New Products: Peregrine and Bighorn

Antelope Users Group Meeting

October, 2012

Reno, Nevada

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Peregrine

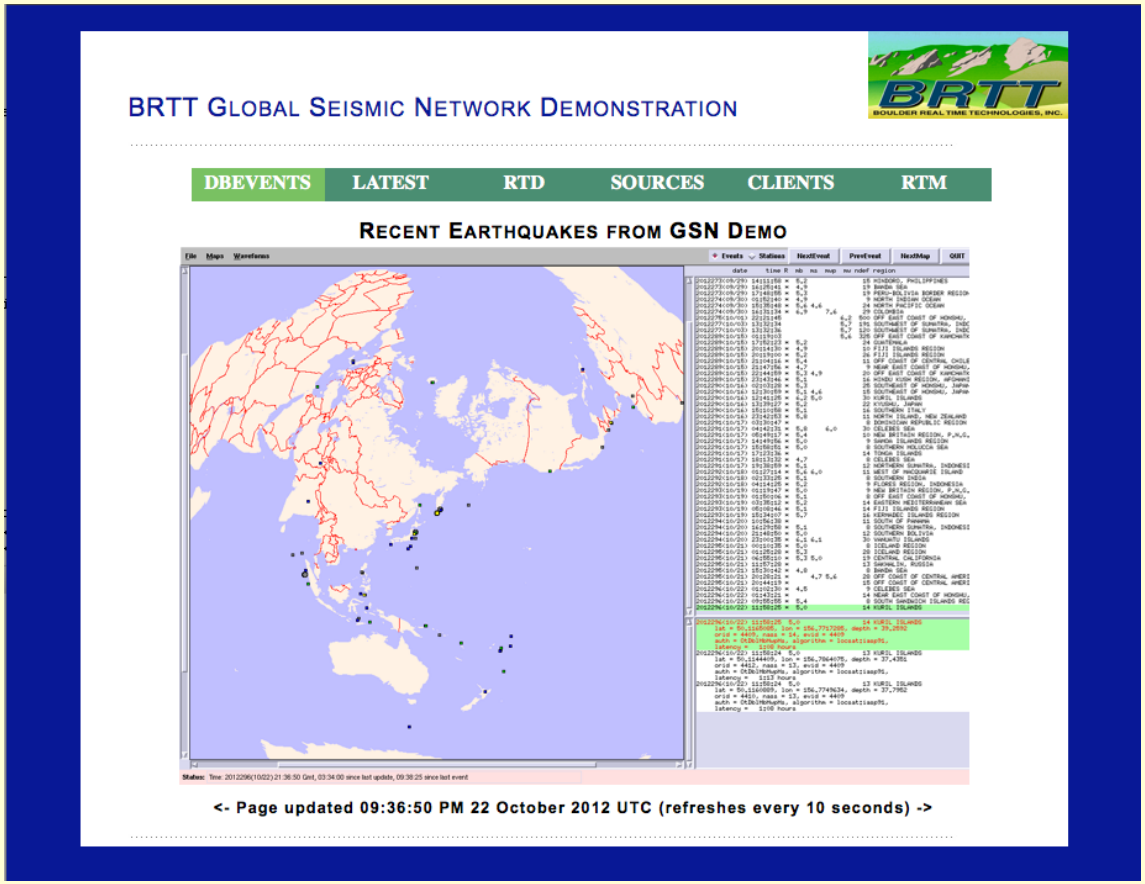
- Antelope Base System + Web Infrastructure
  - New program ***rtwebserver***
  - New program ***rtcache***
  - Host of supporting python libraries

Peregrine

- Web-based Monitoring
- Web-based Information distribution
- Web-based Interaction

Peregrine Example: *dbevents* on the Web

For
Users
And
Operators



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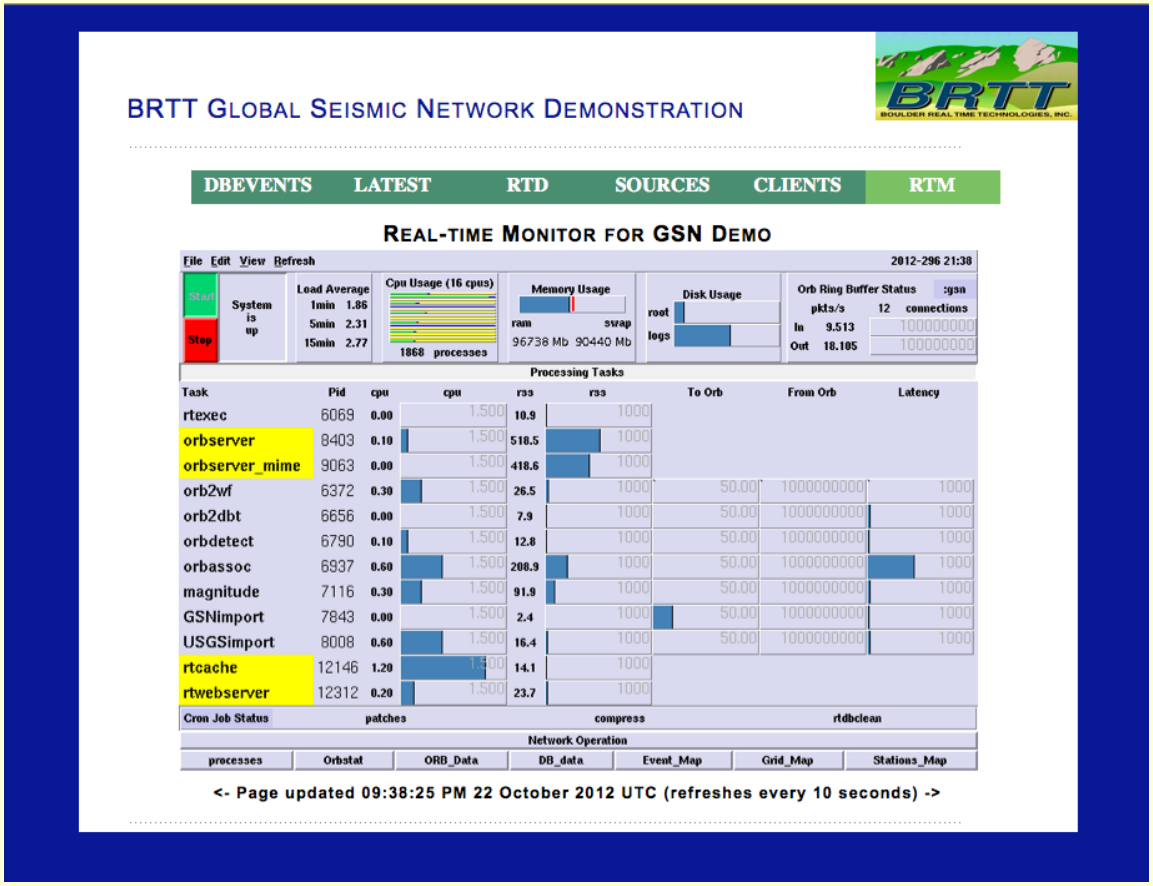
Peregrine Example: *RTM* on the Web

For Operators



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Peregrine Goals

- Robust Web Presence for users and operators
- Capitalize on informative power of real-time system
- Platform for revealing more about RT system to operators
- Clean integration with real-time system
- Familiar configuration patterns for operators
- Low user-maintenance cost and complexity
- Flexible and Extensible
- Self-contained
- Maintainable software base

What We Did

- Wrote our own web server
- Made it run under a real-time system (rtexec)
- Made it look and feel like our existing programs
- Made it connect easily to Antelope
- Wrote a caching daemon to generate products for it

Why not Existing Technologies?

- E.g. operator-managed Apache?
- And open-source PHP?
- And hand-linked Python?
- And user-compiled ImageMagick?
- And consultant-developed custom apps?

Why not Existing Technologies?

- One Simple Reason:
  - It hasn't worked in commercial context
    - (works for a few places with advanced development staff and strong sysadmin resources)
  - Hasn't provided generally accessible platform
- Apache installations are highly variable
- Linking in buzzword technologies is complex
- Configurable elements are heterogeneous
- Underlying open-source is constantly changing
- High cost of ownership, high cost of development

Why not distribute an existing stack?

- Lots of work; worth doing right
- We can create something better tuned for our users
- Ours is fully self-contained
- Ours is maintainable by us
- Actually we did start with an existing stack:
  - Python
  - Twisted Web Platform

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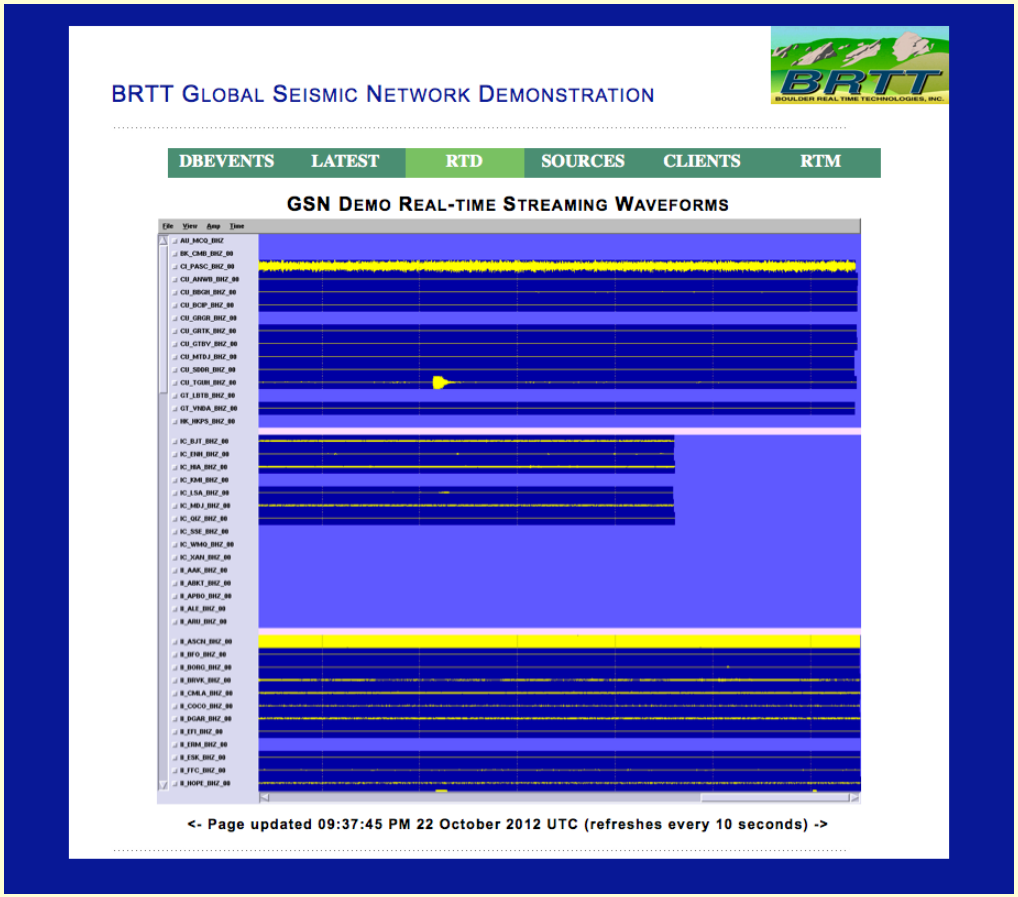
Summary --

- Hard to maintain what we don't control
- Hard to support what we haven't built
- Hard to come up with strategies to integrate our apps with organic free-for-all code base
  - Much less explain those strategies…

- ("Hard" => "Very Expensive")

Peregrine Example: *orbmonrtd* on the web



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Peregrine: What's the difference?

