Mass-usage of Ntrip for GNSS product dissemination, experiences and perspectives

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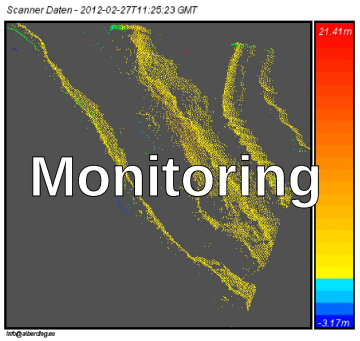
Alberding GmbH

March 2012

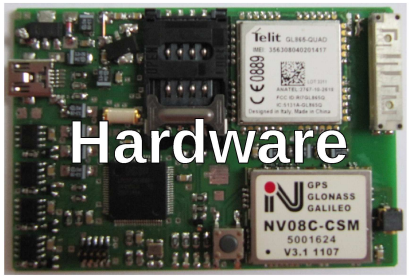
Our company

Fields of experience



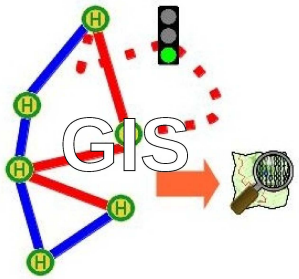
RTCM
MSM
SSR

PPP project



Data handling

Consulting



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1 BKG caster operation

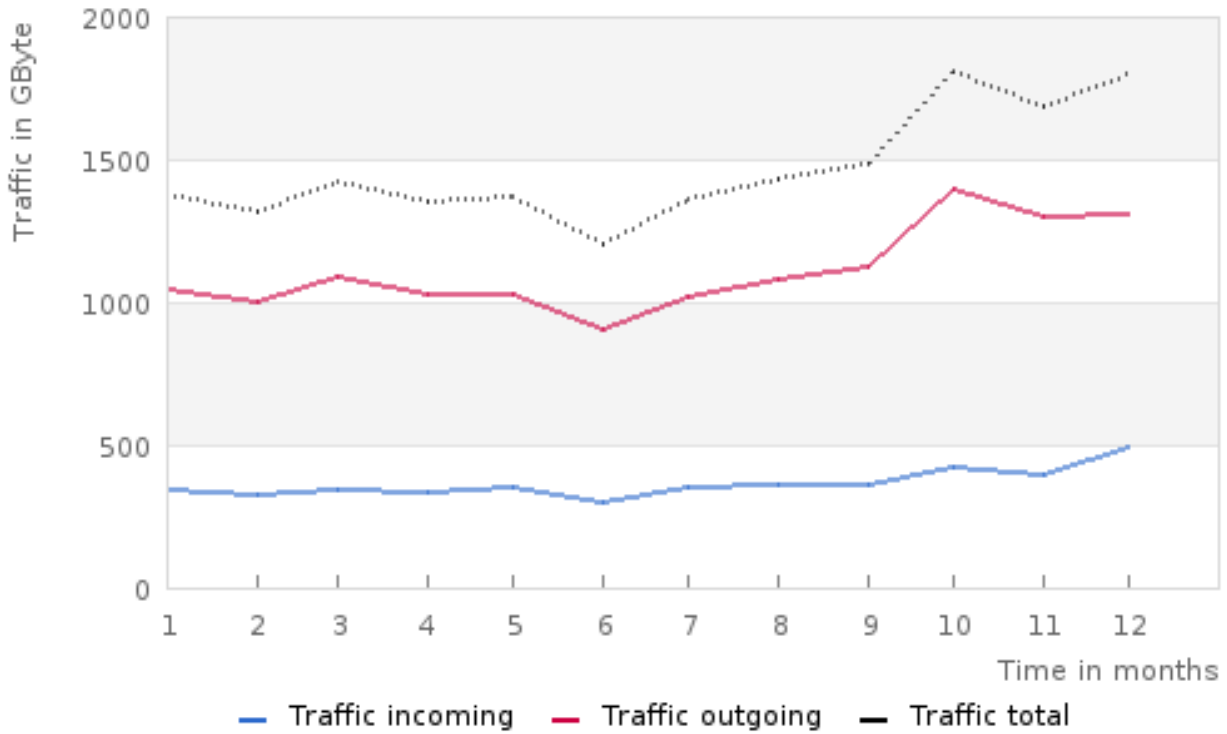
2 Redundancy and stable services

3 Practical issues with backup systems

Working for BKG

- Ntrip 2 standardization
- Professional BKG Ntrip caster updates
- RTCM3 SSR message implementation and interoperability tests
- RTCM3 MSM software development
- IGS Multi-GNSS Experiment (M-GEX) data conversion (EuroNet)
- Casters monitoring and configuration
- NABU message generation
- Operating BKG casters

Data transfer igs-ip.net 2011



Incoming:
4,313.244
Outgoing:
13,276.715
(in GByte)

