AS201701

build an internet backbone with pure 1he servers

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takt

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- ➔ Autonomous System: AS199714
- ➔ AS_PATH: 15169, 201701, 8560, 199714, 12581, 20773, 8422
- ➔ Twitter: @taktv6

pberndro

- Philip Berndroth - philip@freifunk-rheinland.net
- Member of the board Freifunk Rheinland e.V.
- Run my own company with software and datacenter stuff
- Fan of Irish Steak and Guinness
- Twitter: @pberndro - Facebook: facebook.com/philip.berndroth

What is Freifunk and what does the FFRL?

- Research in free wifi and mesh networks
- Empower people to build free and open infrastructure
- Organization of regional, national and international meetings and conferences
- provide ip transit for the most Freifunk communities in Germany
- **Access to the internet for socially disadvantaged people**

Bring the Internet to _all_ people

A United Nations report said:
disconnecting people from the internet is a human rights violation and against international law.

Free wifi for refugees

- a government task but the Freifunk community fixed it
- Communication with family and friends
- Access to education and information in a foreign country
- Use your money for food and family and not for prepaid internet dealers
- There is no dsl/fiber in a refugee camp

Build internet into the wild is hard...

- There is no business model -> we need donations
- Bring volunteers and professionals together
- many technical challenges to build wifi with mesh networks for the mass

- Freifunk communities accepted the challenge
- Build free internet for many thousands of people in Germany

Gardermann
0800 322727

EUROMASTER

VPN providers don’t scale

- only for a single user
- mostly OpenVPN -> userspace daemon
- you have to pay per user every month
- abuse is a problem, it’s not your own network

- **-> run your own fucking infrastructure (*is hard*)**

DIY ISP

Problems:

- No Budget
- No Number Ressources
- No Hardware
- No Colo
- No Transit
- No Peering

How it began

First idea in November 2013

Freifunk Rheinland e.V. became a LIR in August 2014

First Deployments in September 2014

First deployment

Weekend in September 2014:

Frankfurt (Interxion):
2x Supermicro, Xeon 5405, 4GB RAM, 4x SAS HDD RAID-1
Arch Linux, Quagga
2x 1Gbit/s Transit from takt's former employer

Berlin (Speedbone):
2x HP DL320 Gen8, Xeon E3-1220, 8GB RAM, SD Card
Arch Linux, Quagga
2x 1Gbit/s Transit from IN-Berlin AS29670

Deployment #2

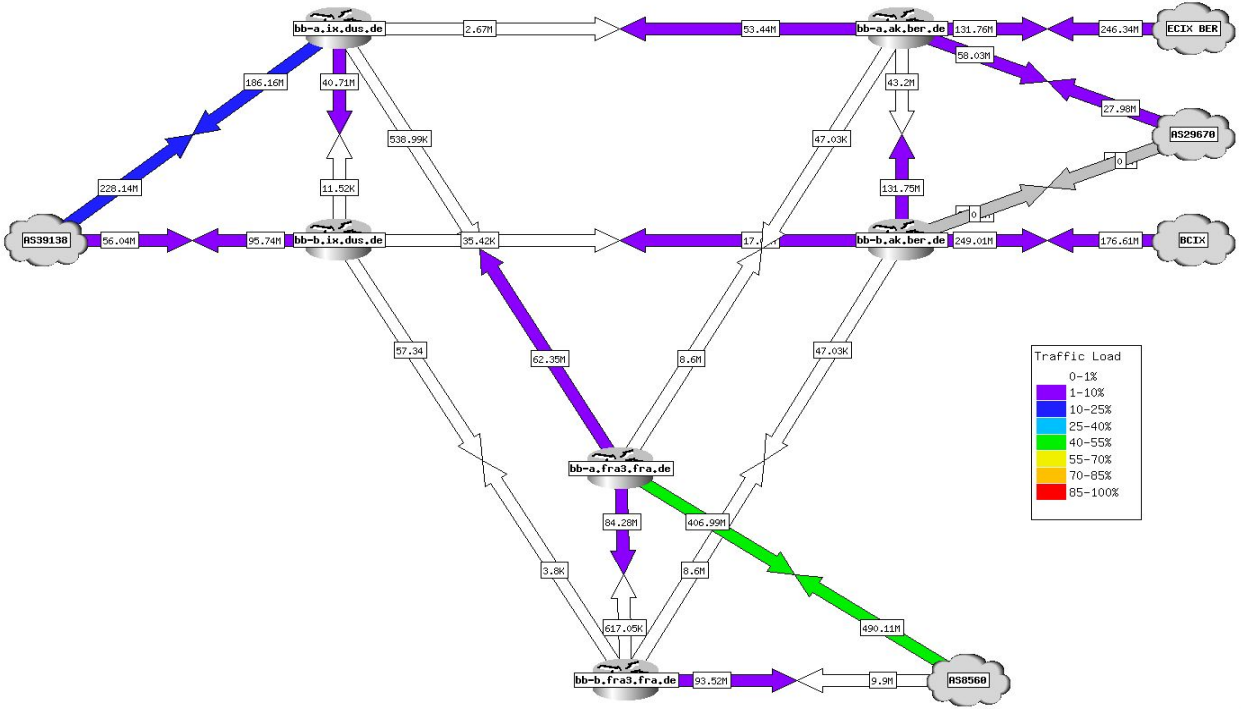
Düsseldorf (Interxion):