- No ImageMagick! (whew)
- No Installation sysadmin of open-source code
- No Configuration sysadmin of 3rd party code
- Little or no custom development
- Much more plug-n-play
- Generalized Platform, Streamlined Tools
  - Custom development still possible!

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Peregrine: What's the difference?

- Single command-lines to launch programs
- Entirely contained within rtexec system
- Parameter-file configured
- Python modules included to provide capabilities

rtwebserver

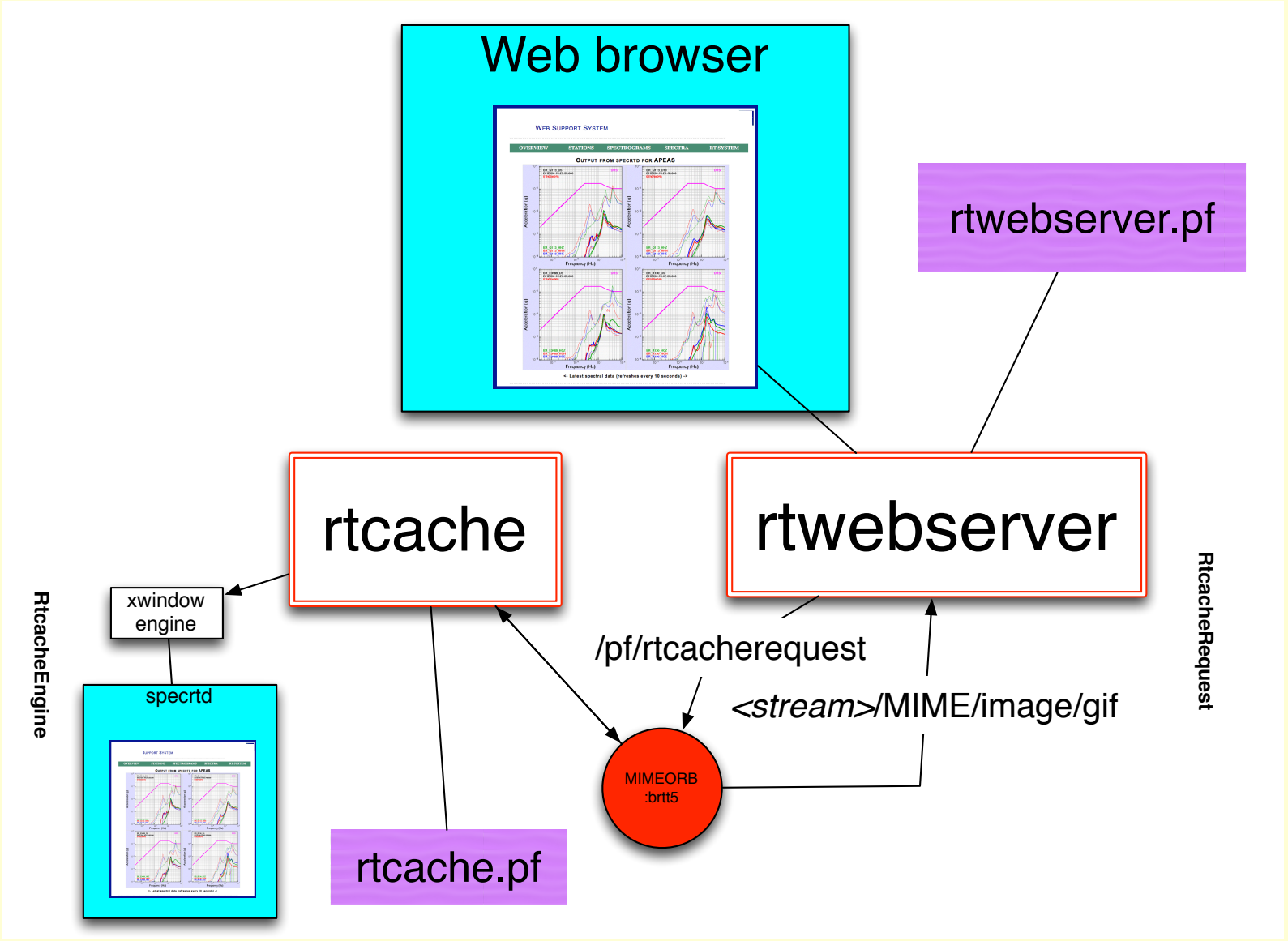
- Self-contained web-server

```
% rtwebserver -v -P 8000
```

- Runs under rtexec
- Parameter-file configures entire site
  - *rtwebserver.pf*
- Logs connections to database
- Python and Twisted (*http://twistedmatrix.com*)

rtcache

- Generalized Caching Daemon
- Pre-builds products for the web server
- E.g.:
  - Dynamic X-window screen-shots
  - Strong-motion alarm reports
  - Anything you can code into Python
- Exchanges request/response via orbserver
- Can show on the web any GUI you can run as X-client


Web browser
rtwebserver.pf
rtcache
rtwebserver
xwindow
engine
RtcacheEngine
RtcacheRequest
/pf/rtcacherequest
<stream>/MIME/image/gif
specrtd
MIMEORB
:brtt5
rtcache.pf

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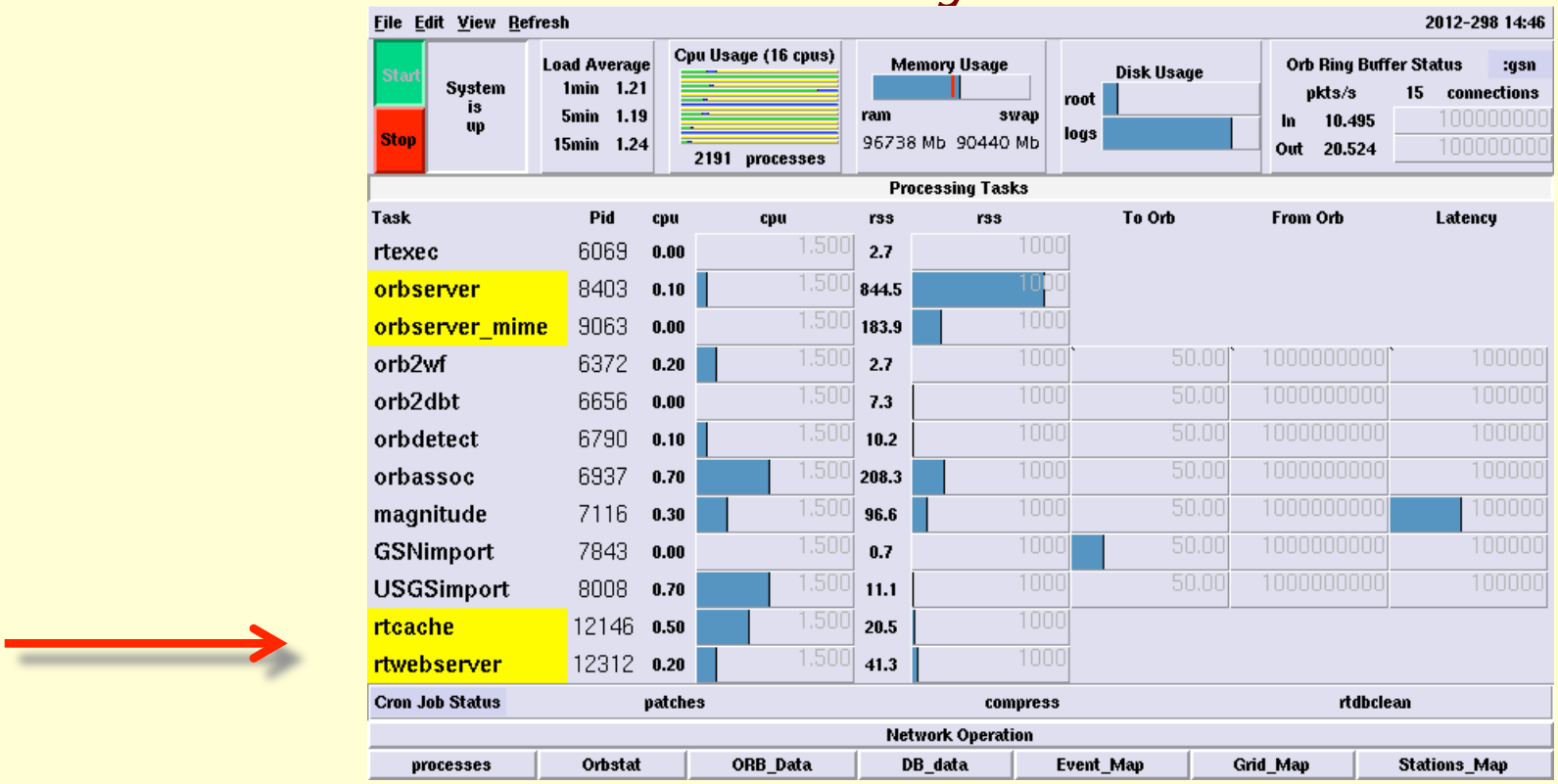
Rtwebserver / rtcache in real-time system



rtwebserver.pf

```
site &Arr{
   pages &Arr{
      index              rpy:webitems/index.rpy  index
      latest             rpy:webitems/latest.rpy
      rtm                rpy:webitems/rtm.rpy
      orbmonrtd          rpy:webitems/orbmonrtd.rpy
      sources            rpy:webitems/sources.rpy
      clients            rpy:webitems/clients.rpy
      dynamic &Arr{
        ximage           rtcache:ximage
      }
      images &Arr{
        brtt_logo.gif    file:webitems/images/brtt_logo.gif
        dots.gif         file:webitems/images/dots.gif
      }
      css &Arr{
        style.css        pf:stylesheet   text/css
      }
   }
```

rtwebserver page types

- file
- pf
- rpy
- rtcache
- (revproxy)

rtwebserver.pf

```
site &Arr{
   siteconfig &Arr{
        time_format             %I:%M:%S %p %d %B %Y %Z
        centerimage_width       640
        refresh_sec             10
   }
   ximage &Arr{
        orbname                 :gsn2
        diagnostics             1
        maxwait_sec             5.0
        rtcache_targetname
    }
    phrases &Arr{
        header &Literal{
                <div id="header">
                <span class="private"><img id="logo" src="/images/brtt_logo.gif"/></span>
                <p id="banner">BRTT Global Seismic Network Demonstration</p>
                </div>
                <img class="dots" alt="dots" src="/images/dots.gif"/>
        }
    }
}
```

rtwebserver.pf

```
site &Arr{
 stylesheet &Literal{

        html, body {
          background: #0c2093 ;
          margin: 0px ;
          padding: 0px ;
        }

        h1 {
          color: #000 ;
          font-family: arial, helvetica, geneva, sans-serif ;
          font-size: 1.3em ;
          margin: 2px ;
          margin-top: 20px ;
          font-variant: small-caps ;
          letter-spacing: 1px ;
          text-align: center ;
        }
   }
}
```