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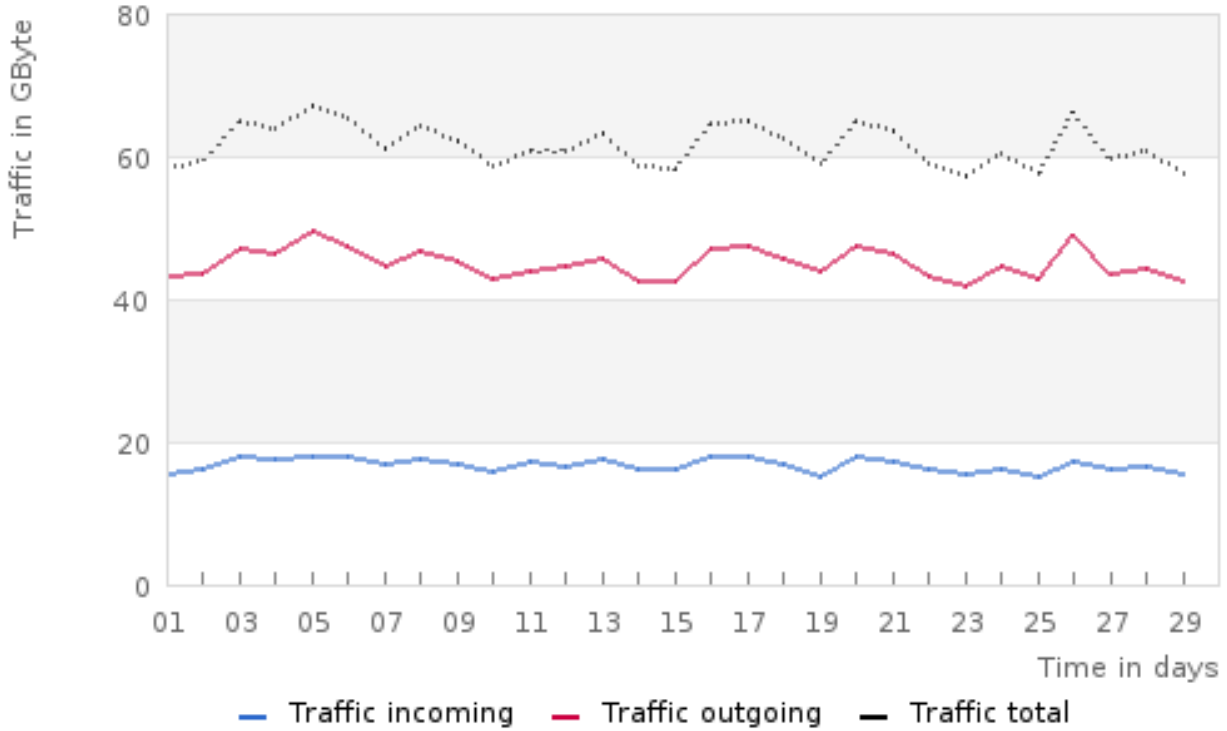
Data transfer igs-ip.net February 2012



Incoming:
479.986
Outgoing:
1,302.231
(in GByte)

igs-ip.net data streams March 5th, 2012

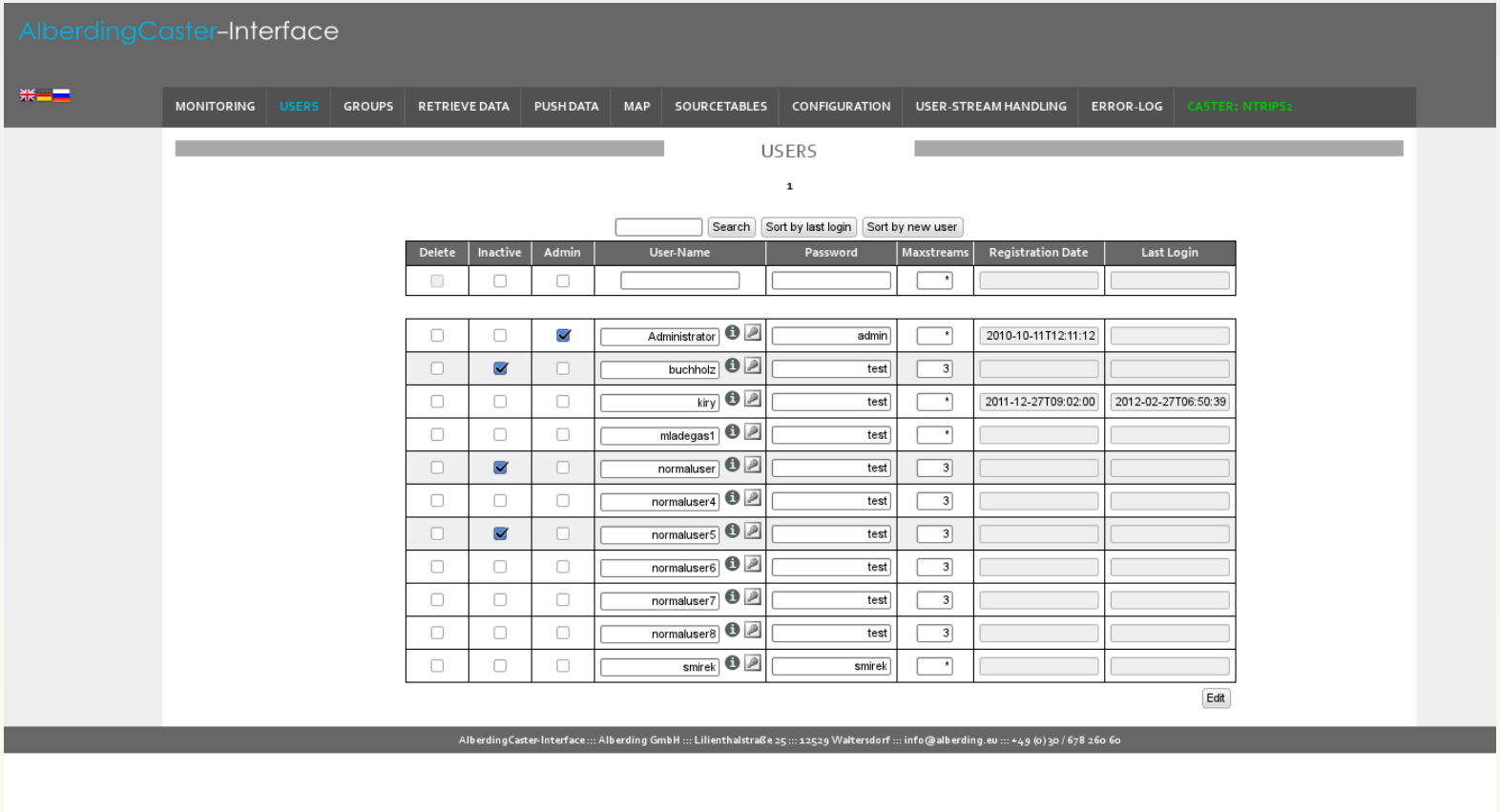
- 131 data streams active
- 1168 data streams delivered
- 46 different users