2x HP DL320 Gen8, Xeon E3-1220, 8GB RAM, SD Card

Arch Linux, Quagga

2x 1Gbit/s Transit from rrbone AS39138

End of 2014


bb-a.ix.dus.de
bb-a.ak.ber.de
ECIX BER
AS29670
AS39138
bb-b.ix.dus.de
bb-b.ak.ber.de
BCIX
bb-a.fra3.fra.de
bb-b.fra3.fra.de
AS8560
2.67M
53.44M
131.76M
246.34M
58.03M
27.98M
186.16M
40.71M
538.99K
43.2M
47.03K
228.14M
11.52K
131.75M
56.04M
95.74M
35.42K
249.01M
176.61M
57.34
62.35M
8.6M
47.03K
84.28M
406.99M
3.8K
8.6M
617.05K
490.11M
93.52M
9.9M
Traffic Load
0-1%
1-10%
10-25%
25-40%
40-55%
55-70%
70-85%
85-100%

Problems in Q1/2015

Inter-POP connectivity = GRE

1G circuits are not big pipes

Transit sucks, Peering rocks

XCONs limited or impossible in some of our locations

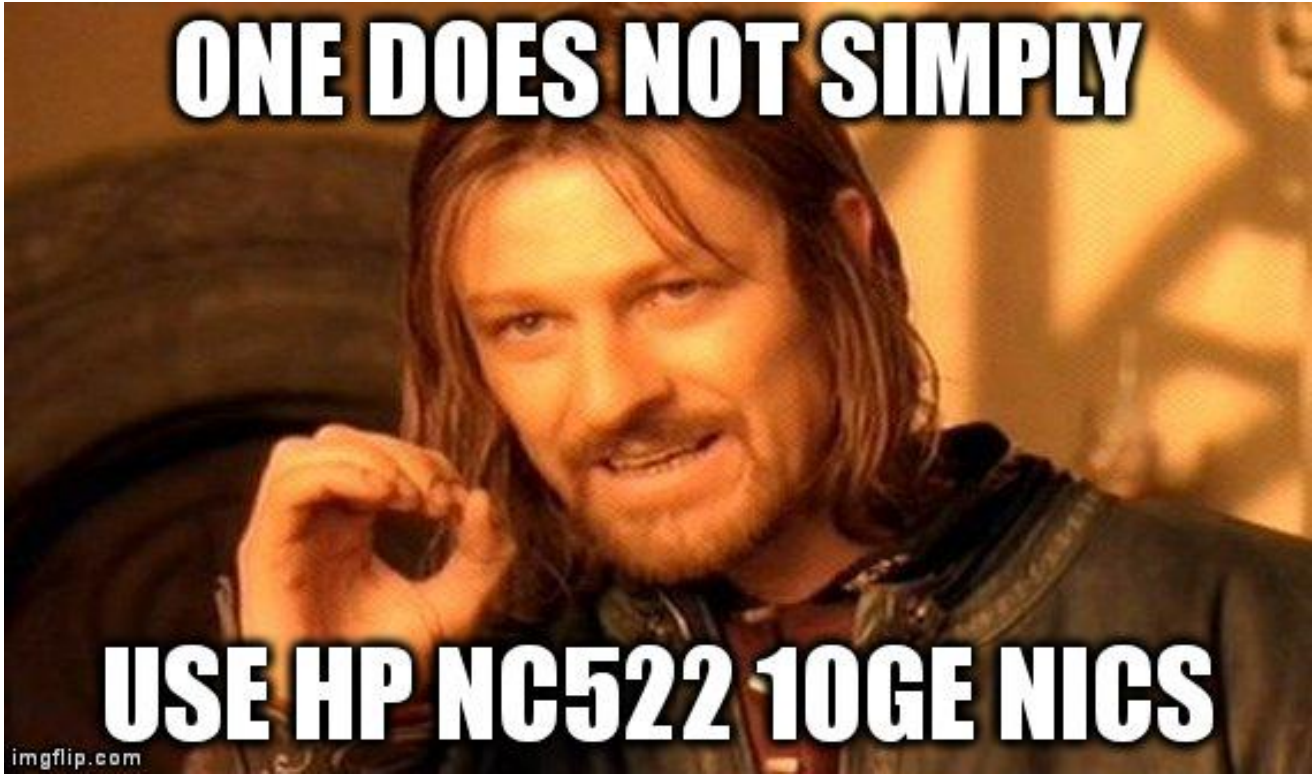
Quagga sucks

Arch sucks (at least for our usecase)

Solutions

Move FRA POP to another location
Move DUS POP to another location
BCIX sponsored 10G port in BER
ECIX sponsored 10G ports in FRA, DUS, BER, HAM (used by Freifunk Hamburg)
ECIX sponsored 1G L2VPN between all Sites
NLix sponsored 1G ports in FRA, DUS, BER
Somehow we are on DECIX FRA
Replaced Quagga with BIRD
Replaced Arch with Debian
Replaced Debian Kernel with CentOS Kernel

First approach to 10GE (HP NetXen)



Mellanox ConnectX on Kernel 4.2

```
for interface in `cat /proc/net/dev | grep eth | awk -F: '{print $1}'`; do
        /sbin/ethtool -K $interface tx off
        /sbin/ethtool -K $interface gro off
        /sbin/ethtool -K $interface gso off
        /sbin/ethtool -K $interface tso off
        /sbin/ethtool -K $interface sg off
done;
```

Result

iLO Integrated Remote Console - Server: bb-a.ak.ber.de.ffrl.de | iLO: ilo-bb-a-ak-ber-de.ffrl.de

Power Switch Virtual Drives Keyboard

```
[ 1282.133125]  [<ffffffff8147c351>] ? napi_gro_frags+0xa1/0x1e0
