



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

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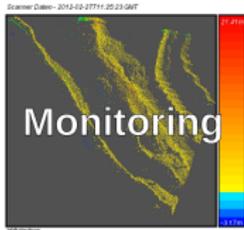
Alberding GmbH

March 2012

Our company



Fields of experience



RTCM
MSM
SSR

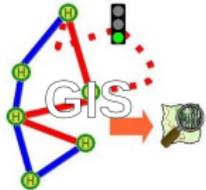
PPP project



Data handling



Consulting





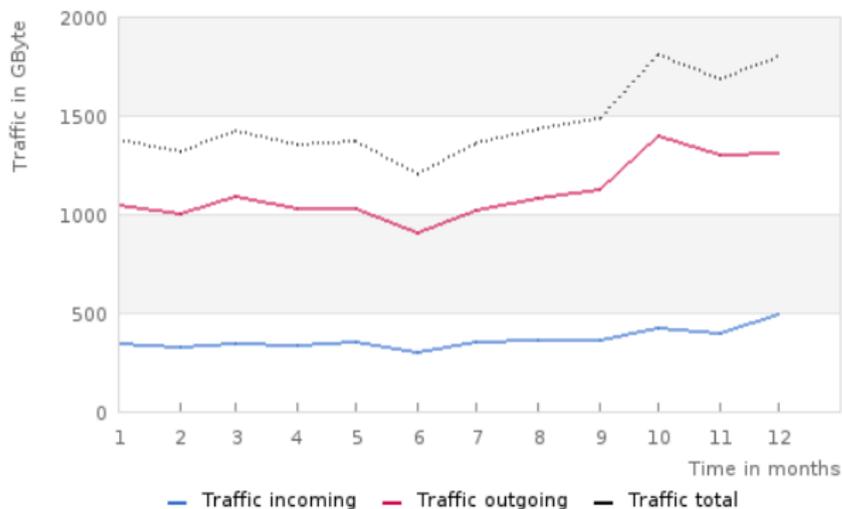
- 1 BKG caster operation
- 2 Redundancy and stable services
- 3 Practical issues with backup systems

Working for BKG



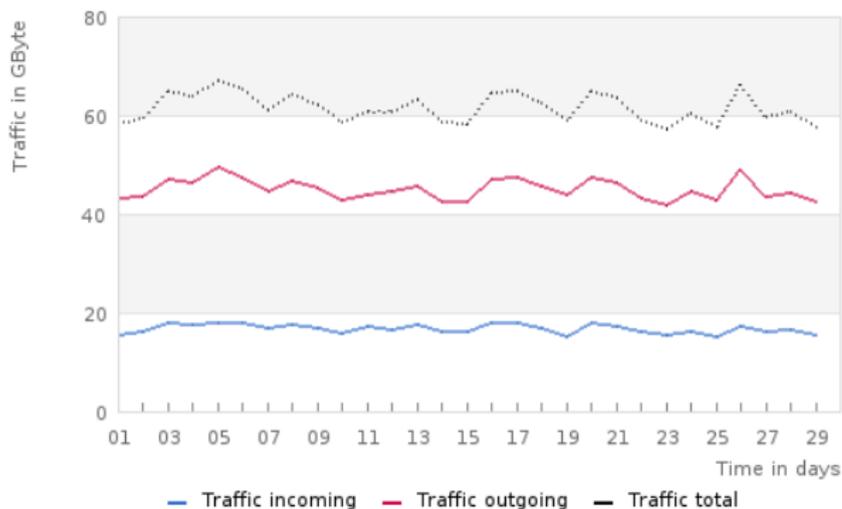
- Ntrip 2 standardization
- Professional BKG Ntrip caster updates
- RTCM3 SSR message implementation and interoperability tests
- RTCM3 MSM software development
- IGS Multi-GNSS Experiment (M-GEX) data conversion (EuroNet)
- Casters monitoring and configuration
- NABU message generation
- Operating BKG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