2 years hosting for BKG

- 8 casters
- 4 TByte data a month
- About 5 issues due to hardware (mostly attacks at provider infrastructure).
- One failure of DNS for domain name causing connection trouble for some hours
- Most severe issues: Configuration bugs due to human errors

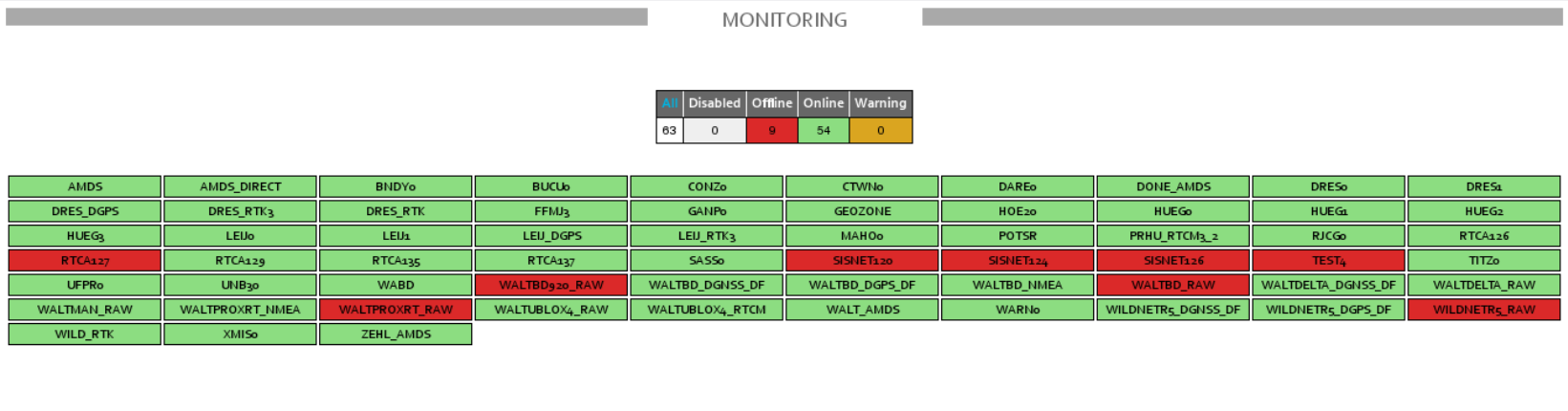
Management software

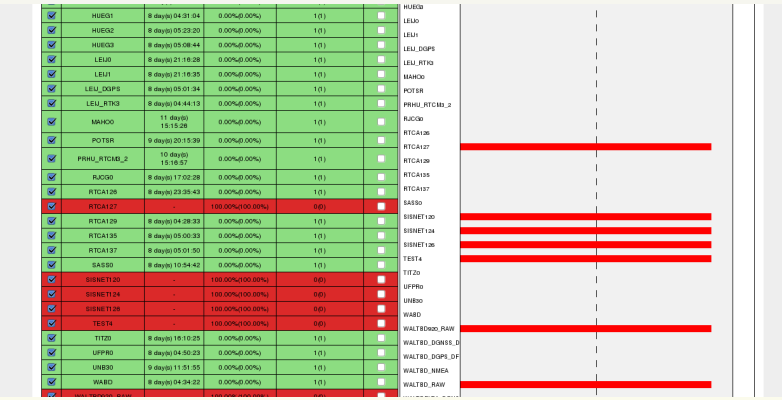
- web interface for caster management (all 8 servers)



