Collaborations | Site map

NETWORK & DATA
Station list | Maps | Tracking status | Data access | Proposed stations | Station log submission | Station picture submission

PRODUCTS & SERVICES
Data analysis | Daily/weekly positions | Positions & velocities | Tropospheric delays | ETRF/ITRF transformation | Position time series | Satellite orbit & clock correction streams

DOCUMENTATION
Formats | Guidelines | Equipment & calibration | Papers | FAQ

NEWS, EVENTS & LINKS
News | Mails | Calendar | Workshops | FTP server | Web history | Links

NETWORK & DATA > DATA ACCESS > REAL-TIME > **PRODUCTS & DATA STREAMS**

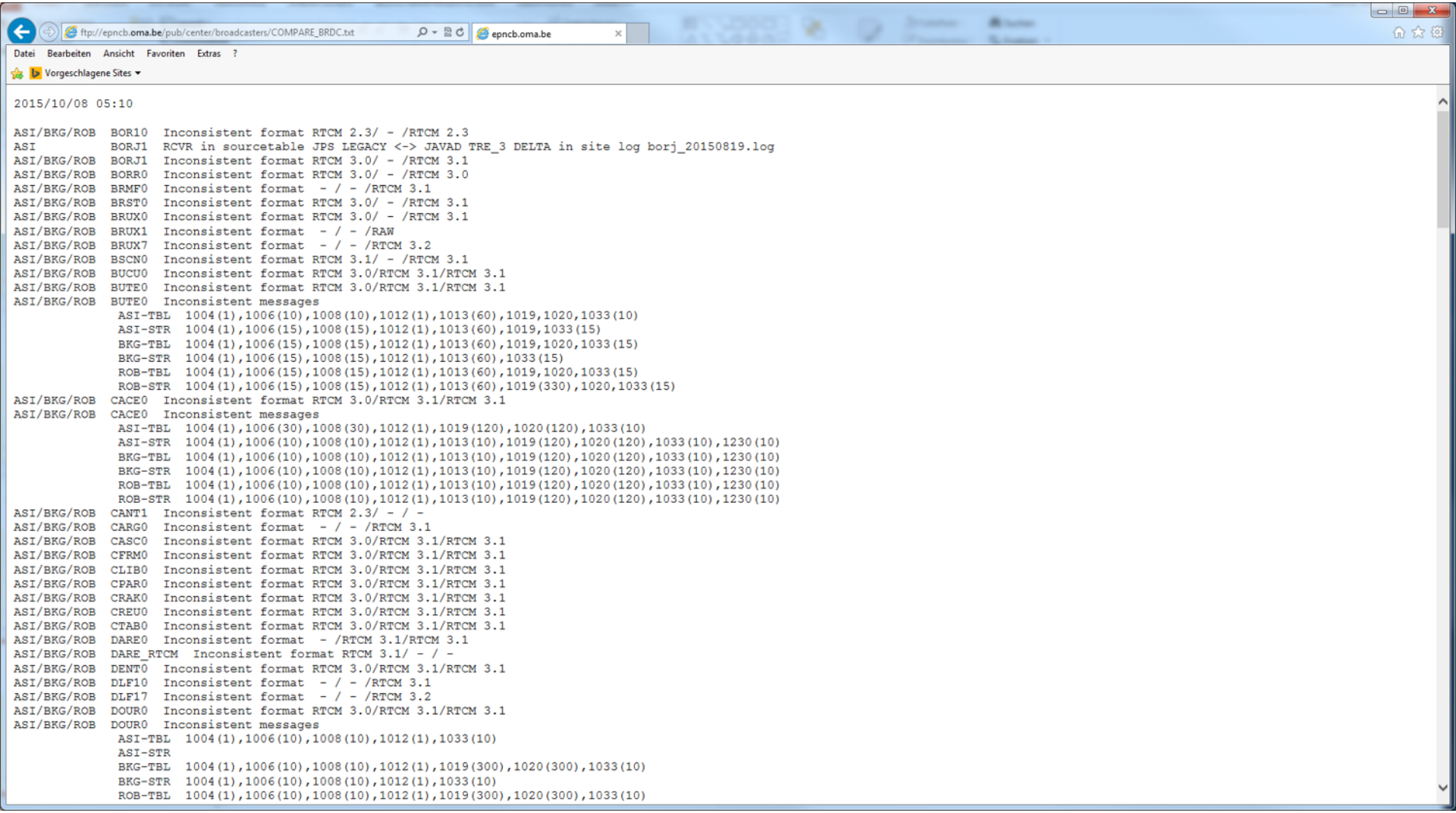
REAL-TIME PRODUCTS

Mountpoint	ASI (status: 2016-01-28 07:55 UTC)	BKG (status: 2016-01-28 07:55 UTC)	ROB (status: 2016-01-28 07:55 UTC)
EUREF01	RTCM 3.0 - BKG	RTCM 3.0 - EUREF filter combination	RTCM 3.0 - EUREF filter combination
EUREF02	RTCM 3.0 - BKG	RTCM 3.0 - EUREF filter combination	RTCM 3.0 - EUREF filter combination
RTCM3EPH	RTCM 3 - products.igs-ip.net:2101/RTCM3EPH(1)	RTCM 3.0 - products.igs-ip.net/RTCM3EPH(1)	RTCM 3.0 - products.igs-ip.net/RTCM3EPH(1)

REAL-TIME DATA STREAMS

Mountpoint	ASI (status: 2016-01-28 07:55 UTC)	BKG (status: 2016-01-28 07:55 UTC)	ROB (status: 2016-01-28 07:55 UTC)
ACOR0	RTCM 3.1- ergnss-ip.ign.es:2101/ACOR0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ACOR0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ACOR0(1)
AJAC0	Last received on 2015-11-27 14:55 UTC	Last received on 2015-11-27 14:55 UTC	Last received on 2015-11-27 14:55 UTC
ALAC0	RTCM 3.1- ergnss-ip.ign.es:2101/ALAC0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ALAC0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ALAC0(1)
ALBA0	RTCM 3.1- ergnss-ip.ign.es:2101/ALBA0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ALBA0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/ALBA0(1)
ALME0	RTCM 2.3- ergnss-ip.ign.es:2101/ALME0(1)	RTCM 2.3- ergnss-ip.ign.es:2101/ALME0(1)	RTCM 2.3- ergnss-ip.ign.es:2101/ALME0(1)
AUT10	Last received on 2016-01-13 11:35 UTC	Last received on 2016-01-13 11:35 UTC	Last received on 2016-01-13 11:35 UTC
BCLN0	RTCM 3.1- ergnss-ip.ign.es:2101/BCLN0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/BCLN0(1)	RTCM 3.1- ergnss-ip.ign.es:2101/BCLN0(1)
BELF0	RTCM 3.1- www.euref-ip.net:2101/BELF0(1)	RTCM 3.1- OSNI	RTCM 3.1- www.euref-ip.net:2101/BELF0(1)
BELL0	RTCM 3.0- www.euref-ip.net:2101/BELL0(1)	RTCM 3.0- ICGC	RTCM 3.0- www.euref-ip.net:2101/BELL0(1)
BOGI0	Last received on 2015-03-12 12:15 UTC	RTCM 3.0- IGIK	RTCM 3.0- www.euref-ip.net:2101/BOGI0(1)
BOR10	RTCM 2.3- www.euref-ip.net:2101/BOR10(1)	RTCM 2.3- SRCPAS	RTCM 2.3- www.euref-ip.net:2101/BOR10(1)
BORJ1	RTCM 3.0- www.euref-ip.net:2101/BORJ1(1)	RTCM 3.1- BKG	RTCM 3.1- www.euref-ip.net:2101/BORJ1(1)
BORR0	RTCM 3.0- icverva.icv.gva.es:2101/RTBO1(1)	RTCM 3.0- IGE	RTCM 3.0- icverva.icv.gva.es:2101/RTBO1(1)
BRMF0		RTCM 3.1- rgp-ip.ign.fr:2101/BRMF(1)	RTCM 3.1- rgp-ip.ign.fr:2101/BRMF(1)
BRST0	RTCM 3.0- rgp-ip.ign.fr:2101/BRST1(1)	RTCM 3.1- www.igs-ip.net:2101/BRST0(2)	RTCM 3.1- rgp-ip.ign.fr:2101/BRST1(1)
BRUX0	Last received on 2015-03-12 09:45 UTC	RTCM 3.1- www.igs-ip.net:2101/BRUX0(2)	RTCM 3.1- ROB
BRUX1			RAW- ROB
BRUX7			RTCM 3.2- mgex.igs-ip.net:2101/BRUX7(1)
BSCN0	RTCM 3.1- rgp-ip.ign.fr:2101/BSCN1(1)	RTCM 3.1- rgp-ip.ign.fr:2101/BSCN1(1)	RTCM 3.1- rgp-ip.ign.fr:2101/BSCN1(1)
BUCU0	Last received on 2015-07-30 10:55 UTC	Last received on 2015-08-04 10:25 UTC	Last received on 2015-07-30 10:55 UTC
BUTE0	RTCM 3.0- www.euref-ip.net:2101/BUTE0(1)	RTCM 3.1- BUTE	RTCM 3.1- www.euref-ip.net:2101/BUTE0(1)