AlberdingCaster-Interface

MONITORING **USERS** GROUPS RETRIEVE DATA PUSH DATA MAP SOURCETABLES CONFIGURATION USER-STREAM HANDLING ERROR-LOG [HELP](#)

USERS

1

Search Sort by last login Sort by new user

Delete	Inactive	Admin	User-Name	Password	Maxstreams	Registration Date	Last Login
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			*		
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Administrator	admin	*	2010-10-11T12:11:12	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	tuchholz	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	tkry	test	*	2011-12-27T09:02:00	2012-02-27T06:50:36
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	reidegast	test	*		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	normaluser1	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	normaluser4	test	3		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	normaluser5	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	normaluser6	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	normaluser7	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	normaluser8	test	3		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	snrwi	test	*		

Exit

AlberdingCaster-Interface -- Alberding GmbH -- Ullrichstrasse 15 -- 12159 Wannsee -- info@alberding.de -- +49 (0)30 478 100 60

- push and pull streams
- sourcetable definition

Management software



MONITORING

❌	Disabled	Offline	Online	Warning
63	0	9	54	0

AMDS	AMDS_DIRECT	BDY%	BUK%	CONZ%	CTW%	DAR%	DOHE_AMDS	DRE%	DRES%
DRES_DGPs	DRES_RTK_1	DRES_RTK	FFM%	GAN%	GEOZONE	HOE%	HUE%	HUE%	HUE%
HUE%	LEI%	LEI%	LEI_RTK_1	LEI_RTK_1	MAH%	POTSR	PRH_RTK%_1	RJC%	RTCA%_1
RTCA%_17	RTCA%_19	RTCA%_15	RTCA%_17	SAS%	SIGRT%_1	SIGRT%_1	SIGRT%_1	TEST%	TIT%
UPP%	URB%	WARD	WALTB%_1_RAW	WALTB%_1_DG%_DF	WALTB%_1_DG%_DF	WALTB%_1_H%_A	WALTB%_1_RAW	WALTB%_1_DG%_DF	WALTB%_1_RAW
WALTB%_1_RAW	WALTB%_1_H%_A	WALTB%_1_RAW	WALTB%_1_RAW	WALTB%_1_RTK%	WALTB%_1_RAW	WALTB%_1_RAW	WALTB%_1_DG%_DF	WALTB%_1_DG%_DF	WALTB%_1_RAW
WILD_RTK	WILD%	ZEH_AMDS							