- push and pull streams
- sourcetable definition

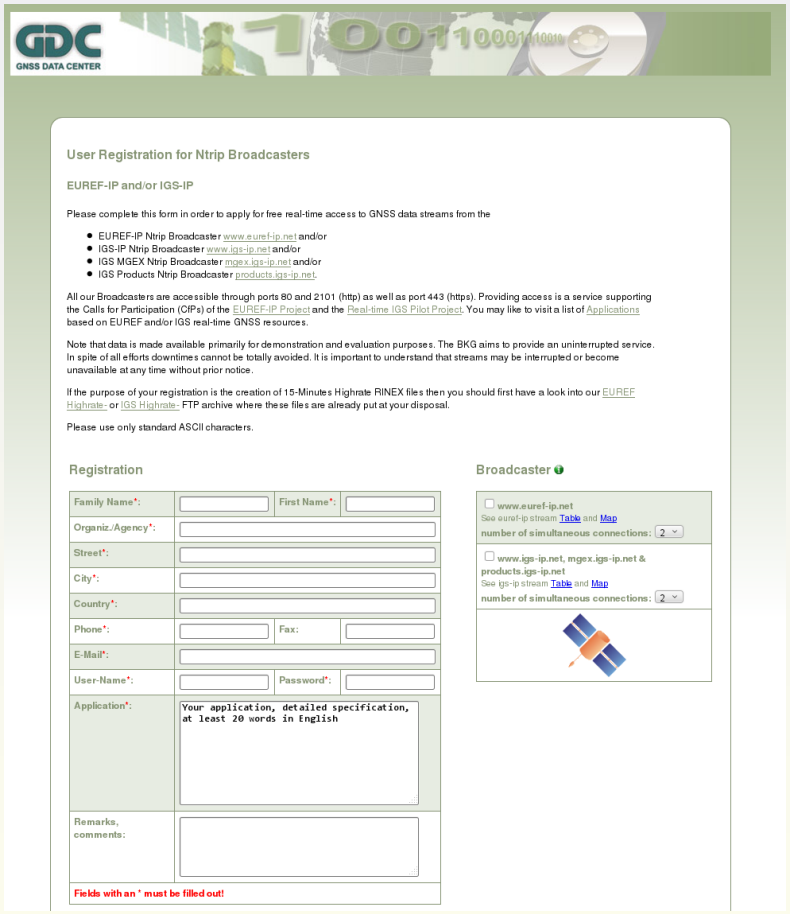
Management software

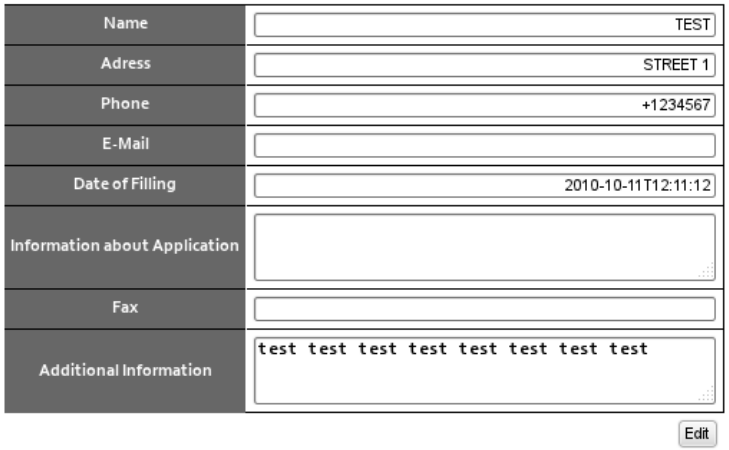




- monitoring of data stream availability
- realtime status
- history

Management software





- User management, groups
- Access logging
- New user registration page

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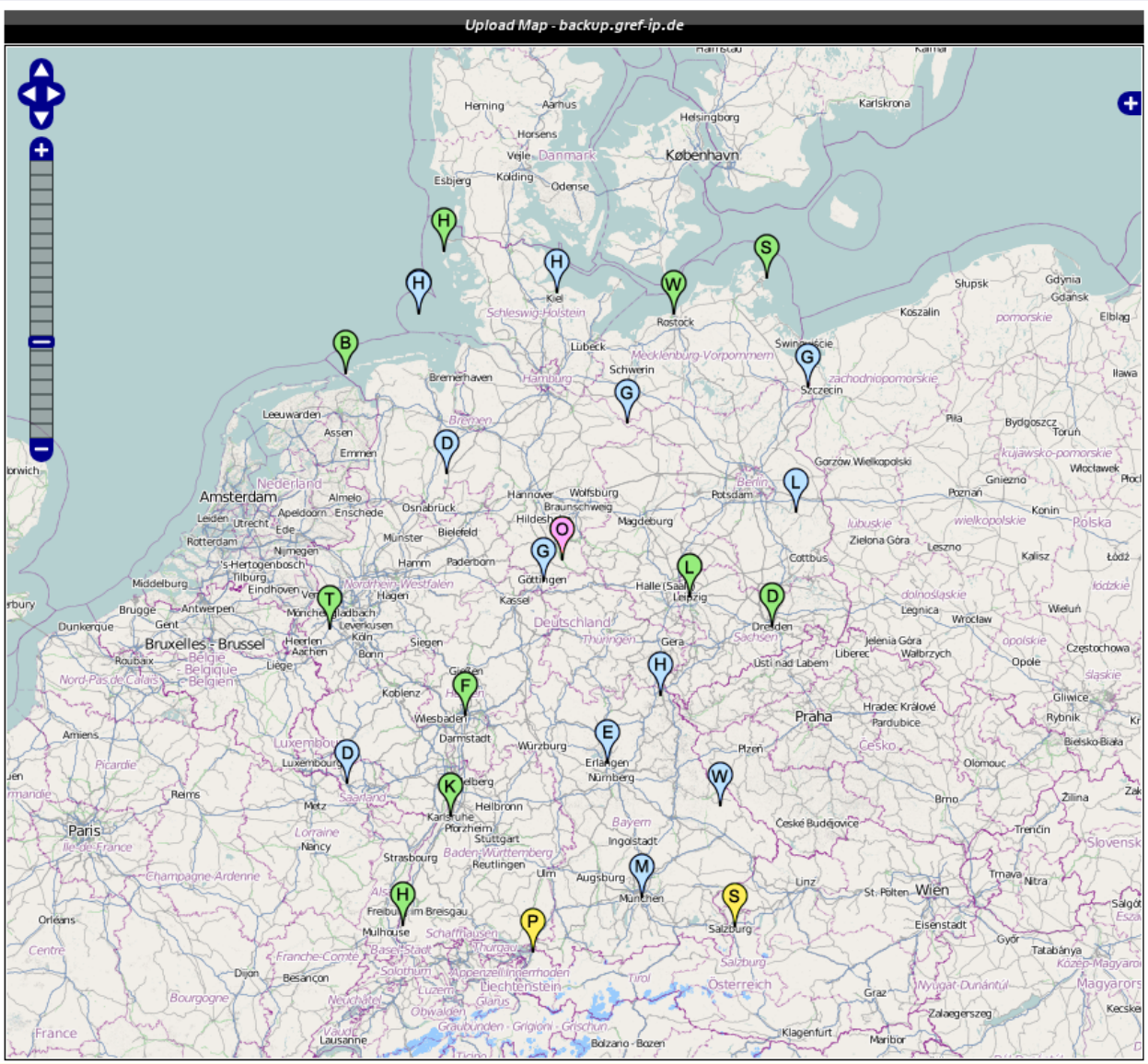
Management software: Map



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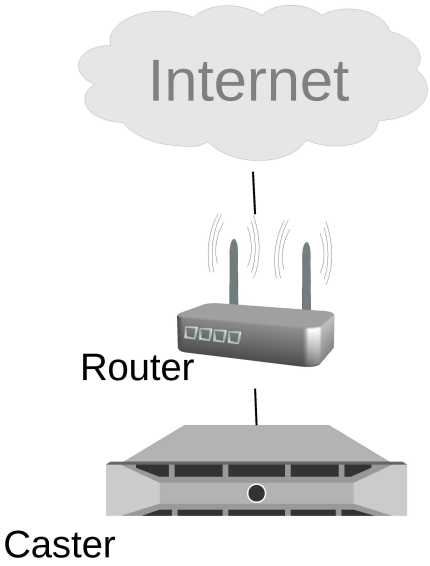