Monitoring (OBS, PROD)




```
2015/10/08 05:10

ASI/BKG/ROB  BOR10  Inconsistent format RTCM 2.3/ - /RTCM 2.3
ASI          BORJ1  RCVR in sourcetable JPS LEGACY <-> JAVAD TRE_3 DELTA in site log borj_20150819.log
ASI/BKG/ROB  BORJ1  Inconsistent format RTCM 3.0/ - /RTCM 3.1
ASI/BKG/ROB  BORR0  Inconsistent format RTCM 3.0/ - /RTCM 3.0
ASI/BKG/ROB  BRMF0  Inconsistent format  - / - /RTCM 3.1
ASI/BKG/ROB  BRST0  Inconsistent format RTCM 3.0/ - /RTCM 3.1
ASI/BKG/ROB  BRUX0  Inconsistent format RTCM 3.0/ - /RTCM 3.1
ASI/BKG/ROB  BRUX1  Inconsistent format  - / - /RAW
ASI/BKG/ROB  BRUX7  Inconsistent format  - / - /RTCM 3.2
ASI/BKG/ROB  BSCN0  Inconsistent format RTCM 3.1/ - /RTCM 3.1
ASI/BKG/ROB  BUCU0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  BUTE0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  BUTE0  Inconsistent messages
              ASI-TBL  1004(1),1006(10),1008(10),1012(1),1013(60),1019,1020,1033(10)
              ASI-STR  1004(1),1006(15),1008(15),1012(1),1013(60),1019,1033(15)
              BKG-TBL  1004(1),1006(15),1008(15),1012(1),1013(60),1019,1020,1033(15)
              BKG-STR  1004(1),1006(15),1008(15),1012(1),1013(60),1033(15)
              ROB-TBL  1004(1),1006(15),1008(15),1012(1),1013(60),1019,1020,1033(15)
              ROB-STR  1004(1),1006(15),1008(15),1012(1),1013(60),1019(330),1020,1033(15)
ASI/BKG/ROB  CACE0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CACE0  Inconsistent messages
              ASI-TBL  1004(1),1006(30),1008(30),1012(1),1019(120),1020(120),1033(10)
              ASI-STR  1004(1),1006(10),1008(10),1012(1),1013(10),1019(120),1020(120),1033(10),1230(10)
              BKG-TBL  1004(1),1006(10),1008(10),1012(1),1013(10),1019(120),1020(120),1033(10),1230(10)
              BKG-STR  1004(1),1006(10),1008(10),1012(1),1013(10),1019(120),1020(120),1033(10),1230(10)
              ROB-TBL  1004(1),1006(10),1008(10),1012(1),1013(10),1019(120),1020(120),1033(10),1230(10)
              ROB-STR  1004(1),1006(10),1008(10),1012(1),1013(10),1019(120),1020(120),1033(10),1230(10)
ASI/BKG/ROB  CANT1  Inconsistent format RTCM 2.3/ - / -
ASI/BKG/ROB  CARG0  Inconsistent format  - / - /RTCM 3.1
ASI/BKG/ROB  CASC0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CFRM0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CLIB0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CPAR0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CRAK0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CREU0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  CTAB0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  DARE0  Inconsistent format  - /RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  DARE_RTCM  Inconsistent format RTCM 3.1/ - / -
ASI/BKG/ROB  DENT0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  DLF10  Inconsistent format  - / - /RTCM 3.1
ASI/BKG/ROB  DLF17  Inconsistent format  - / - /RTCM 3.2
ASI/BKG/ROB  DOUR0  Inconsistent format RTCM 3.0/RTCM 3.1/RTCM 3.1
ASI/BKG/ROB  DOUR0  Inconsistent messages
              ASI-TBL  1004(1),1006(10),1008(10),1012(1),1033(10)
              ASI-STR
              BKG-TBL  1004(1),1006(10),1008(10),1012(1),1019(300),1020(300),1033(10)
              BKG-STR  1004(1),1006(10),1008(10),1012(1),1033(10)
              ROB-TBL  1004(1),1006(10),1008(10),1012(1),1019(300),1020(300),1033(10)
```

Monitoring (OBS, PROD)

/home/rtmon/scripts/bin/checkSourcetables.pl: log email - Nachricht (Nur-Text)

DATEI NACHRICHT ENTWICKLERTOOLS McAfee E-Mail-Scan

Ignorieren Junk-E-Mail Löschen Antworten Allen antworten Weiterleiten Besprechung Weitere Löschen Antworten

Caster_Registrat... An Vorgesetzte(n) Team-E-Mail Erledigt Antworten und... Neu erstellen QuickSteps