ID	NAME	STATUS	TYPE	GROUP	LAST	STATUS	GROUP	STATUS	GROUP
1	AMDS	Online	AMDS	AMDS	100%	OK	AMDS	OK	AMDS
2	AMDS_DIRECT	Online	AMDS_DIRECT	AMDS_DIRECT	100%	OK	AMDS_DIRECT	OK	AMDS_DIRECT
3	BDY%	Online	BDY%	BDY%	100%	OK	BDY%	OK	BDY%
4	BUK%	Online	BUK%	BUK%	100%	OK	BUK%	OK	BUK%
5	CONZ%	Online	CONZ%	CONZ%	100%	OK	CONZ%	OK	CONZ%
6	CTW%	Online	CTW%	CTW%	100%	OK	CTW%	OK	CTW%
7	DAR%	Online	DAR%	DAR%	100%	OK	DAR%	OK	DAR%
8	DOHE_AMDS	Online	DOHE_AMDS	DOHE_AMDS	100%	OK	DOHE_AMDS	OK	DOHE_AMDS
9	DRE%	Online	DRE%	DRE%	100%	OK	DRE%	OK	DRE%
10	DRES%	Online	DRES%	DRES%	100%	OK	DRES%	OK	DRES%
11	DRES_DGPs	Online	DRES_DGPs	DRES_DGPs	100%	OK	DRES_DGPs	OK	DRES_DGPs
12	DRES_RTK_1	Online	DRES_RTK_1	DRES_RTK_1	100%	OK	DRES_RTK_1	OK	DRES_RTK_1
13	HUE%	Online	HUE%	HUE%	100%	OK	HUE%	OK	HUE%
14	LEI%	Online	LEI%	LEI%	100%	OK	LEI%	OK	LEI%
15	LEI_RTK_1	Online	LEI_RTK_1	LEI_RTK_1	100%	OK	LEI_RTK_1	OK	LEI_RTK_1
16	MAH%	Online	MAH%	MAH%	100%	OK	MAH%	OK	MAH%
17	POTSR	Online	POTSR	POTSR	100%	OK	POTSR	OK	POTSR
18	PRH_RTK%_1	Online	PRH_RTK%_1	PRH_RTK%_1	100%	OK	PRH_RTK%_1	OK	PRH_RTK%_1
19	RJC%	Online	RJC%	RJC%	100%	OK	RJC%	OK	RJC%
20	RTCA%_1	Online	RTCA%_1	RTCA%_1	100%	OK	RTCA%_1	OK	RTCA%_1
21	RTCA%_17	Warning	RTCA%_17	RTCA%_17	100%	WARN	RTCA%_17	WARN	RTCA%_17
22	RTCA%_19	Warning	RTCA%_19	RTCA%_19	100%	WARN	RTCA%_19	WARN	RTCA%_19
23	RTCA%_15	Warning	RTCA%_15	RTCA%_15	100%	WARN	RTCA%_15	WARN	RTCA%_15
24	RTCA%_17	Warning	RTCA%_17	RTCA%_17	100%	WARN	RTCA%_17	WARN	RTCA%_17
25	SAS%	Online	SAS%	SAS%	100%	OK	SAS%	OK	SAS%
26	SIGRT%_1	Online	SIGRT%_1	SIGRT%_1	100%	OK	SIGRT%_1	OK	SIGRT%_1
27	SIGRT%_1	Warning	SIGRT%_1	SIGRT%_1	100%	WARN	SIGRT%_1	WARN	SIGRT%_1
28	SIGRT%_1	Warning	SIGRT%_1	SIGRT%_1	100%	WARN	SIGRT%_1	WARN	SIGRT%_1
29	SIGRT%_1	Warning	SIGRT%_1	SIGRT%_1	100%	WARN	SIGRT%_1	WARN	SIGRT%_1
30	SIGRT%_1	Warning	SIGRT%_1	SIGRT%_1	100%	WARN	SIGRT%_1	WARN	SIGRT%_1
31	TIT%	Online	TIT%	TIT%	100%	OK	TIT%	OK	TIT%
32	UPP%	Online	UPP%	UPP%	100%	OK	UPP%	OK	UPP%
33	URB%	Online	URB%	URB%	100%	OK	URB%	OK	URB%
34	WARD	Online	WARD	WARD	100%	OK	WARD	OK	WARD
35	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
36	WALTB%_1_DG%_DF	Warning	WALTB%_1_DG%_DF	WALTB%_1_DG%_DF	100%	WARN	WALTB%_1_DG%_DF	WARN	WALTB%_1_DG%_DF
37	WALTB%_1_DG%_DF	Warning	WALTB%_1_DG%_DF	WALTB%_1_DG%_DF	100%	WARN	WALTB%_1_DG%_DF	WARN	WALTB%_1_DG%_DF
38	WALTB%_1_H%_A	Warning	WALTB%_1_H%_A	WALTB%_1_H%_A	100%	WARN	WALTB%_1_H%_A	WARN	WALTB%_1_H%_A
39	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
40	WALTB%_1_DG%_DF	Warning	WALTB%_1_DG%_DF	WALTB%_1_DG%_DF	100%	WARN	WALTB%_1_DG%_DF	WARN	WALTB%_1_DG%_DF
41	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
42	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
43	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
44	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
45	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
46	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
47	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
48	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
49	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW
50	WALTB%_1_RAW	Warning	WALTB%_1_RAW	WALTB%_1_RAW	100%	WARN	WALTB%_1_RAW	WARN	WALTB%_1_RAW

- monitoring of data stream availability
- realtime status
- history

Management software



GDC
GEO DATA CENTER

100110001

User Registration for Ntrip Broadcasters

EURPEP-IP and/or IGS-IP

Please complete this form in order to apply for free real-time access to GPS/GNSS data streams from the