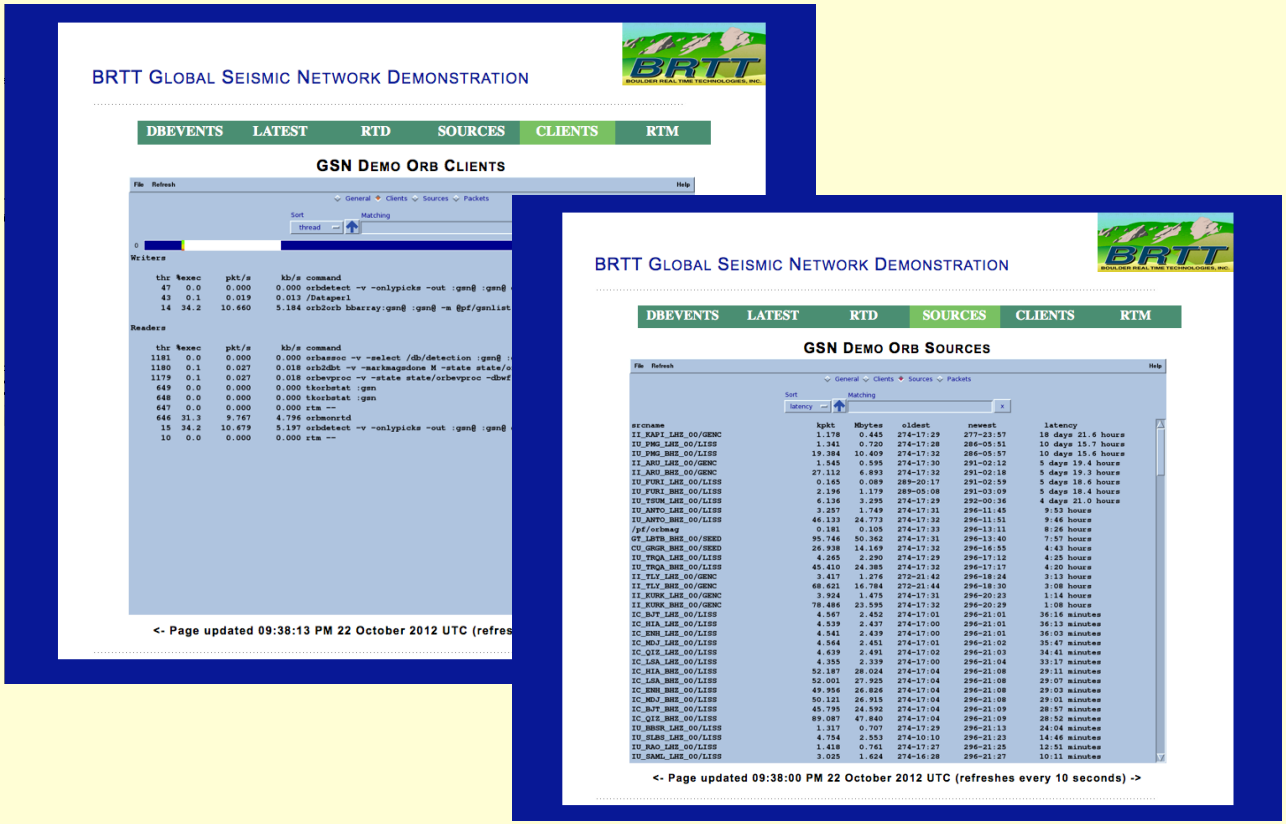
rtcache.pf

```
caches &Arr{
    defaults &Arr{
        enginetype xwindow
        command_env &Arr{
                PATH    &env(PATH)
                ANTELOPE        &env(ANTELOPE)
                PFPATH          &env(PFPATH)
}
        image_format GIF
        window_name
        virtual_display auto
        virtual_screen_geometry 1280x1024
        startup_sleep_sec 0.2
        xwindow_restart_sec 86400
    }
    rtm &Arr{
        command rtm
    }
    dbevents &Arr{
        command dbevents db/gsn
    }
    orbmonrtd &Arr{
        command orbmonrtd :gsn -wmax 1200 -hmax 1000
    }
```

Peregrine Development Successes

- Easy display of generic X clients
- rtdemo_gsn web display
- Bighorn Web interaction platform

Easy display of generic X clients



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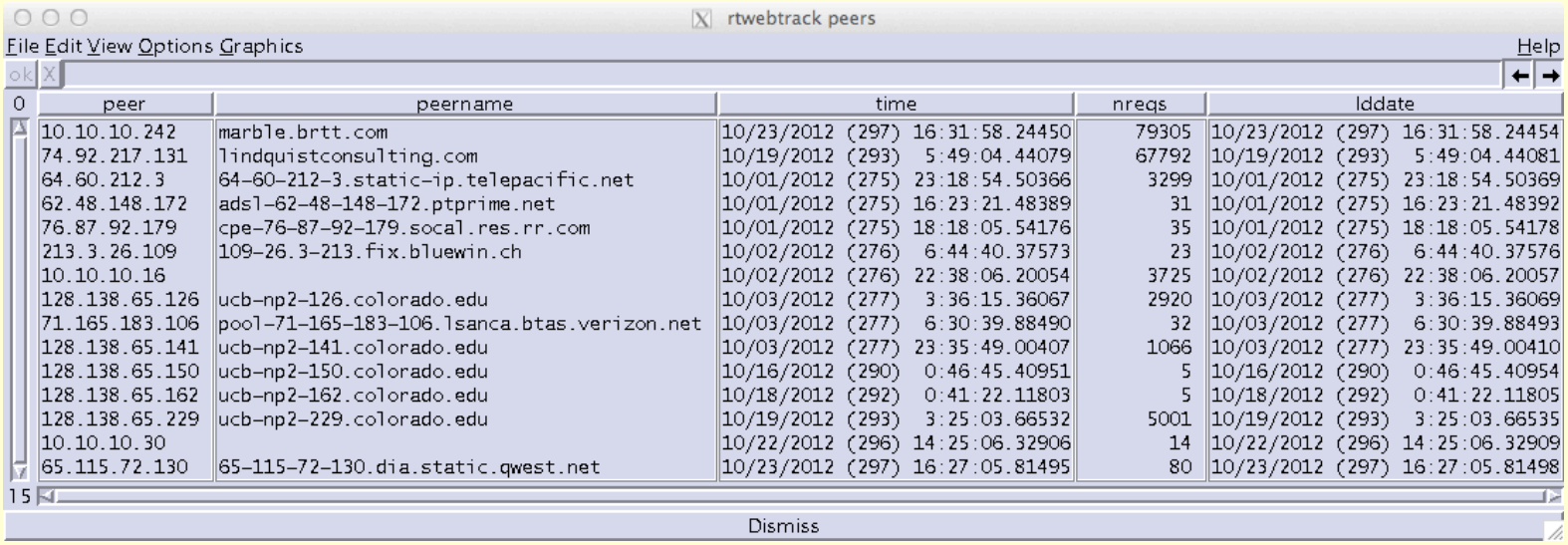
rtwebserver connection logging


rtwebtrack peers

File Edit View Options Graphics Help

ok X

0

peer	peername	time	nreqs	lddate
10.10.10.242	marble.brtt.com	10/23/2012 (297) 16:31:58.24450	79305	10/23/2012 (297) 16:31:58.24454
74.92.217.131	lindquistconsulting.com	10/19/2012 (293) 5:49:04.44079	67792	10/19/2012 (293) 5:49:04.44081
64.60.212.3	64-60-212-3.static-ip.telepacific.net	10/01/2012 (275) 23:18:54.50366	3299	10/01/2012 (275) 23:18:54.50369
62.48.148.172	adsl-62-48-148-172.ptprime.net	10/01/2012 (275) 16:23:21.48389	31	10/01/2012 (275) 16:23:21.48392
76.87.92.179	cpe-76-87-92-179.socal.res.rr.com	10/01/2012 (275) 18:18:05.54176	35	10/01/2012 (275) 18:18:05.54178
213.3.26.109	109-26.3-213.fix.bluewin.ch	10/02/2012 (276) 6:44:40.37573	23	10/02/2012 (276) 6:44:40.37576
10.10.10.16		10/02/2012 (276) 22:38:06.20054	3725	10/02/2012 (276) 22:38:06.20057
128.138.65.126	ucb-np2-126.colorado.edu	10/03/2012 (277) 3:36:15.36067	2920	10/03/2012 (277) 3:36:15.36069
71.165.183.106	pool-71-165-183-106.lsanca.btas.verizon.net	10/03/2012 (277) 6:30:39.88490	32	10/03/2012 (277) 6:30:39.88493
128.138.65.141	ucb-np2-141.colorado.edu	10/03/2012 (277) 23:35:49.00407	1066	10/03/2012 (277) 23:35:49.00410
128.138.65.150	ucb-np2-150.colorado.edu	10/16/2012 (290) 0:46:45.40951	5	10/16/2012 (290) 0:46:45.40954
128.138.65.162	ucb-np2-162.colorado.edu	10/18/2012 (292) 0:41:22.11803	5	10/18/2012 (292) 0:41:22.11805
128.138.65.229	ucb-np2-229.colorado.edu	10/19/2012 (293) 3:25:03.66532	5001	10/19/2012 (293) 3:25:03.66535
10.10.10.30		10/22/2012 (296) 14:25:06.32906	14	10/22/2012 (296) 14:25:06.32909
65.115.72.130	65-115-72-130.dia.static.qwest.net	10/23/2012 (297) 16:27:05.81495	80	10/23/2012 (297) 16:27:05.81498