Verschieben Regeln OneNote Aktionen Verschieben

Als ungelesen markieren Kategorisieren Nachverfolgung Kategorien

Übersetzen Suchen Verwandt Markieren Bearbeiten

Zoom Zoom

Do 08.10.2015 08:22

noreply@bkg.bund.de

/home/rtmon/scripts/bin/checkSourcetables.pl: log email

An Wiesensarter, Erwin; Söhne, Wolfgang

```
2015/10/08 06:17:06 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> GREF-IP: AUBG3: AntType skl vs. scanned: 'LEIAR25.R4     LEIT' <-> 'LEIAR25.R4 LEIT'
2015/10/08 06:17:08 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> GREF-IP: GELL1: AntType skl vs. scanned: 'LEIAR25.R4     LEIT' <-> 'LEIAR25.R4 LEIT'
2015/10/08 06:17:08 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> GREF-IP: KARL0: RecType skl: 'JPS LEGACY' - sourcetable: 'JAVAD TRE_3 DELTA'
2015/10/08 06:17:14 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> RELAY: BORJ2: RecType skl: 'JAVAD TRE_3 DELTA' - sourcetable: 'LEICA GRX1200+GNSS'
2015/10/08 06:17:14 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> RELAY: BORJ3: RecType skl: 'JAVAD TRE_3 DELTA' - sourcetable: 'LEICA GRX1200+GNSS'
2015/10/08 06:17:27 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> RELAY: KARL0: RecType skl: 'JPS LEGACY' - sourcetable: 'JAVAD TRE_3 DELTA'
2015/10/08 06:17:27 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> RELAY: KARL1: RecType skl: 'JPS LEGACY' - sourcetable: 'JAVAD TRE_3 DELTA'
2015/10/08 06:19:23 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> IGS-IP: CTWN0: AntType skl vs. scanned: 'ASH701941.B    SCIS' <-> 'TRM59800.00    SCIS'
2015/10/08 06:19:40 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> IGS-IP: ONRJ0: AntType skl vs. scanned: 'LEIAX1203+GNSS' <-> 'TRM59800.00    NONE'
2015/10/08 06:19:40 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> IGS-IP: ONRJ0: AntHeight skl vs. scanned: 0.0080 <-> 0.0079
2015/10/08 06:19:50 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> IGS-IP: TLSE0: AntHeight skl vs. scanned: 1.0530 <-> 1.0529
2015/10/08 06:19:50 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> IGS-IP: UNRO0: AntType skl vs. scanned: 'TRM57971.00' <-> 'TRM57971.00    NONE'
2015/10/08 06:19:50 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> IGS-IP: UNRO0: AntHeight skl vs. scanned: 0.0000 <-> 0.0001
2015/10/08 06:19:55 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> BACKUP-GREF-IP: KARL0: RecType skl: 'JPS LEGACY' - sourcetable: 'JAVAD TRE_3 DELTA'
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: BRST0: AntType skl vs. scanned: 'TRM57971.00    NONE' <-> 'TRM55971.00    NONE'
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: BRST0: AntHeight skl vs. scanned: 2.0431 <-> 2.0430
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: CACE0: AntHeight skl vs. scanned: 0.0600 <-> 0.0599
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: CLIB0: AntHeight skl vs. scanned: 0.0663 <-> 0.0662
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: COBA0: AntHeight skl vs. scanned: 0.0790 <-> 0.0780
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: CREU0: AntType skl vs. scanned: 'TRM41249.00    NONE' <-> 'TRM41249.00'
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: DENT0: AntHeight skl vs. scanned: 0.7650 <-> 1.2880
2015/10/08 06:21:30 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: DYNG0: AntHeight skl vs. scanned: 2.0180 <-> 2.0179
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: EBRE0: AntType skl vs. scanned: 'TRM57971.00    NONE' <-> 'TRM57971.00'
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: GRAZ3: AntHeight skl vs. scanned: 1.9640 <-> 1.9639
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: HERT0: AntType skl vs. scanned: 'LEIAT504GG     NONE' <-> 'LEIAT504GG'
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: HUEL0: AntHeight skl vs. scanned: 0.0000 <-> 0.0001
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: IGEO0: AntType skl vs. scanned: 'ASH700936D_M   SNOW' <-> 'ASH700936D_M   SNO'
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: IGEO0: AntHeight skl vs. scanned: -0.0136 <-> 0.0000
2015/10/08 06:21:31 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: JOZ20: AntType skl vs. scanned: 'LEIAT504GG     NONE' <-> 'LEIAT504GG'
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: JOZ30: AntType skl vs. scanned: 'LEIAT504GG     NONE' <-> 'AT504 GG LEIS'
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 294> EUREF-IP: KARL1: RecType skl: 'JPS LEGACY' - sourcetable: 'JAVAD TRE_3 DELTA'
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: KRA10: AntHeight skl vs. scanned: 0.0000 <-> 0.0001
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: LAMA0: AntHeight skl vs. scanned: 0.0600 <-> 0.0599
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: MALL0: AntHeight skl vs. scanned: 0.0600 <-> 0.0599
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: MATE0: AntType skl vs. scanned: 'LEIAT504GG     NONE' <-> 'LEIAT504GG'
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: MOP20: AntType skl vs. scanned: 'TRM55971.00    TZGD' <-> 'TRM57971.00    TZGD'
2015/10/08 06:21:32 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: ORID0: AntType skl vs. scanned: 'LEIAT504GG     LEIS' <-> 'LEIAT504GG'
2015/10/08 06:21:33 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: PLAN0: AntType skl vs. scanned: 'TRM57971.00    NONE' <-> 'TRM57971.00'
2015/10/08 06:21:33 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: SALA0: AntHeight skl vs. scanned: 0.0600 <-> 0.0599
2015/10/08 06:21:33 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 308> EUREF-IP: SOFI0: AntType skl vs. scanned: 'LEIAR25.R3     LEIT' <-> 'LEIAR25      LEIT'
2015/10/08 06:21:33 [fwv201.bkg] /home/rtmon/scripts/bin/checkSourcetables.pl 324> EUREF-IP: SOFI0: AntHeight skl vs. scanned: 0.2200 <-> 0.2199
```

Conclusions

- Latency (PROD)
  - IGS real-time combination products need latency improvement
- Redundancy (OBS)
  - Only some stations are fulfilling recommendation of parallel upload
  - Minority of new stations by default provides real-time data
  - Needs more effort (by the network coordinators?) in substituting station managers
- Redundancy (PROD)
  - Upload of products to two different casters almost complete (JPL, BKG; ASI, BKG, ROB)