[ 1282.133152]  [<ffffffffa023d5a7>] ? mlx4_en_process_rx_cq+0x827/0xc20 [mlx4_e
n]
[ 1282.133187]  [<ffffffff8101d285>] ? read_tsc+0x5/0x10
[ 1282.133211]  [<ffffffffa023da86>] ? mlx4_en_poll_rx_cq+0x86/0x150 [mlx4_en]
[ 1282.133235]  [<ffffffff8147be22>] ? net_rx_action+0x212/0x340
[ 1282.133258]  [<ffffffff810772fa>] ? __do_softirq+0x11a/0x290
[ 1282.133281]  [<ffffffff810775e5>] ? irq_exit+0x95/0xa0
[ 1282.133303]  [<ffffffff8157bf9f>] ? do_IRQ+0x4f/0xe0
[ 1282.133325]  [<ffffffff81579e2e>] ? common_interrupt+0x6e/0x6e
[ 1282.133347]  <EOI>
[ 1282.133353]  [<ffffffff810d73a7>] ? get_next_timer_interrupt+0x1d7/0x250
[ 1282.133392]  [<ffffffff8144571d>] ? cpuidle_enter_state+0xad/0x200
[ 1282.133415]  [<ffffffff814456ec>] ? cpuidle_enter_state+0x7c/0x200
[ 1282.133438]  [<ffffffff810b262b>] ? cpu_startup_entry+0x3ab/0x430
[ 1282.133462]  [<ffffffff81928f54>] ? start_kernel+0x479/0x484
[ 1282.133484]  [<ffffffff81928120>] ? early_idt_handler_array+0x120/0x120
[ 1282.133507]  [<ffffffff81928120>] ? early_idt_handler_array+0x120/0x120
[ 1282.133530]  [<ffffffff81928605>] ? x86_64_start_kernel+0x148/0x157
[ 1282.133552] Code: c2 0f 83 91 01 00 00 44 8b 04 24 89 2c 24 8b 6c 24 18 4c 89
 64 24 40 4c 8b 54 24 20 4c 8b 5c 24 70 44 8b 64 24 28 41 39 ef 7c 3c <41> 8b 82
 84 00 00 00 41 39 82 80 00 00 00 0f 85 60 04 00 00 45
[ 1282.133833] RIP  [<ffffffff8146d0f4>] skb_segment+0x394/0xa50
[ 1282.133858]  RSP <ffff880202203748>
[ 1282.133877] CR2: 0000000000000084
[ 1282.134264] ---[ end trace ddff426a7f9c9889 ]---
[ 1282.134332] Kernel panic - not syncing: Fatal exception in interrupt
[ 1282.134442] Kernel Offset: disabled
[ 1282.134509] ---[ end Kernel panic - not syncing: Fatal exception in interrupt
```