15

Dismiss

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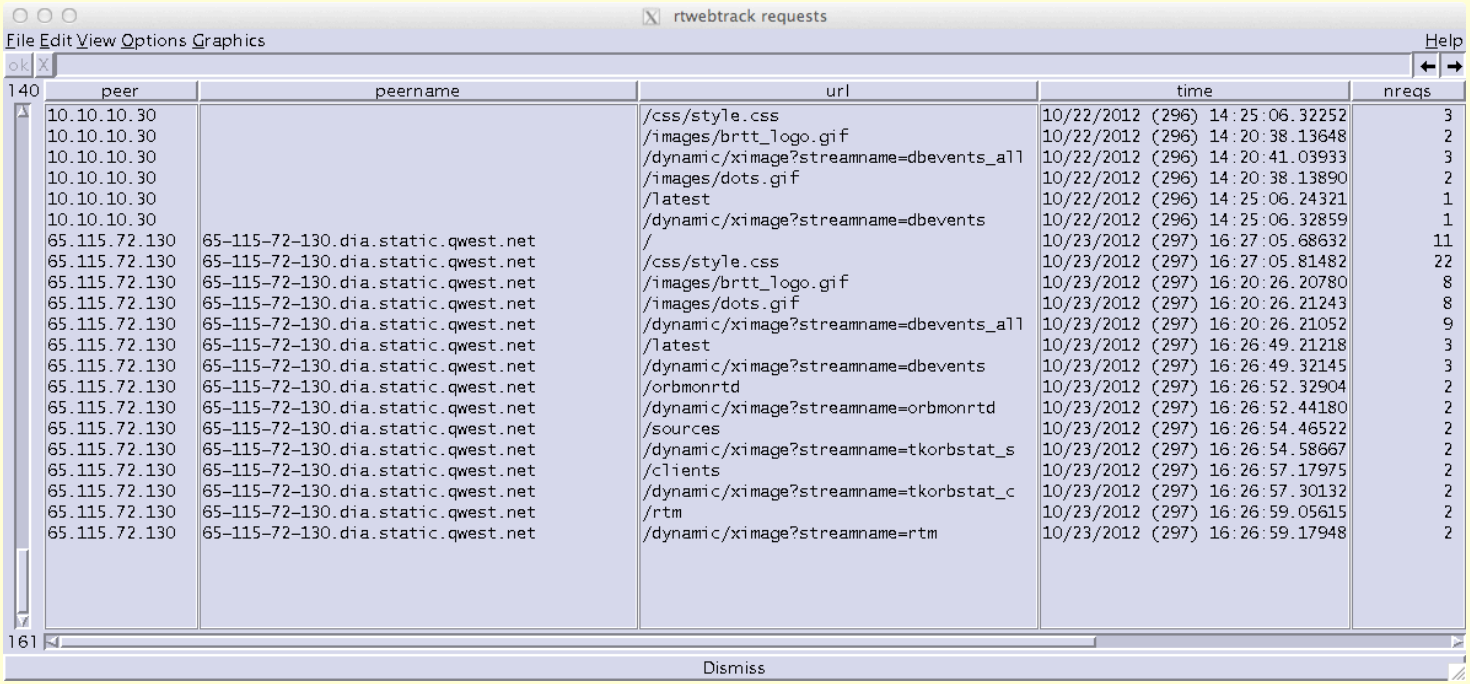
rtwebserver connection logging



peer	peername	url	time	nreqs
10.10.10.30		/css/style.css	10/22/2012 (296) 14:25:06.32252	3
10.10.10.30		/images/brtt_logo.gif	10/22/2012 (296) 14:20:38.13648	2
10.10.10.30		/dynamic/ximage?streamname=dbevents_all	10/22/2012 (296) 14:20:41.03933	3
10.10.10.30		/images/dots.gif	10/22/2012 (296) 14:20:38.13890	2
10.10.10.30		/latest	10/22/2012 (296) 14:25:06.24321	1
10.10.10.30		/dynamic/ximage?streamname=dbevents	10/22/2012 (296) 14:25:06.32859	1
65.115.72.130	65-115-72-130.dia.static.qwest.net	/	10/23/2012 (297) 16:27:05.68632	11
65.115.72.130	65-115-72-130.dia.static.qwest.net	/css/style.css	10/23/2012 (297) 16:27:05.81482	22
65.115.72.130	65-115-72-130.dia.static.qwest.net	/images/brtt_logo.gif	10/23/2012 (297) 16:20:26.20780	8
65.115.72.130	65-115-72-130.dia.static.qwest.net	/images/dots.gif	10/23/2012 (297) 16:20:26.21243	8
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=dbevents_all	10/23/2012 (297) 16:20:26.21052	9
65.115.72.130	65-115-72-130.dia.static.qwest.net	/latest	10/23/2012 (297) 16:26:49.21218	3
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=dbevents	10/23/2012 (297) 16:26:49.32145	3
65.115.72.130	65-115-72-130.dia.static.qwest.net	/orbmonrtd	10/23/2012 (297) 16:26:52.32904	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=orbmonrtd	10/23/2012 (297) 16:26:52.44180	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/sources	10/23/2012 (297) 16:26:54.46522	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=tkorbstat_s	10/23/2012 (297) 16:26:54.58667	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/clients	10/23/2012 (297) 16:26:57.17975	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=tkorbstat_c	10/23/2012 (297) 16:26:57.30132	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/rtm	10/23/2012 (297) 16:26:59.05615	2
65.115.72.130	65-115-72-130.dia.static.qwest.net	/dynamic/ximage?streamname=rtm	10/23/2012 (297) 16:26:59.17948	2

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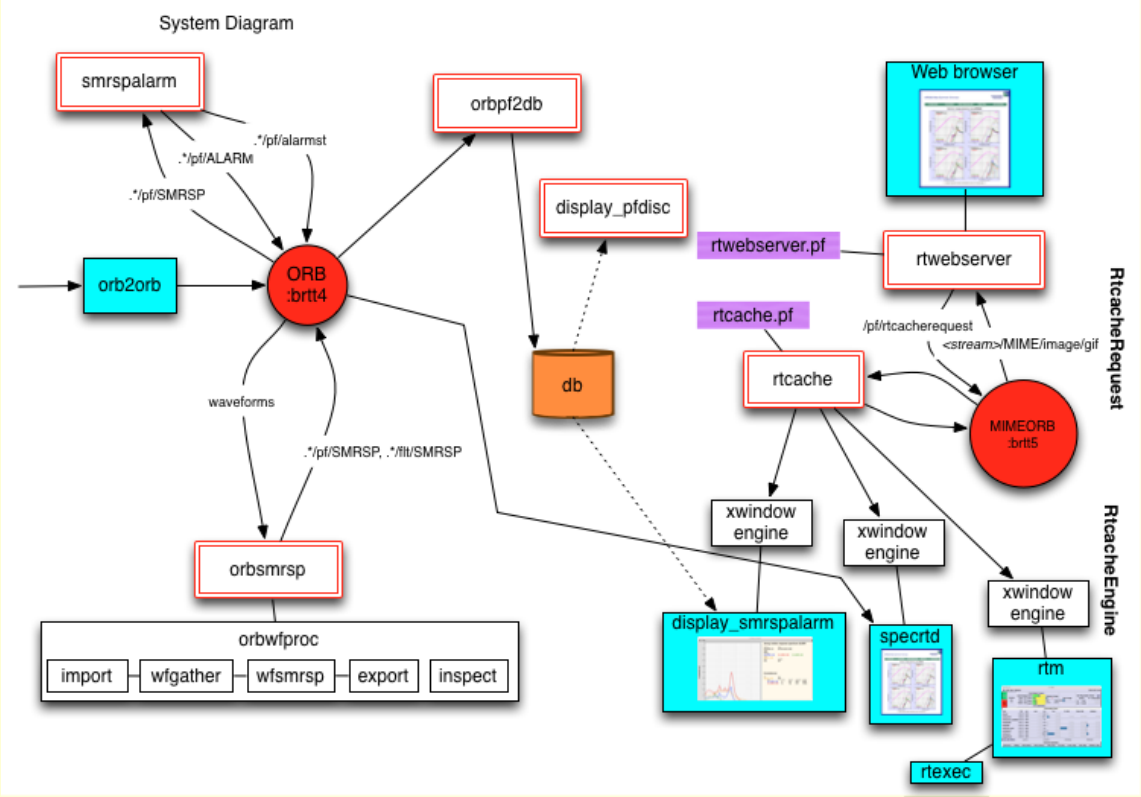
Bighorn

- Peregrine plus engineering analysis tools
- Antelope + rtwebserver + real-time spectral monitoring and alarm capabilities
- Monitor, study, and react to the spectral content of your data

Example Bighorn RT System



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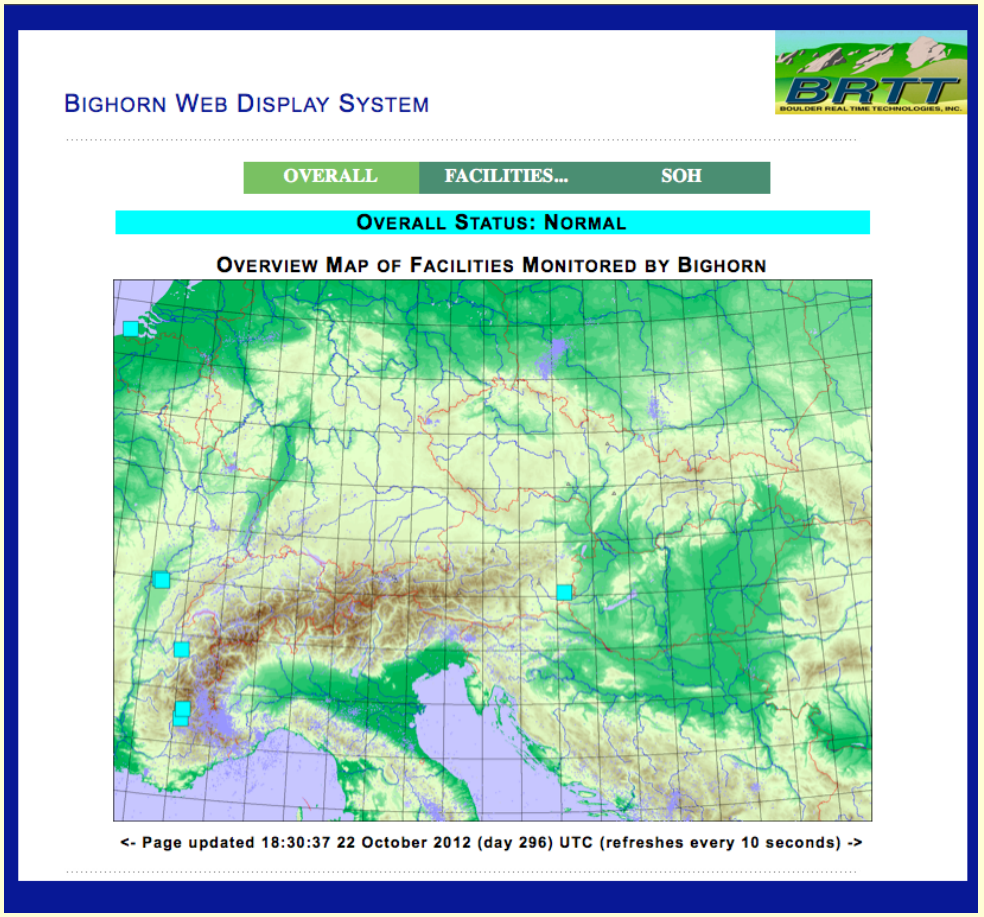
Bighorn Example: Network Overview Center