Providing PPP service

New goal: providing products (clock and orbit corrections)

- Increased data amount
- Changed user structure (less power-users, but more users)
- Redundancy to prevent system outages
- Load balancing

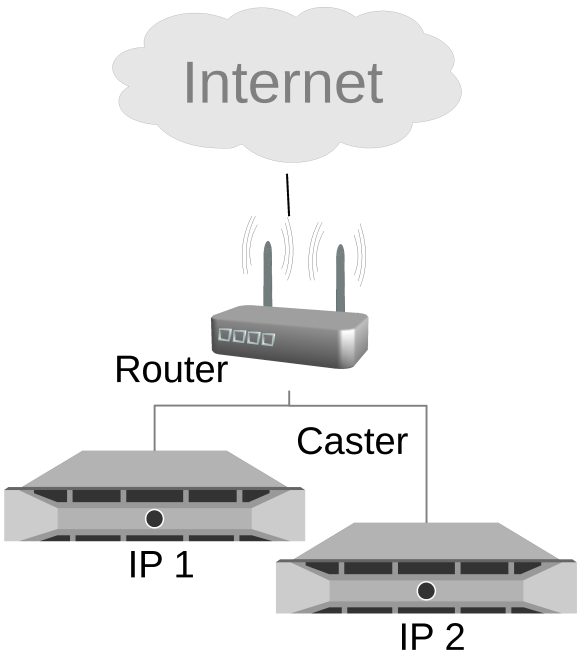
Caster: products.igs-ip.net

Setup without redundancy



- Single caster installation
- Easy to maintain
- Single point of failure
- Easy to disturb (e.g. Denial of Service: DOS/DDOS)