- IGS/EPEP-IP Ntrip Broadcaster www.gdc.net/igs/eurpep/ and/or
- IGS-IP Ntrip Broadcaster www.gdc.net/igs/ and/or
- IGS MEXIX Ntrip Broadcaster www.gdc.net/igs/mex/ and/or
- IGS Peruvian Ntrip Broadcaster www.gdc.net/igs/per/

All our Broadcasters are accessible through ports 80 and 2101 (http) as well as port 443 (https). Providing access to a service supporting the Cyclic for Participation (CPM) of the [IGS/EPEP-IP](http://www.gdc.net/igs/) and the [IGS MEXIX](http://www.gdc.net/igs/mex/) and the [IGS Peruvian](http://www.gdc.net/igs/per/). You may like to visit a list of [Broadcasters](#) based on IGS/EPEP and IGS and/or IGS MEXIX services.

Note that data is made available primarily for demonstration and evaluation purposes. The IGS aims to provide an uninterrupted service in spite of all sorts of business cases but totally accident it is important to understand that streams may be interrupted or become unavailable at any time without prior notice.

The purpose of your registration is the creation of IGS-Multi-IP license. PUBLISH files then you should first have a look into our [IGS/EPEP-IP](http://www.gdc.net/igs/), [IGS MEXIX](http://www.gdc.net/igs/mex/), or [IGS Peruvian](http://www.gdc.net/igs/per/) FTP archive where these files are already put at your disposal.

Please use only standard ASCII characters.

Registration

Family Name* First Name*

Organiz. Agency*

Street*

City*

Country*

Phone* Fax*

E-Mail*

User Name* Password*

Application*

Remarks, comments

Fields with an "*" must be filled out!

Broadcaster

I want to send
the real-time stream. [Link](#) [Help](#)
number of simultaneous connections:

I want to log stream, integrate log to send it
products log to send
log to products: [Link](#) [Help](#)
number of simultaneous connections:



Name	TEST
Address	STREET 1
Phone	+1234567
E-Mail	
Date of Filing	2010-10-11T12:11:12
Information about Application	
Fax	
Additional Information	test test test test test test test test

Edit

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



- 1 BKG caster operation
- 2 Redundancy and stable services
- 3 Practical issues with backup systems

Providing PPP service

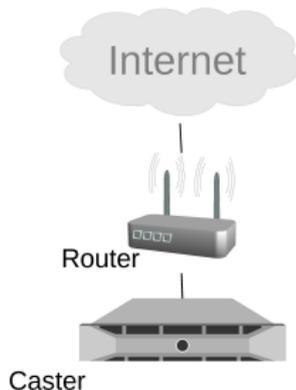


New goal: providing products (clock and orbit corrections)