Conclusions

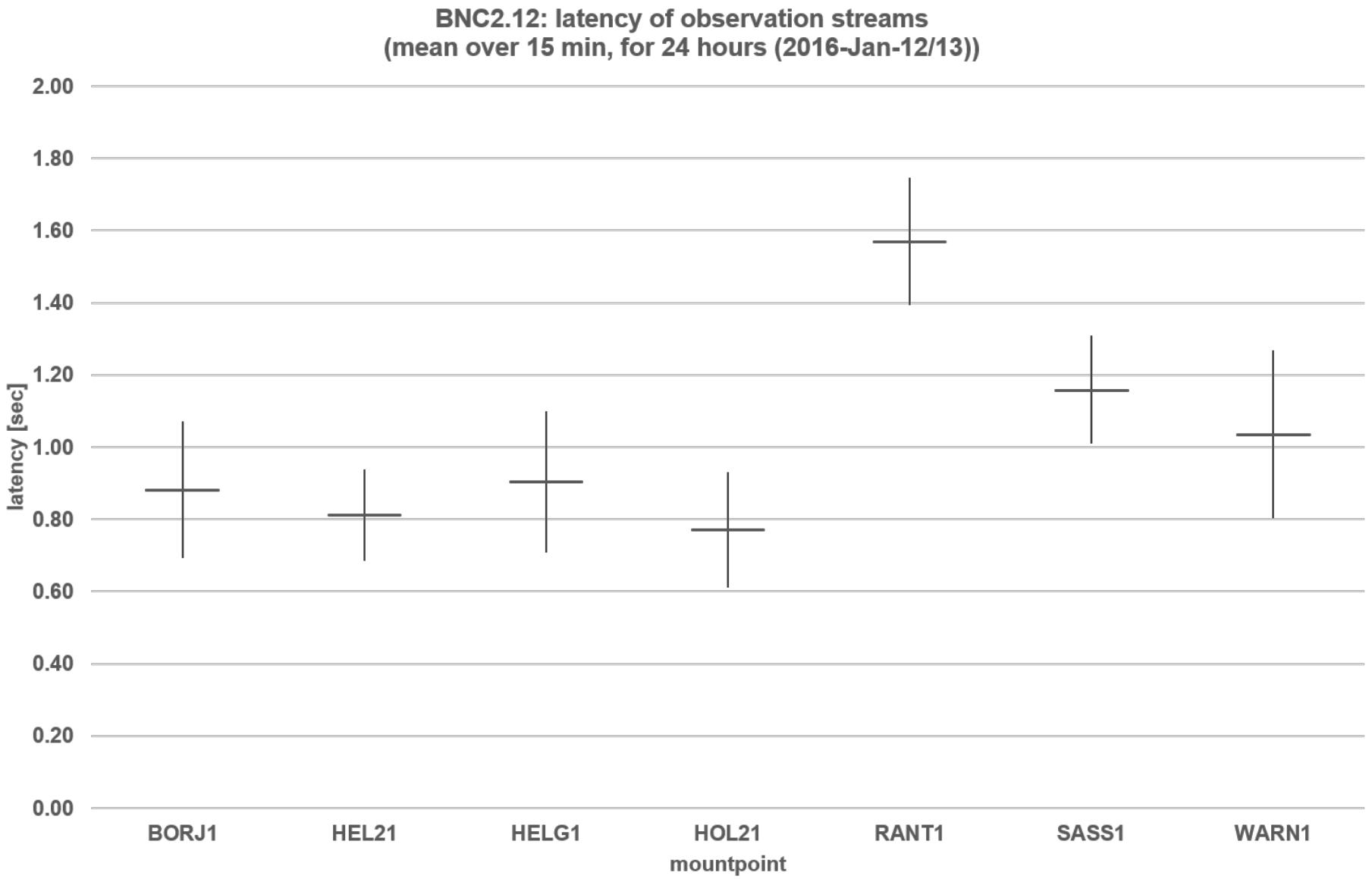
- **Broadcaster (OBS, PROD)**
  - **IGS broadcasters are not as consistent as e.g. EUREF broadcasters**
  - **Status / level of broadcasters is not clear**
  - **EUREF: going from regional to global**
  - **Mixing the different formats (e.g. RTCM 3.1, RTCM 3.2) on one broadcaster**
  - **Mixing observations and products on one caster (as JPL, ASI, ROB are already doing)**

Conclusions

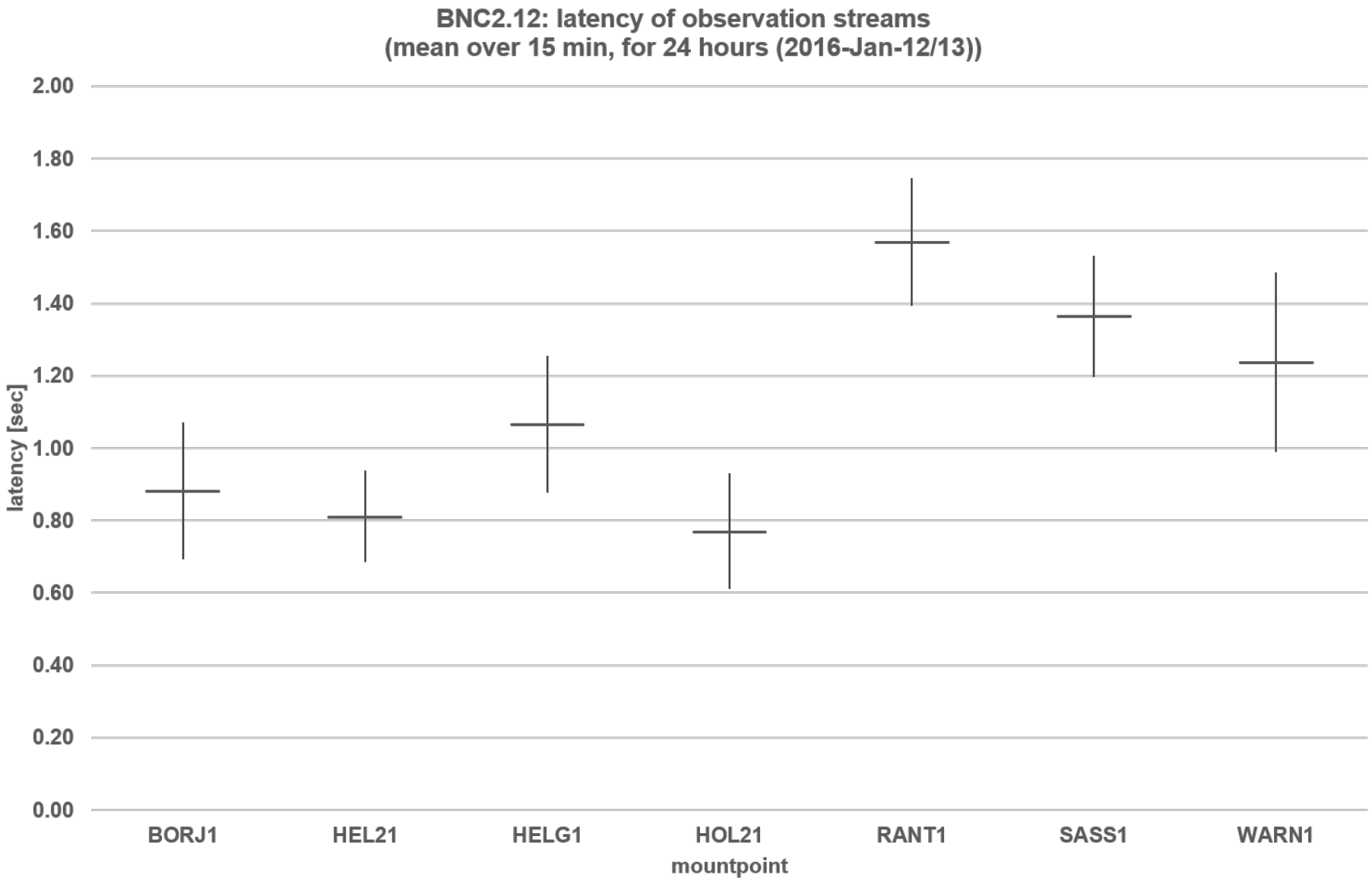
- **Latency & Workload**
  - **Distribution of workload needs a valid and long-term concept**
  - **Re-direction of users to the nearest broadcaster (automatically, manually)?**
  - **How many levels of broadcasters (“relay caster”) are good for IGS?**
- **Guidelines (OBS)**
  - **EUREF straightforward considering real-time activities in its guidelines**
  - **For IGS, there is a need for a coordinated structure (content, naming, access, requirements for being an IGS broadcaster, etc.)**