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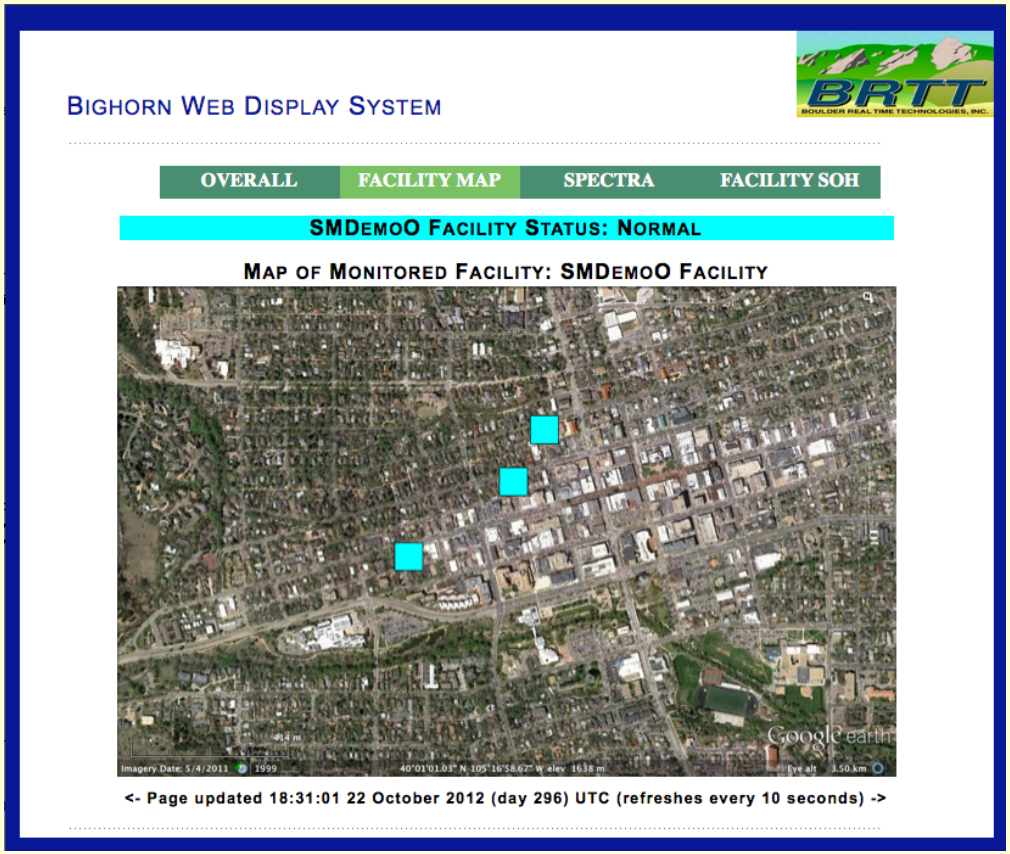
Bighorn Example: Facility Map



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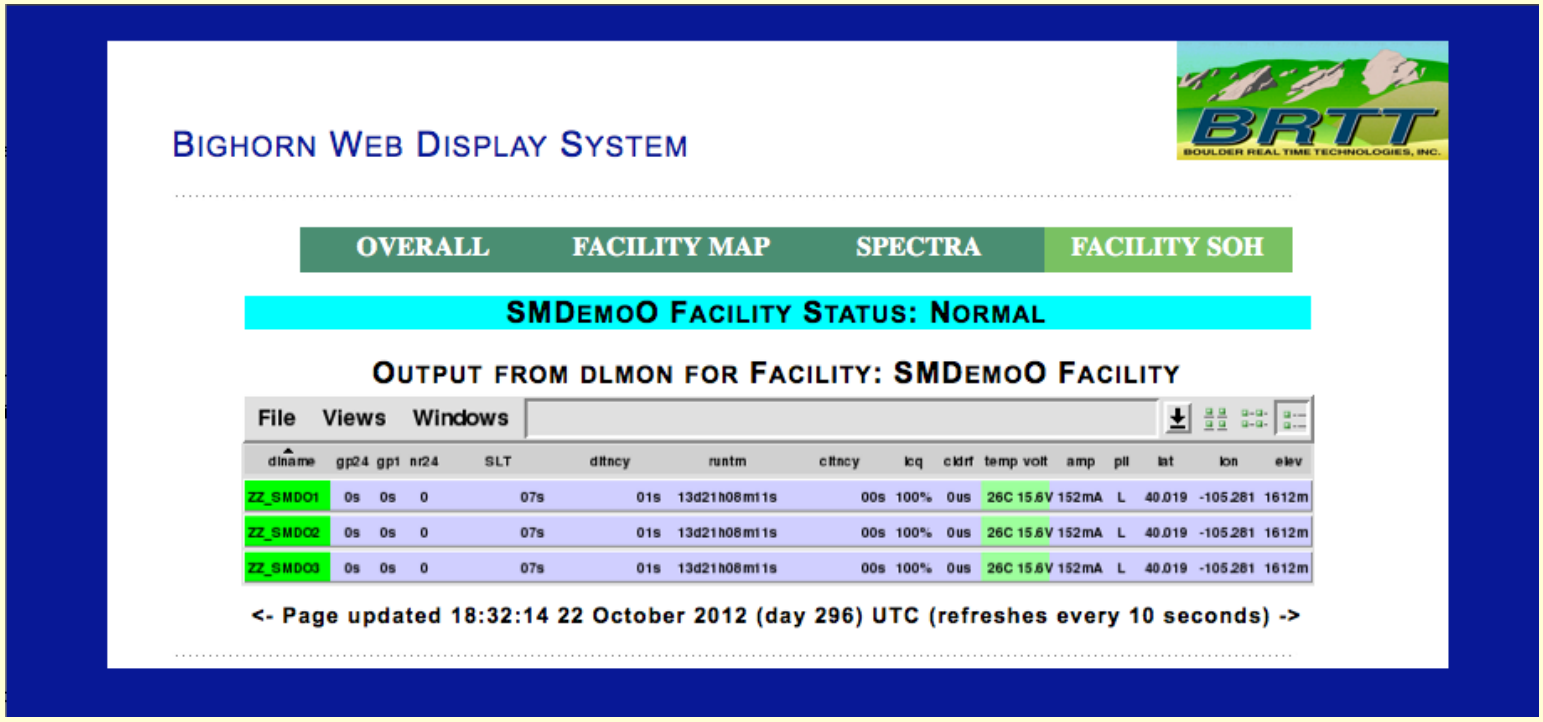
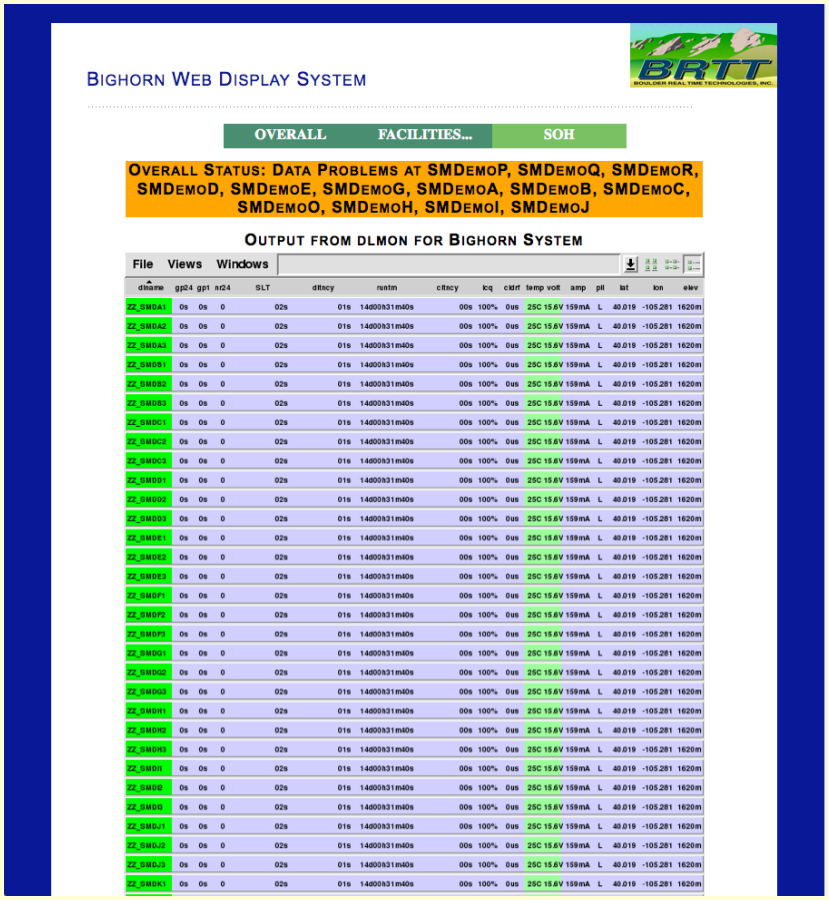
Bighorn Example: Stations *dlmon* for Facility



Bighorn Example: Stations *dlmon* for whole net



BIGHORN WEB DISPLAY SYSTEM

OVERALL | FACILITIES... | SOH

OVERALL STATUS: DATA PROBLEMS AT SMDEMOP, SMDEMOQ, SMDEMOR, SMDEMOD, SMDEMOE, SMDEMOG, SMDEMOA, SMDEMOB, SMDEMOC, SMDEMOO, SMDEMOH, SMDEMOI, SMDEMOJ

OUTPUT FROM DLMON FOR BIGHORN SYSTEM

File Views Windows

dlname	gp24	gp1	nr24	SLT	dltncy	runtm	cltncy	lcq	cldrf	temp	volt	amp	pll	lat	lon	elev
ZZ_SMDA1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDA2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDA3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDB1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDB2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDB3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDC1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDC2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDC3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDD1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDD2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDD3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDE1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDE2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDE3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDF1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDF2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDF3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDG1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDG2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDG3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDH1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDH2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDH3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDI1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDI2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDI3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDJ1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDJ2	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDJ3	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m
ZZ_SMDK1	0s	0s	0	02s	01s	14d00h31m40s	00s	100%	0us	25C	15.6V	159mA	L	40.019	-105.281	1620m

