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

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Fields of experience

- Monitoring
- RTCM
- MSM
- SSR
- Hardware
- Customer software
- Ntrip
- Consulting
- PPP project
- Data handling

Our company
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)
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
### Monitoring Software

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**BKG Redundancy Practice**

- Monitoring of data stream availability
- Realtime status
- History

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**Dirk Stöcker**

**Mass-usage of Ntrip**

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**Management software**

- User management, groups
- Access logging
- New user registration page
Management software: Map
1 BKG caster operation

2 Redundancy and stable services

3 Practical issues with backup systems
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
Redundancy at many levels

- Network provider
- User management
- Domain name service
- Configuration
- Caster
- Data sources
1. BKG caster operation

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3. Practical issues with backup systems
Nontechical 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
Nontecnical 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
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