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

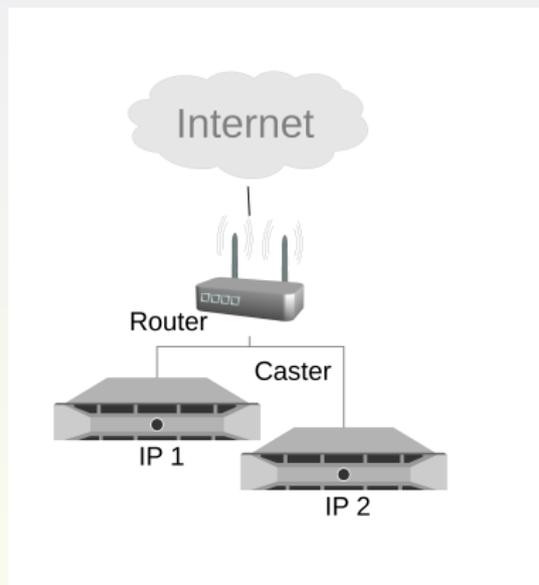
Caster: products.igs-ip.net

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



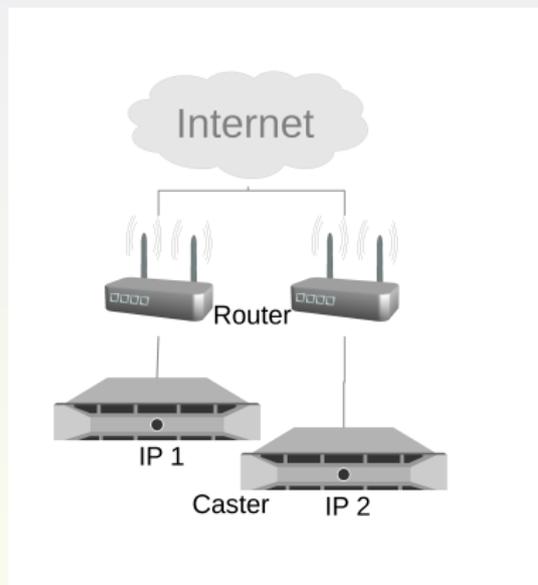
- Dual caster installation (same site)
- Redundancy and load distribution
- Same network allows easy synchronisation
- Still easy to disturb (DOS attack against router)
- Load balancing possible

Load balancing



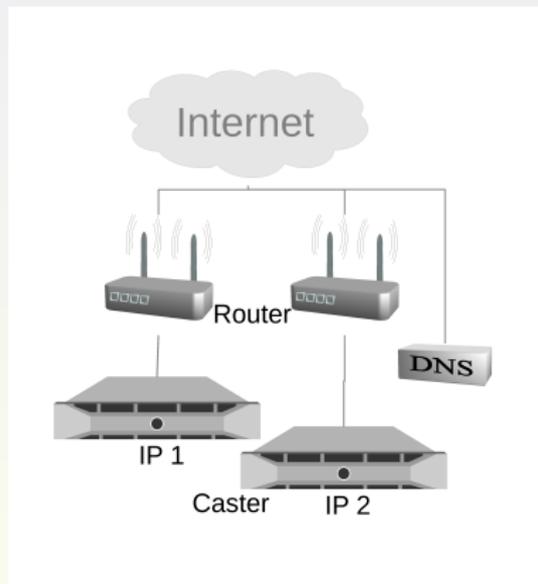
- Router chooses target server
- Equal distribution of work to be done
- All data going through load balancer
- Latest hardware: Bypass for data from server possible
- Synchronisation of access rights and usage statistics necessary
 - single management database
 - multiple synchronized databases
 - individual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

Duplicate hosting



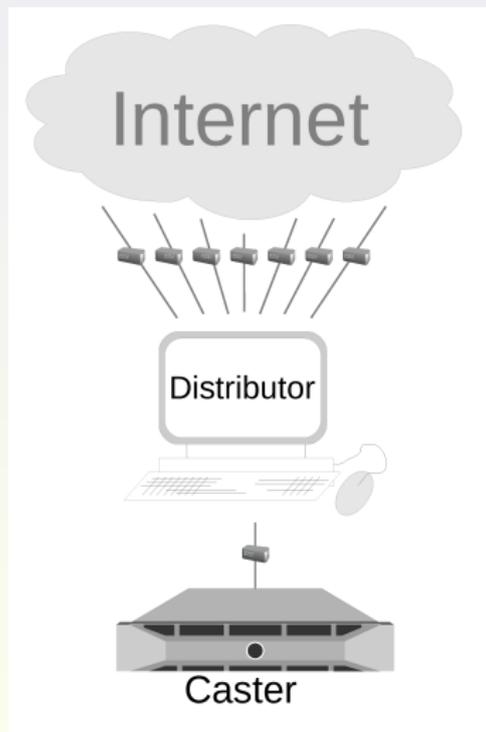
- Dual caster installation (different providers)
- Redundancy and load distribution
- Synchronisation more demanding
- Harder to disturb (2 attack targets)