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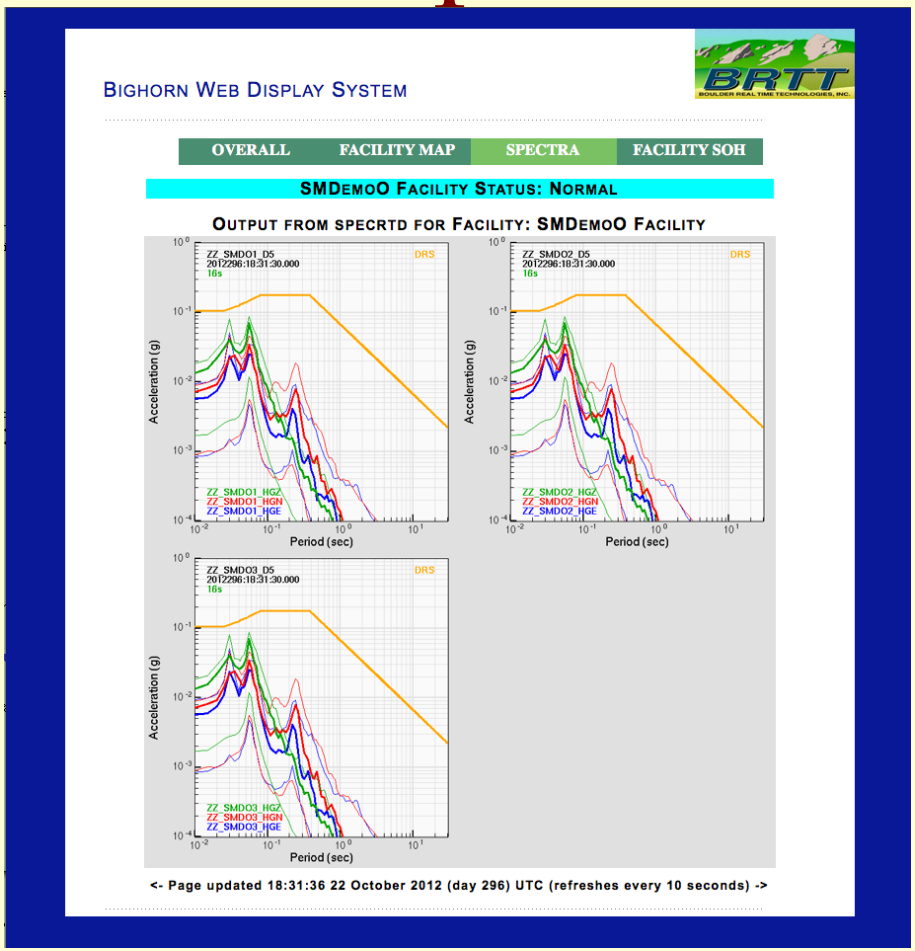
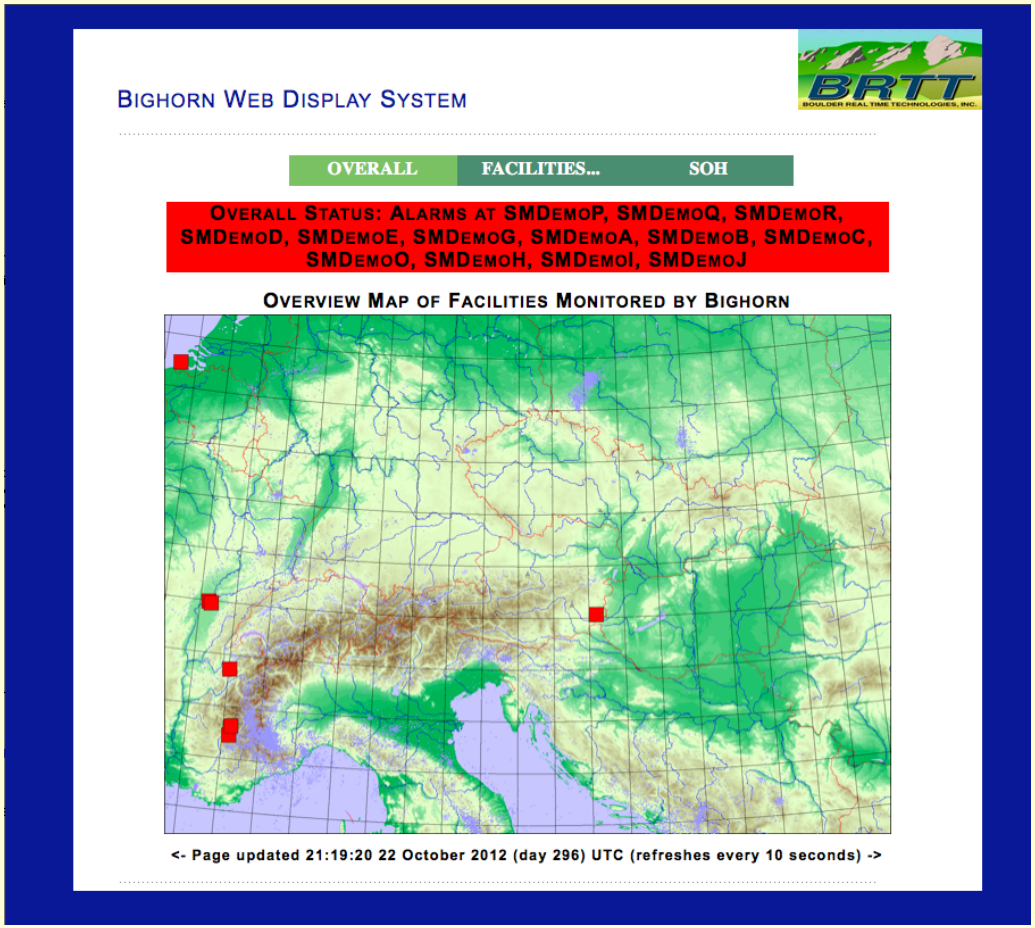
Bighorn Example: Real-time Spectral Display



Bighorn Example: Spectral Exceedence Alarm



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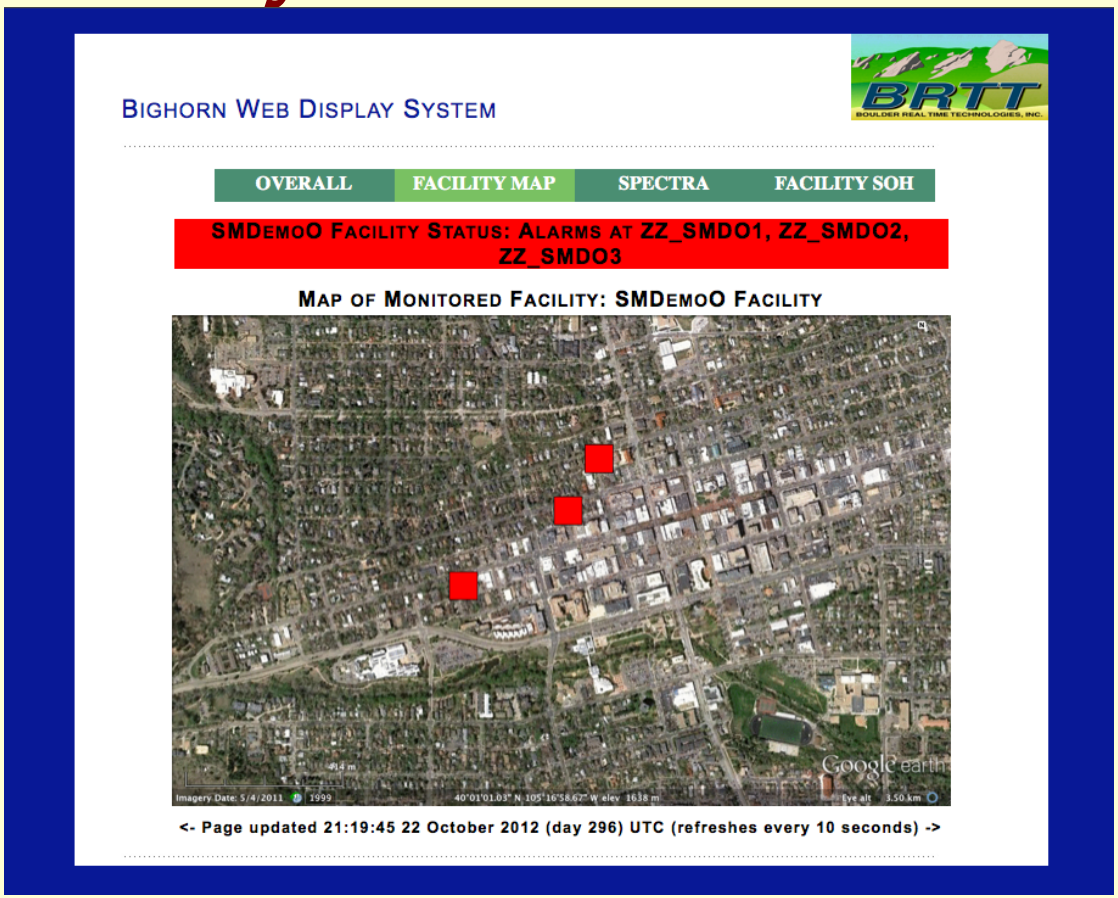
Bighorn Example: Facility Exceedence Alarm