- **Additional slides**

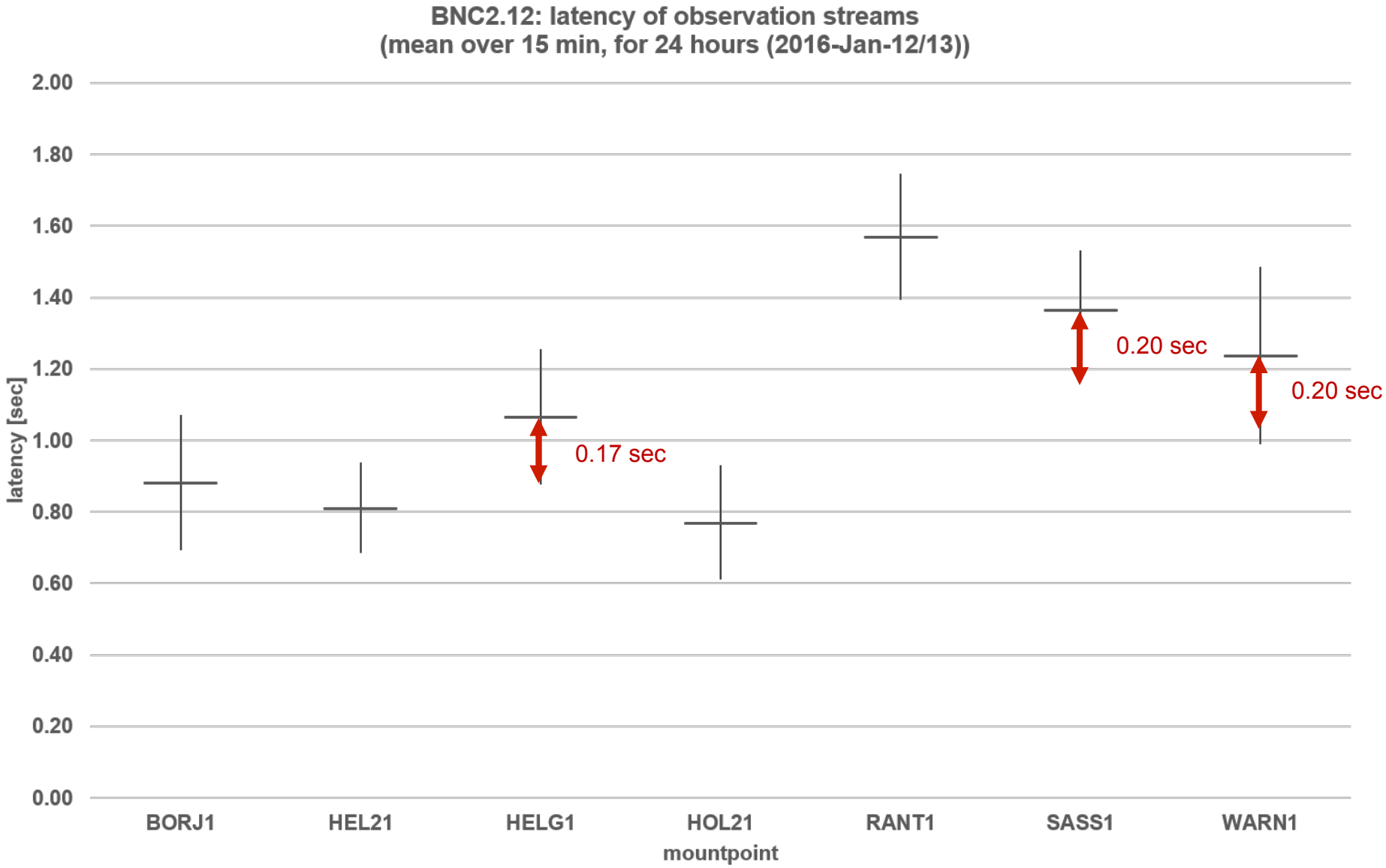
Latency (OBS)


BNC2.12: latency of observation streams
(mean over 15 min, for 24 hours (2016-Jan-12/13))
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
latency [sec]
BORJ1
HEL21
HELG1
HOL21
RANT1
SASS1
WARN1
mountpoint

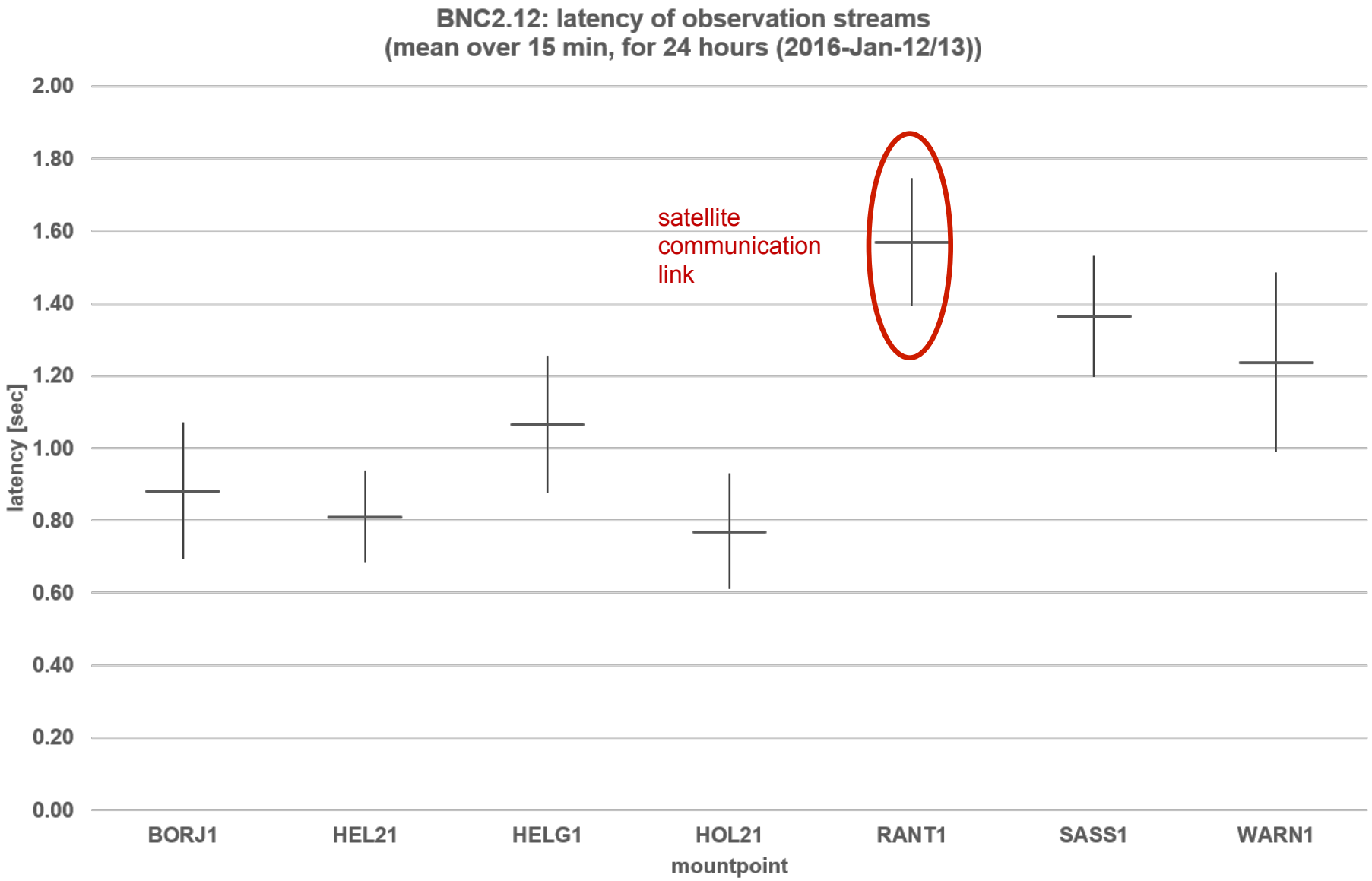
Latency (OBS)