Duplicate hosting and round robin



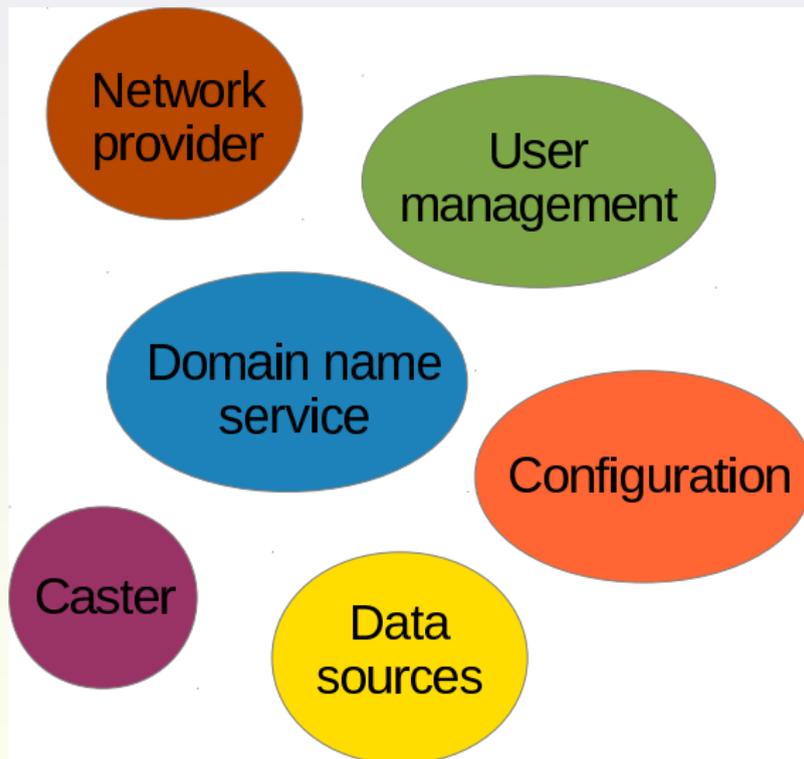
- Installation details hidden behind domain name
- Name resolution dynamic (Round robin)
- Final load on individual machines not fully predictable

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





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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



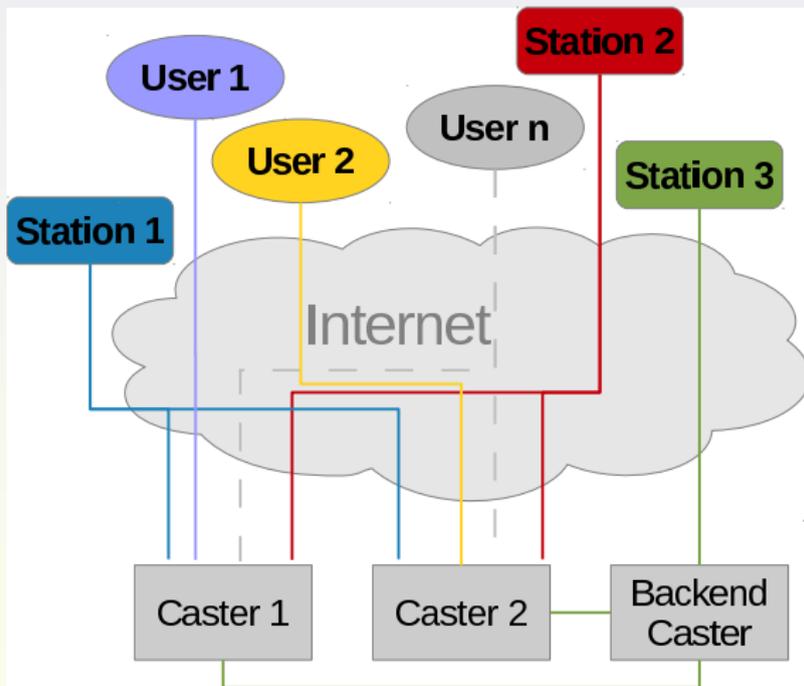
- Direct IP usage instead of domain names
- Hardcoded firewall rules prevent IP changes
- DNS based load balancing difficult for multi-stream users

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



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