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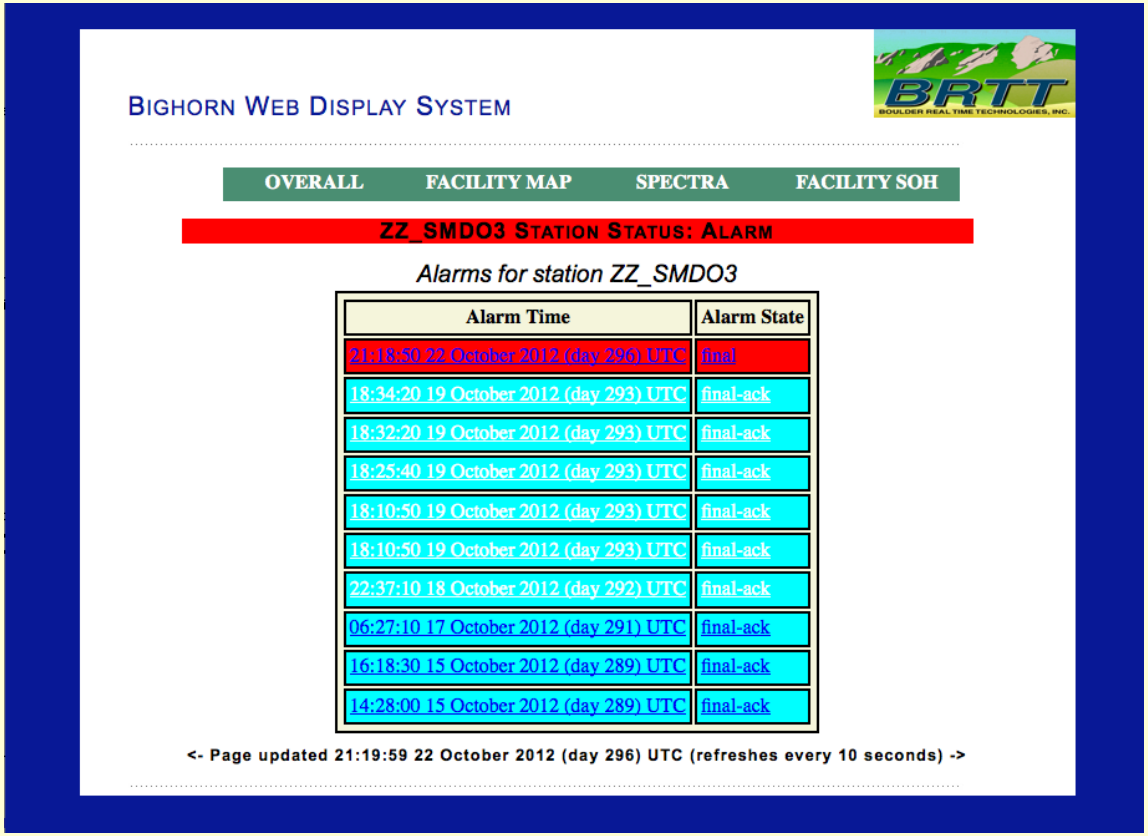
Bighorn Example: Station Alarms Page



BIGHORN WEB DISPLAY SYSTEM

OVERALL | FACILITY MAP | SPECTRA | FACILITY SOH

ZZ_SMDO3 STATION STATUS: ALARM

Alarms for station ZZ_SMDO3

Alarm Time	Alarm State
21:18:50 22 October 2012 (day 296) UTC	final
18:34:20 19 October 2012 (day 293) UTC	final-ack
18:32:20 19 October 2012 (day 293) UTC	final-ack
18:25:40 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
22:37:10 18 October 2012 (day 292) UTC	final-ack
06:27:10 17 October 2012 (day 291) UTC	final-ack
16:18:30 15 October 2012 (day 289) UTC	final-ack
14:28:00 15 October 2012 (day 289) UTC	final-ack

<- Page updated 21:19:59 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->

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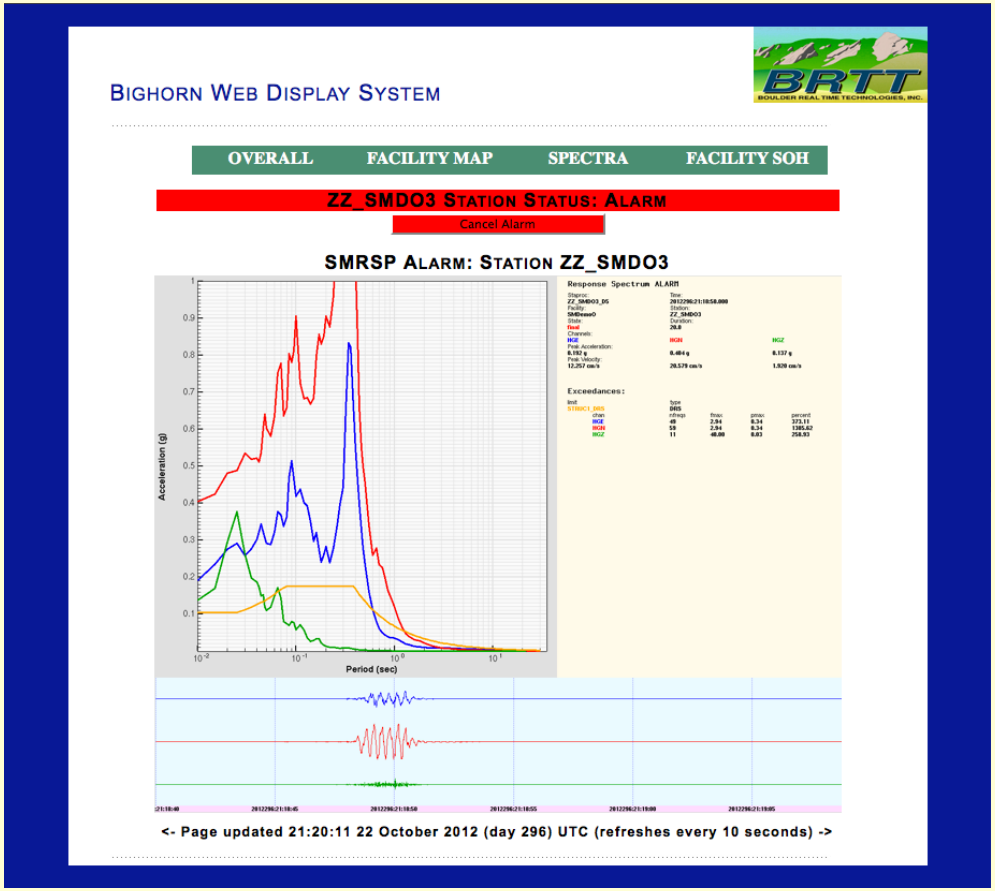
Bighorn Example: Alarm Report and Acknowledgment



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Bighorn Example: Alarm Details

Response Spectrum ALARM

Staproc:	Time:	
ZZ_SMDO3_D5	**2012296:21:18:50.000**	
Facility:	Station:	
SMDemoO	**ZZ_SMDO3**	
State:	Duration:	
final	**20.0**	
Channels:		
HGE	**HGN**	**HGZ**
Peak Acceleration:		
0.192 g	**0.404 g**	**0.137 g**
Peak Velocity:		
12.257 cm/s	**20.579 cm/s**	**1.920 cm/s**

Exceedances:

limit	type			
STRUC1_DRS	**DRS**			
chan	nfreqs	fmax	pmax	percent
HGE	**49**	**2.94**	**0.34**	**373.11**
HGN	**59**	**2.94**	**0.34**	**1385.62**
HGZ	**11**	**40.00**	**0.03**	**258.93**

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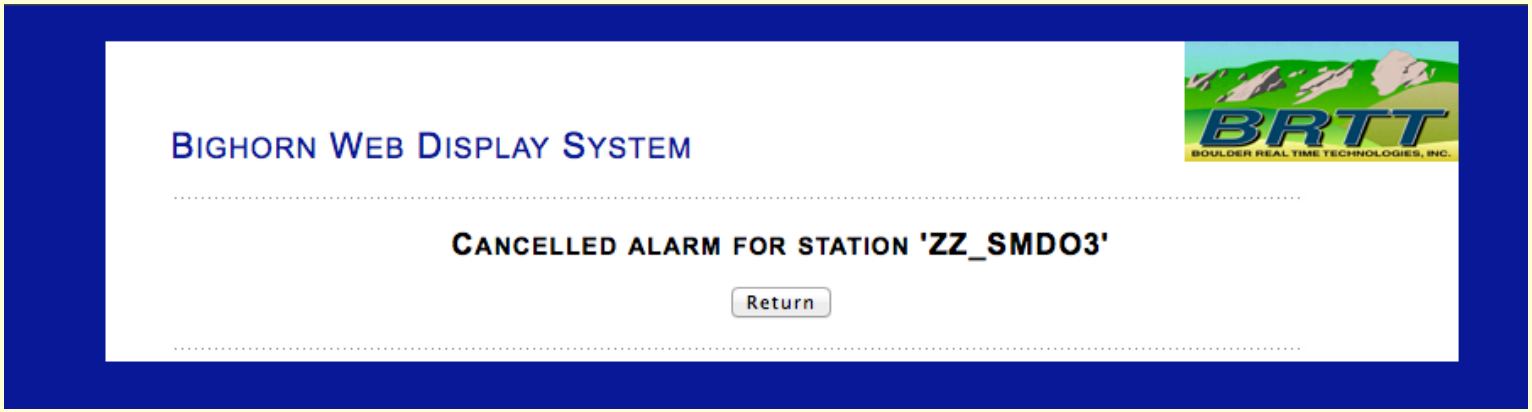
Bighorn Example: Confirmed Alarm Cancellation



Bighorn Example: Dynamic updates from database

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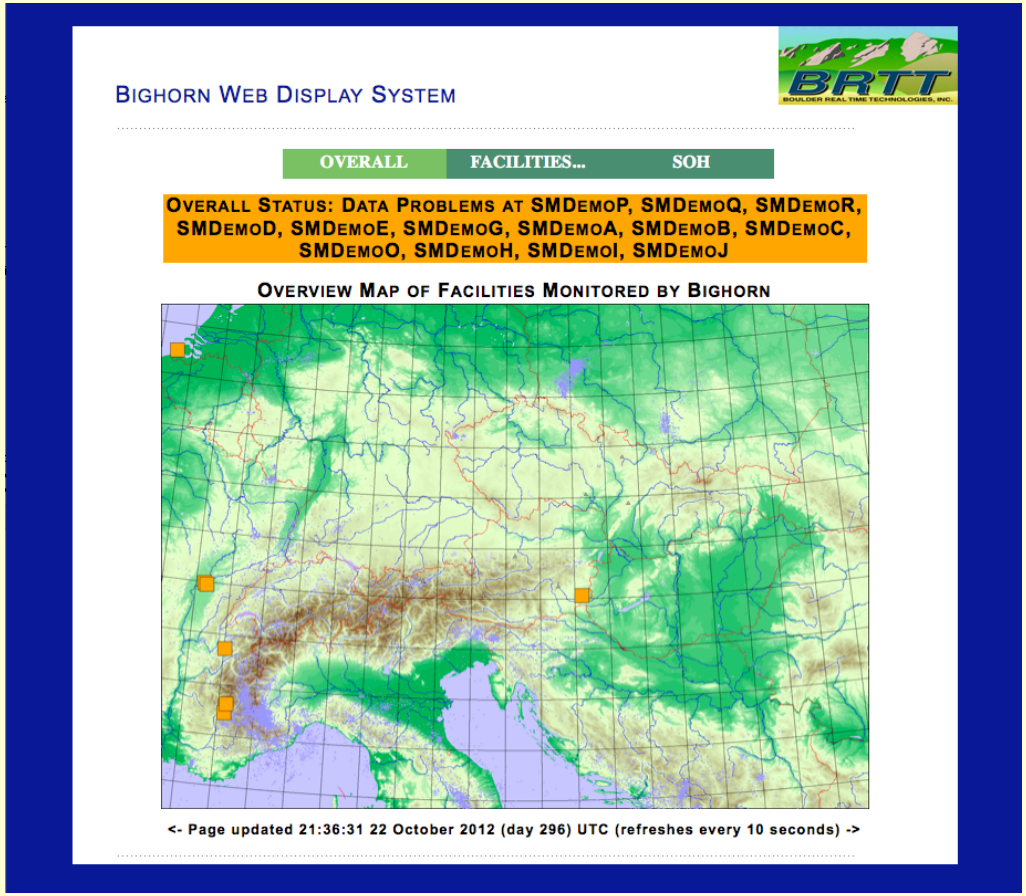
Bighorn Example: Data Problem Detection