Simple hardware duplication

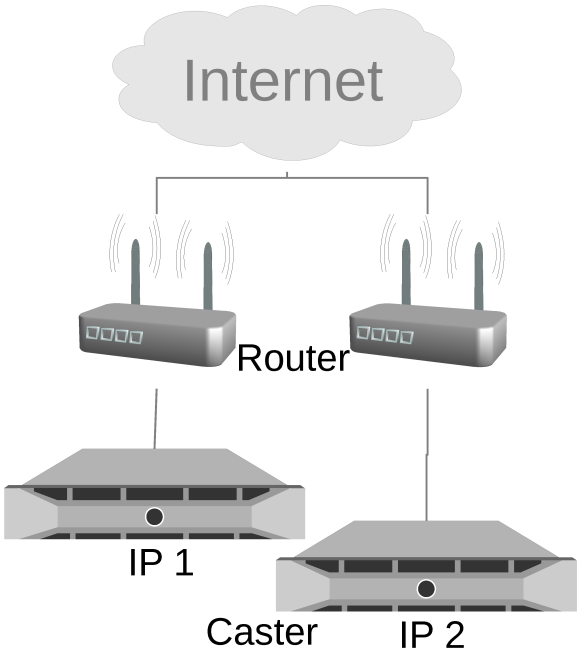


- Dual caster installation (same site)
- Redundancy and load distribution
- Same network allows easy synchronisation
- Still easy to disturb (DOS attack against router)
- Load balancing possible

Load balancing

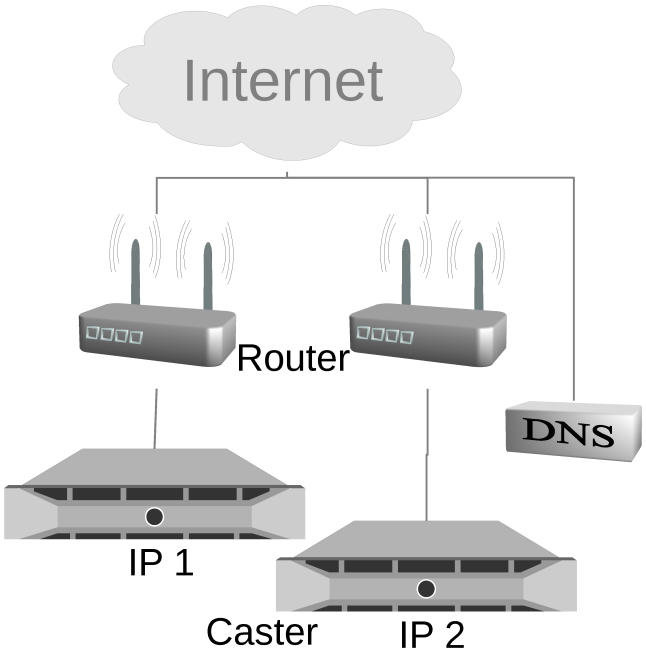
- Router chooses target server
- Equal distribution of work to be done
- All data going through load balancer
- Latest hardware: Bypass for data from server possible
- Synchronisation of access rights and usage statistics necessary
  - single management database
  - multiple synchronized databases
  - individual instances and later data joining: access violations possible

Duplicate hosting



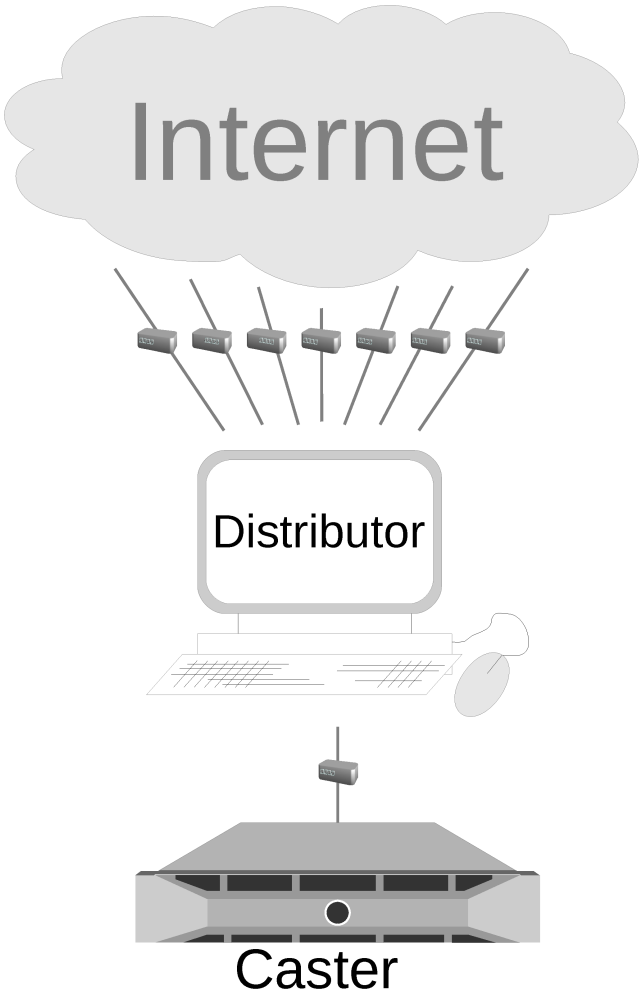
- Dual caster installation (different providers)
- Redundancy and load distribution
- Synchronisation more demanding
- Harder to disturb (2 attack targets)