BNC2.12: latency of observation streams
(mean over 15 min, for 24 hours (2016-Jan-12/13))
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
latency [sec]
BORJ1
HEL21
HELG1
HOL21
RANT1
SASS1
WARN1
mountpoint

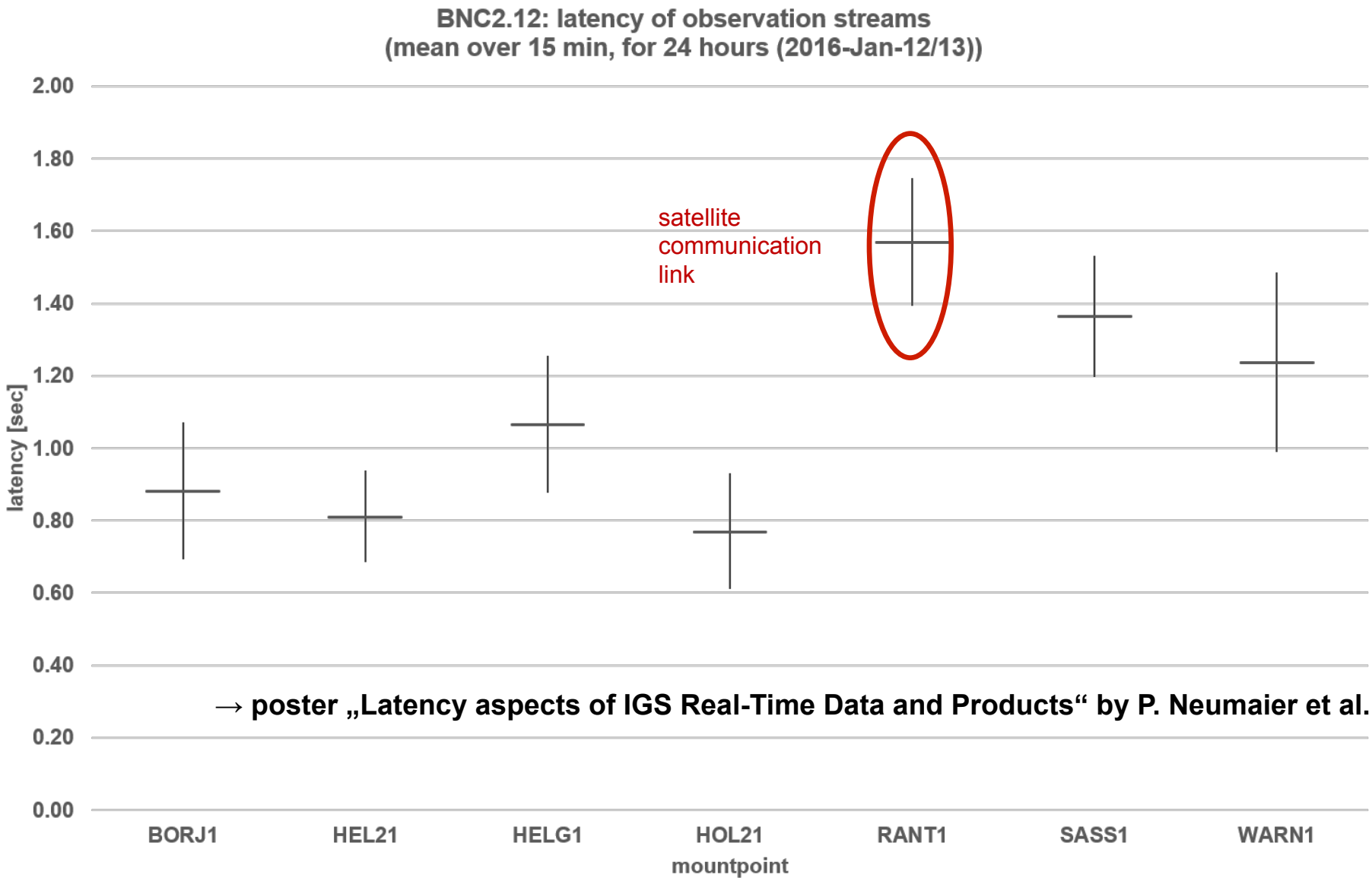
Latency (OBS)


BNC2.12: latency of observation streams
(mean over 15 min, for 24 hours (2016-Jan-12/13))
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
latency [sec]
0.17 sec
0.20 sec
0.20 sec
BORJ1
HEL21
HELG1
HOL21
RANT1
SASS1
WARN1
mountpoint

Latency (OBS)