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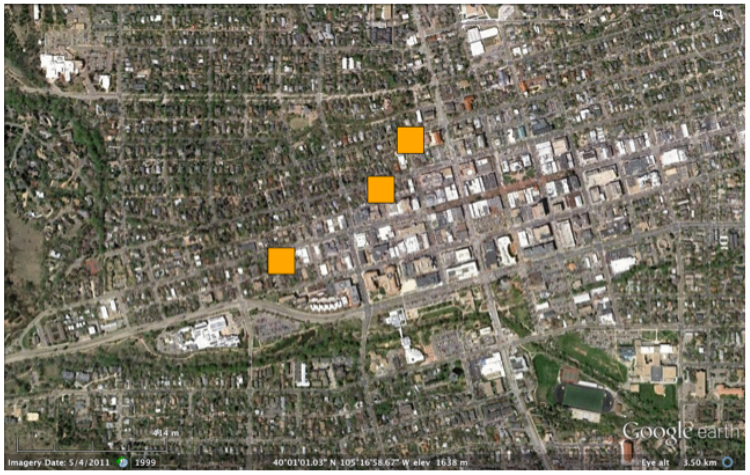
BIGHORN WEB DISPLAY SYSTEM

OVERALL | FACILITY MAP | SPECTRA | FACILITY SOH

SMDEMOO FACILITY STATUS: DATA PROBLEMS AT ZZ_SMDO1, ZZ_SMDO2, ZZ_SMDO3

MAP OF MONITORED FACILITY: SMDEMOO FACILITY



<- Page updated 21:36:15 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->

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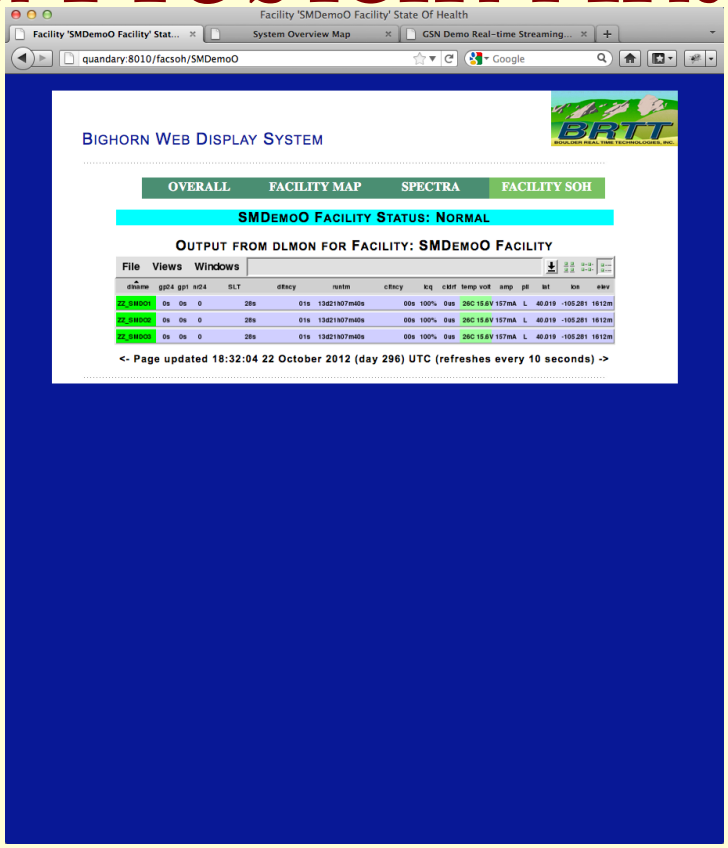
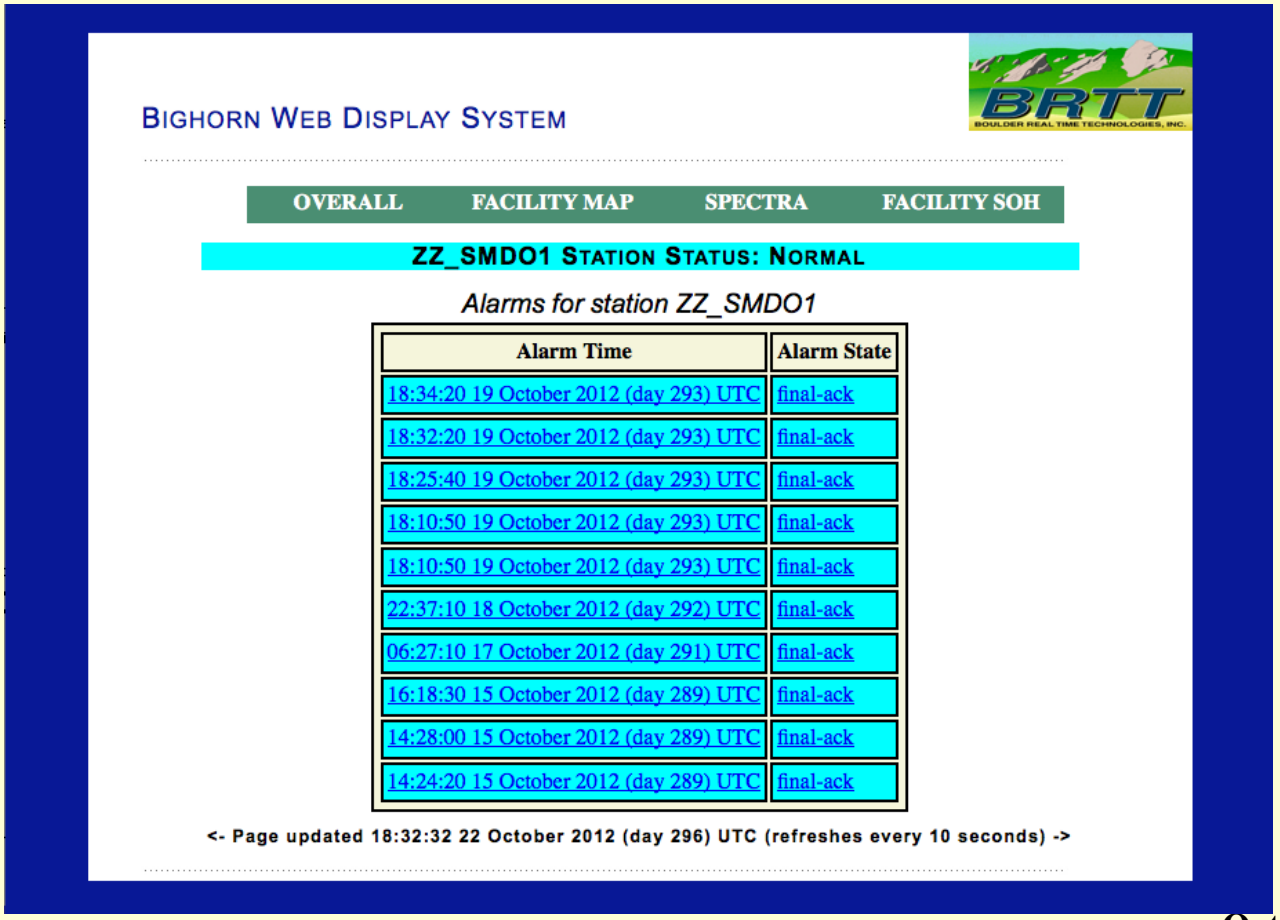
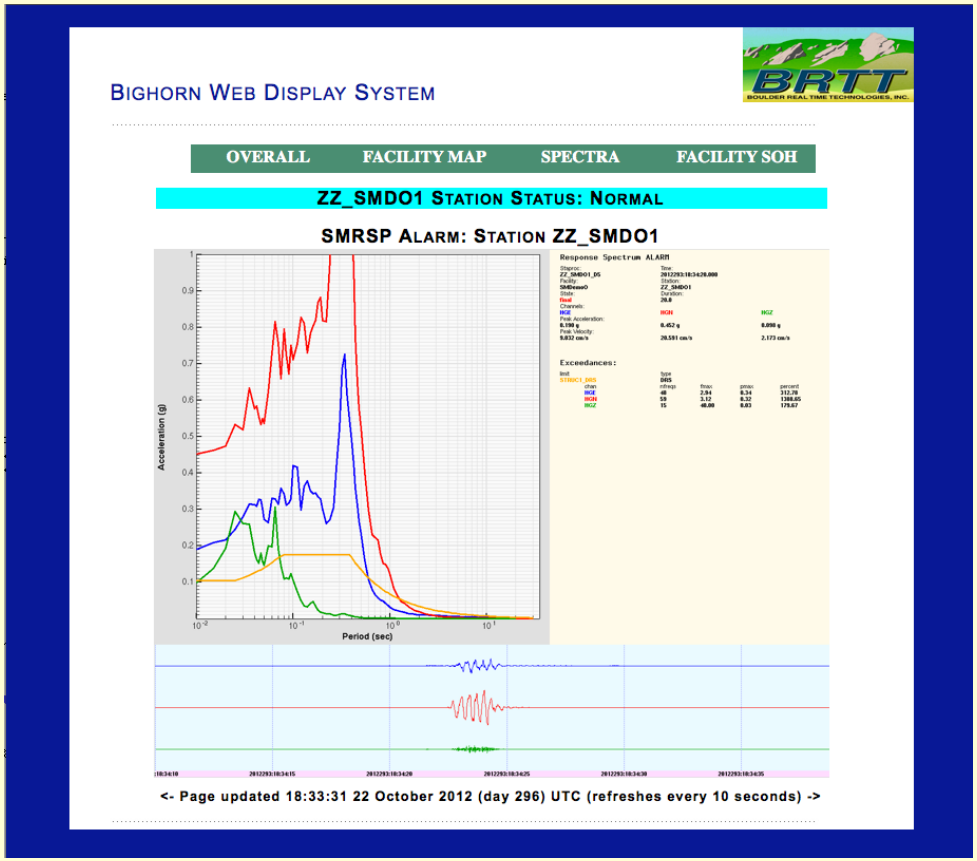
Bighorn Example: Data Problem Analysis



Bighorn Example: Historic Report Exploration



Bighorn Example: Historic Report Display



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Concluding ---

- Exciting new products!
- Future:
  - Password authentication
  - Investigate Google Maps incorporation
  - Investigate X-client interactivity
  - More sophisticated plug-and-play web modules
- Questions ?