Duplicate hosting and round robin



- Installation details hidden behind domain name
- Name resolution dynamic (Round robin)
- Final load on individual machines not fully predictable

Data distributor



- Data stream dissemination by data distributor
- Only HTTP supported (Ntrip2)
- Specialized infrastructure for data
- Worldwide server distribution
- Ntrip caster delivers data for distributor
- Hardly possible due to Ntrip1 compatibility

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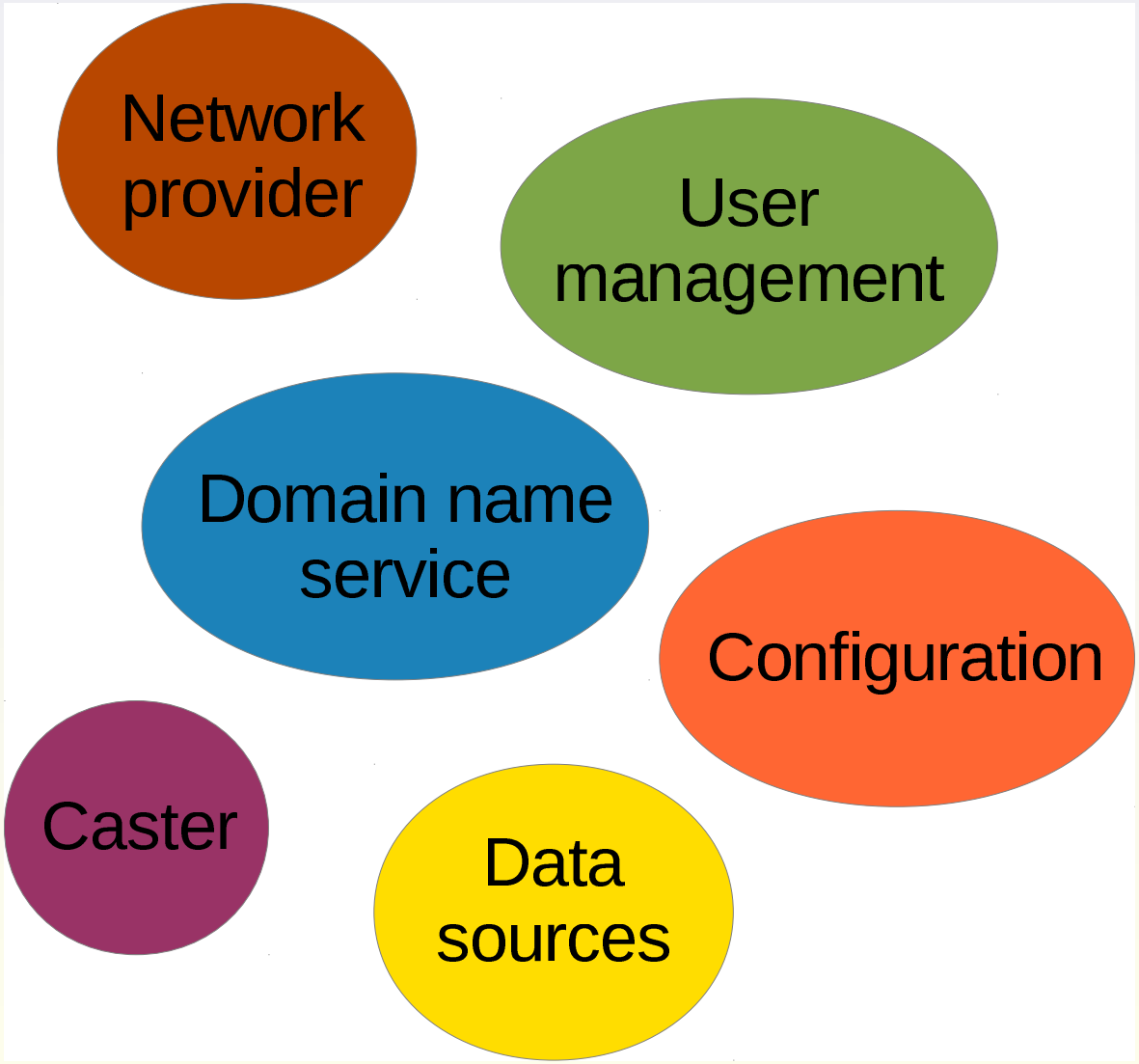
Redundancy at many levels