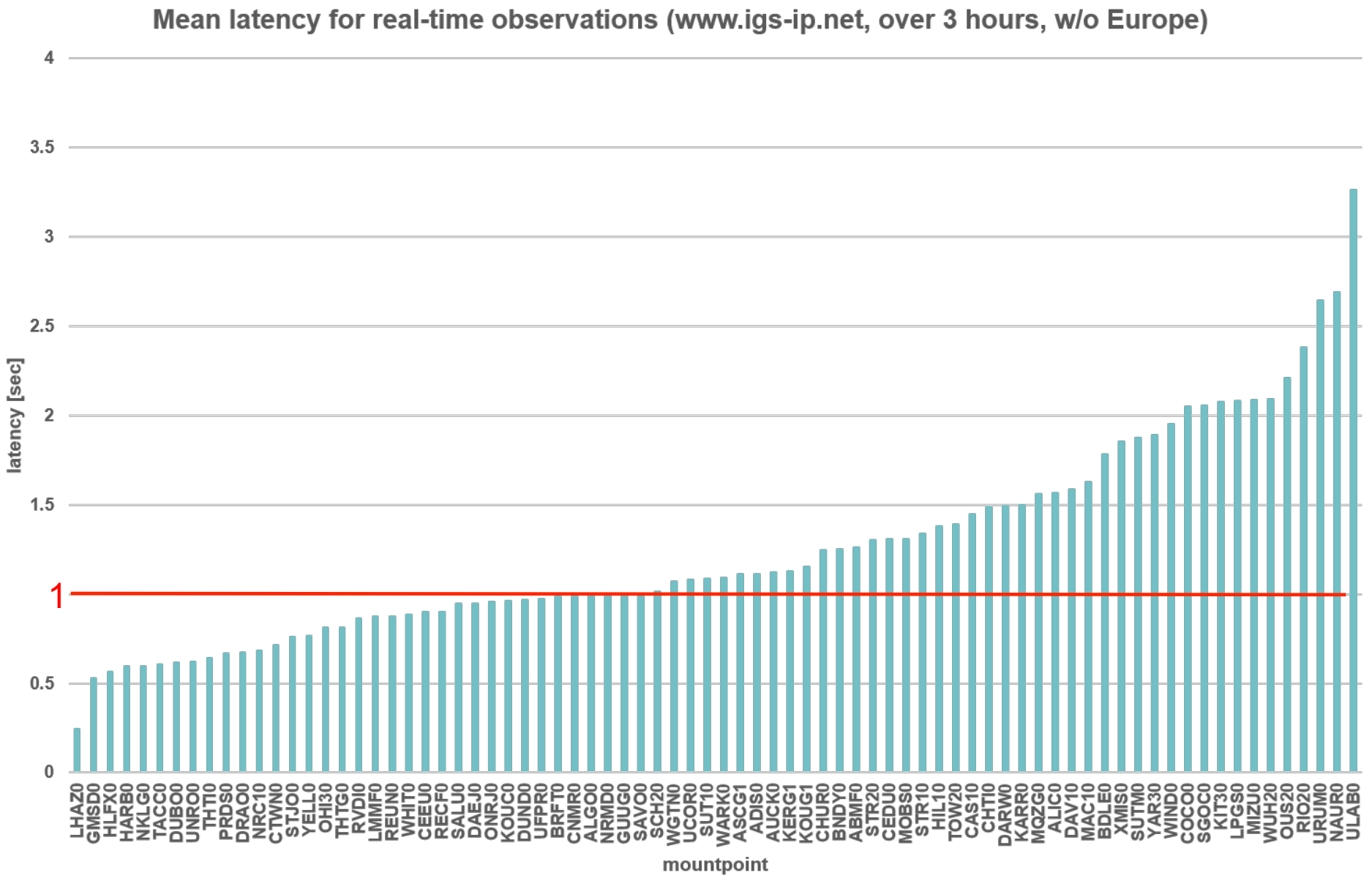

BNC2.12: latency of observation streams
(mean over 15 min, for 24 hours (2016-Jan-12/13))
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
latency [sec]
satellite
communication
link
BORJ1
HEL21
HELG1
HOL21
RANT1
SASS1
WARN1
mountpoint

Latency (OBS)

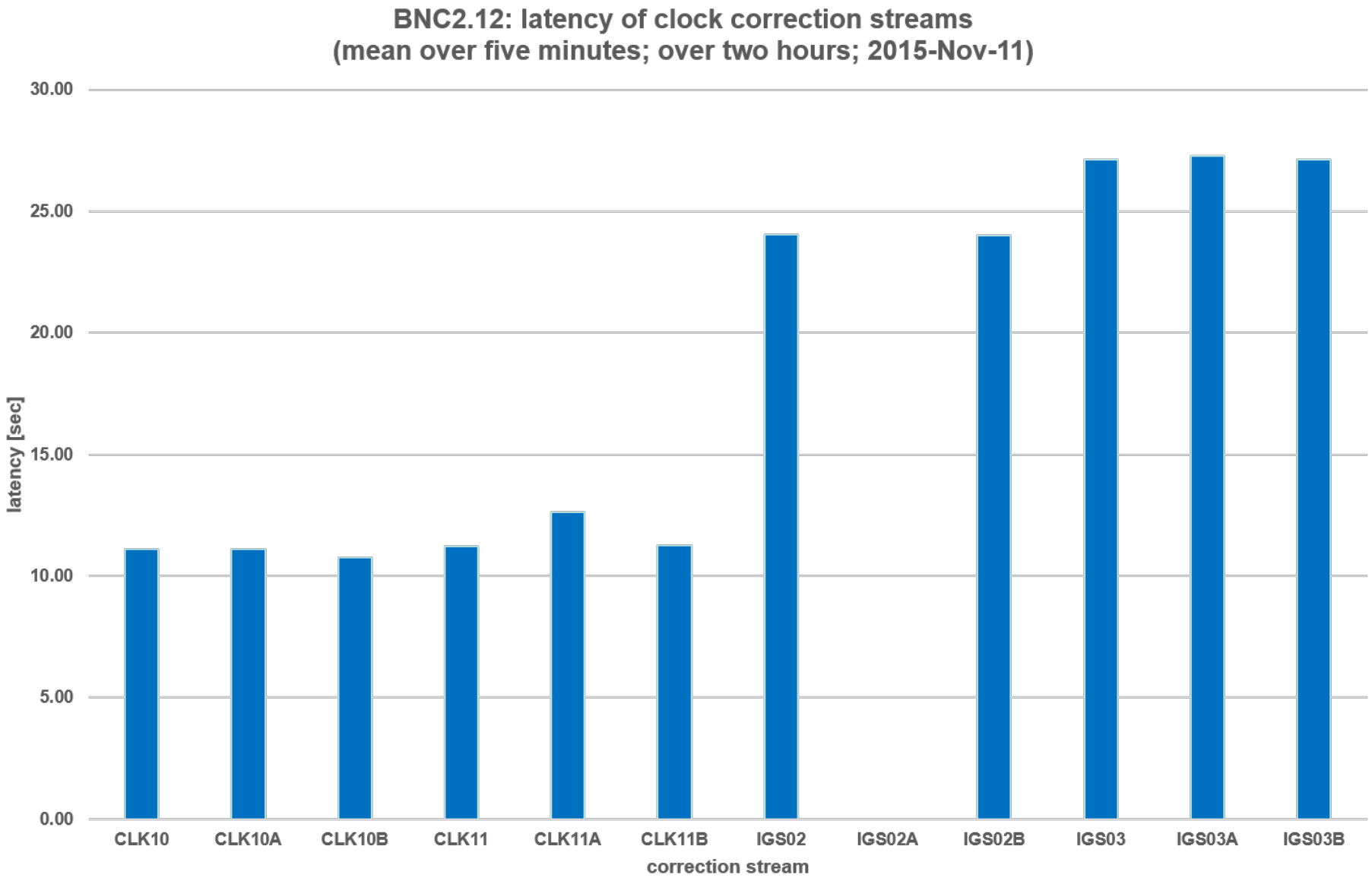


→ poster „Latency aspects of IGS Real-Time Data and Products“ by P. Neumaier et al.

Latency (OBS)


Mean latency for real-time observations (www.igs-ip.net, over 3 hours, w/o Europe)
latency [sec]
4
3.5
3
2.5
2
1.5
1
0.5
0
mountpoint
LHAZ0 GMSD0 HLFX0 HARB0 NKLG0 TACC0 DUBO0 UNRO0 THTI0 PRDS0 DRAO0 NRC10 CTWN0 STJO0 YELL0 OHI30 THTG0 RVDI0 LMMF0 REUN0 WHIT0 CEEU0 RECF0 SALU0 DAEJ0 ONRJ0 KOUC0 DUND0 UFPR0 BRFT0 CNMR0 ALGO0 NRMD0 GUUG0 SAVO0 SCH20 WGTN0 UCOR0 SUT10 WARK0 ASCG1 ADIS0 AUCK0 KERG1 KOUG1 CHUR0 BNDY0 ABMF0 STR20 CEDU0 MOBS0 STR10 HIL10 TOW20 CAS10 CHTI0 DARW0 KARR0 MQZG0 ALIC0 DAV10 MAC10 BDLE0 XMIS0 SUTM0 YAR30 WIND0 COCO0 SGOC0 KIT30 LPGS0 MIZU0 WUH20 OUS20 RIO20 URUM0 NAUR0 ULAB0

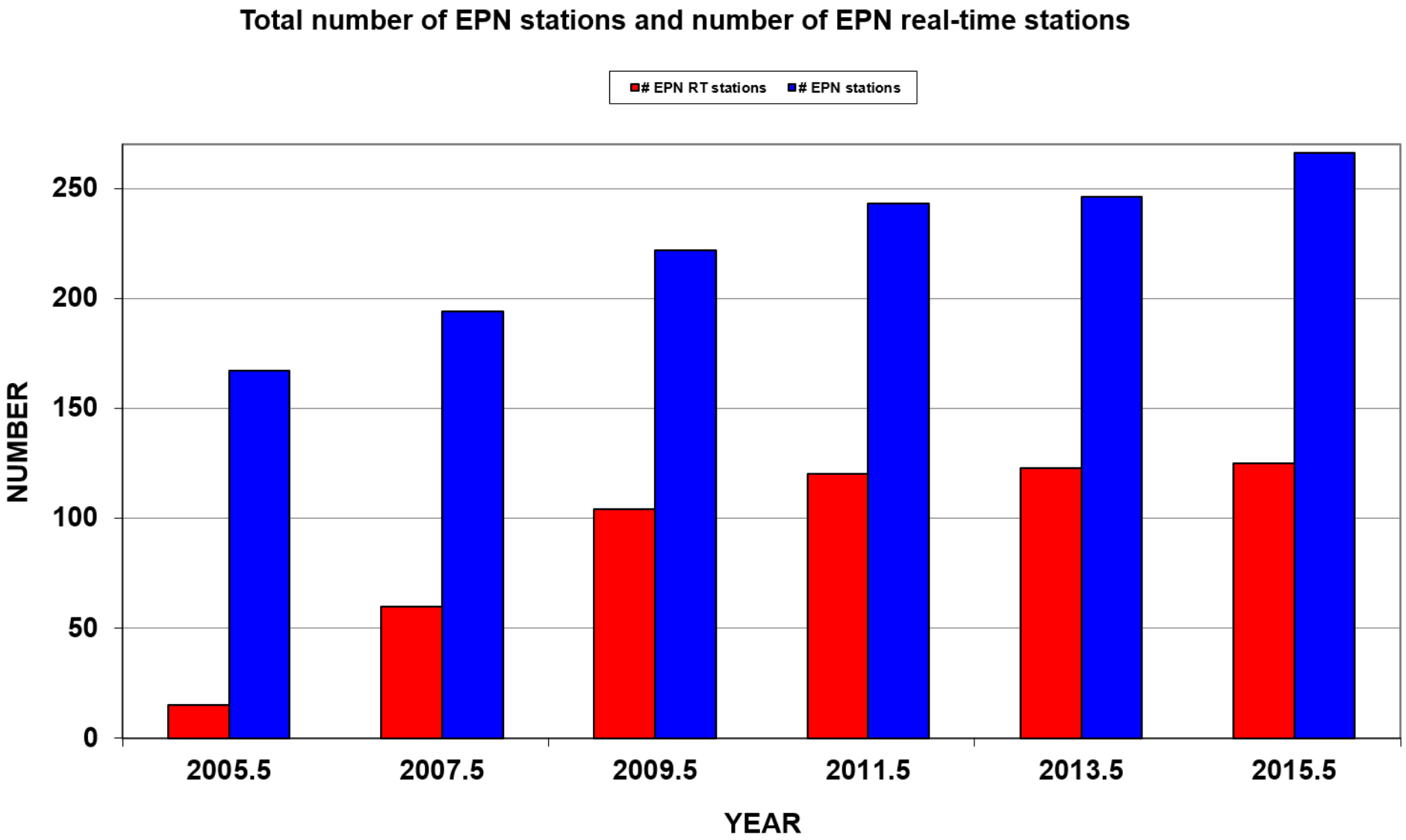
Latency (PROD): redundant streams

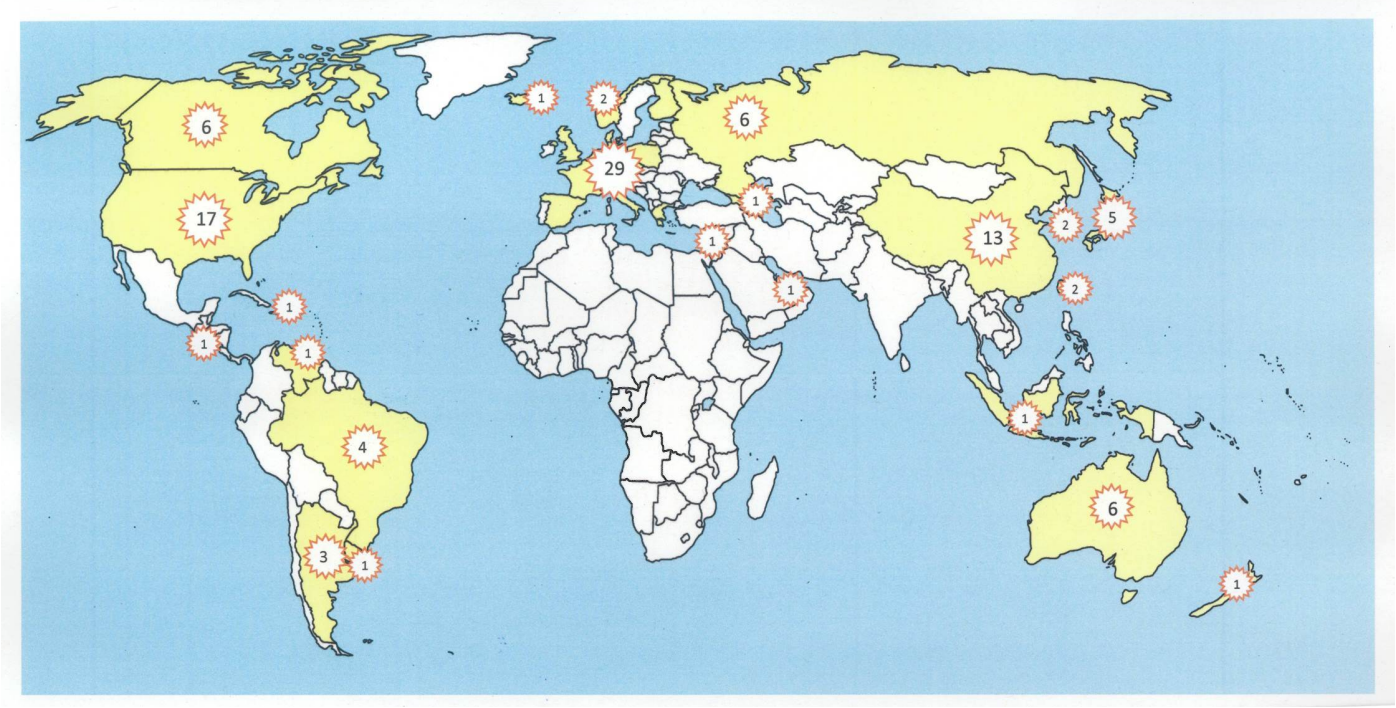


EPN real-time activities

- EUREF-IP
  - 2002-2007
  - Establishing network of real-time stations
  - Now part of routine EPN operations
- EPN Working Group "Real-time Analysis"
  - Since 2008
  - Stabilize dissemination of RT data & products with an elaborated backup system
  - Provide "regional" satellite clock & orbit corrections
- Real-time aspects covered in guidelines
  - "EPN Stations and Operational Centres"
    (http://www.epncb.oma.be/_documentation/guidelines/guidelines_station_operationalcentre.pdf)
  - "EPN Data Centres & EPN Broadcasters"
    (http://www.epncb.oma.be/_documentation/guidelines/guidelines_data_centres.pdf)
- → poster by C. Bruyninx, 2016 about EPN and EUREF

EPN stations



Redundancy aspects – broadcasters

- **BKG's Professional Ntrip Caster Software**
  - **Widely used for IGS and IAG purposes**
  - **Distribution: ~105 copies since 2008**
  - **Current version 2.0.25**
  - **Automatic notification in preparation**