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Nontechnical issues - Stream providers

- Multiple uploads to redundant servers
- Increased bandwidth at remote sites
- Site operators aren't data transfer specialists
- Lots of contacts necessary when setup changes

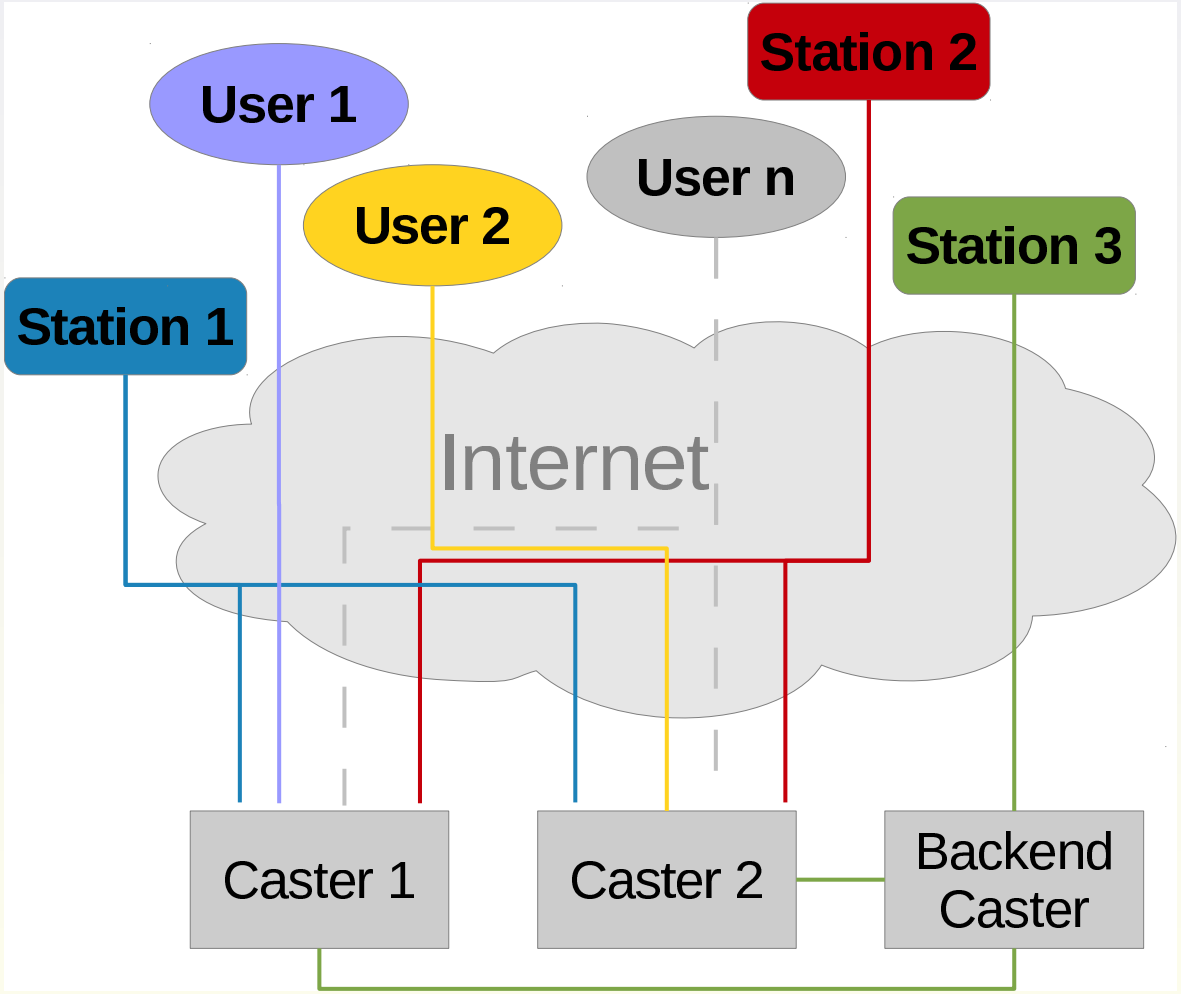
Nontechnical issues - Stream users

- Direct IP usage instead of domain names
- Hardcoded firewall rules prevent IP changes
- DNS based load balancing difficult for multi-stream users

Pragmatical solutions

- Mixed setup of redundant and singular data
- Redundancy individual for each data stream
- Fixed interface for ‘IP using’ user groups
- DNS based load balancing for standard users

Mixed setup


Station 2
User 1
User n
User 2
Station 3
Station 1
Internet
Caster 1
Caster 2
Backend Caster

The end for today

- Take a look at our software!
- `http://www.alberding.eu/` (currently updated)
- NTRIP workshop on Wednesday:
  - Ntrip 2, IPv6, SSL
  - Trouble shooting Ntrip installations
  - Everything about Ntrip you always wanted to know

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