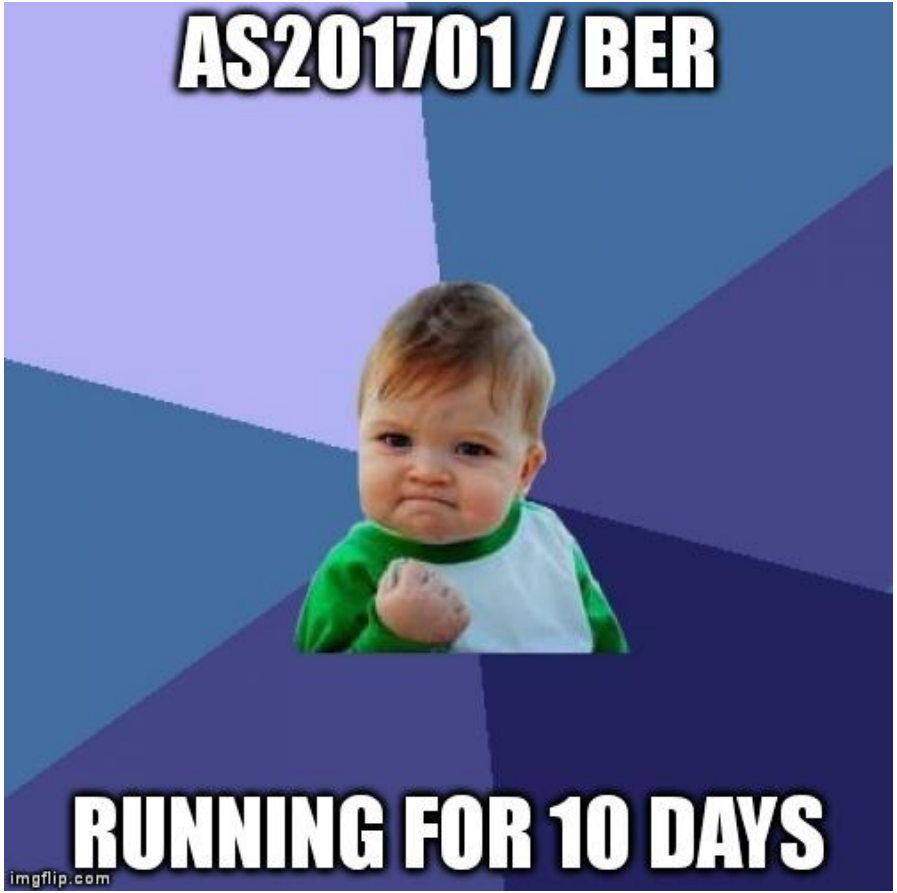
Solution: Downgrade

takt@bb-a.ix.dus.de.ffrl.de ~ % uname -a

Linux bb-a.ix.dus.de.ffrl.de 3.10.0-229.14.1.el7.x86_64 #1 SMP Tue Sep 15 15:05:51 UTC 2015 x86_64 GNU/Linux

takt@bb-a.ix.dus.de.ffrl.de ~ % cat /etc/debian_version

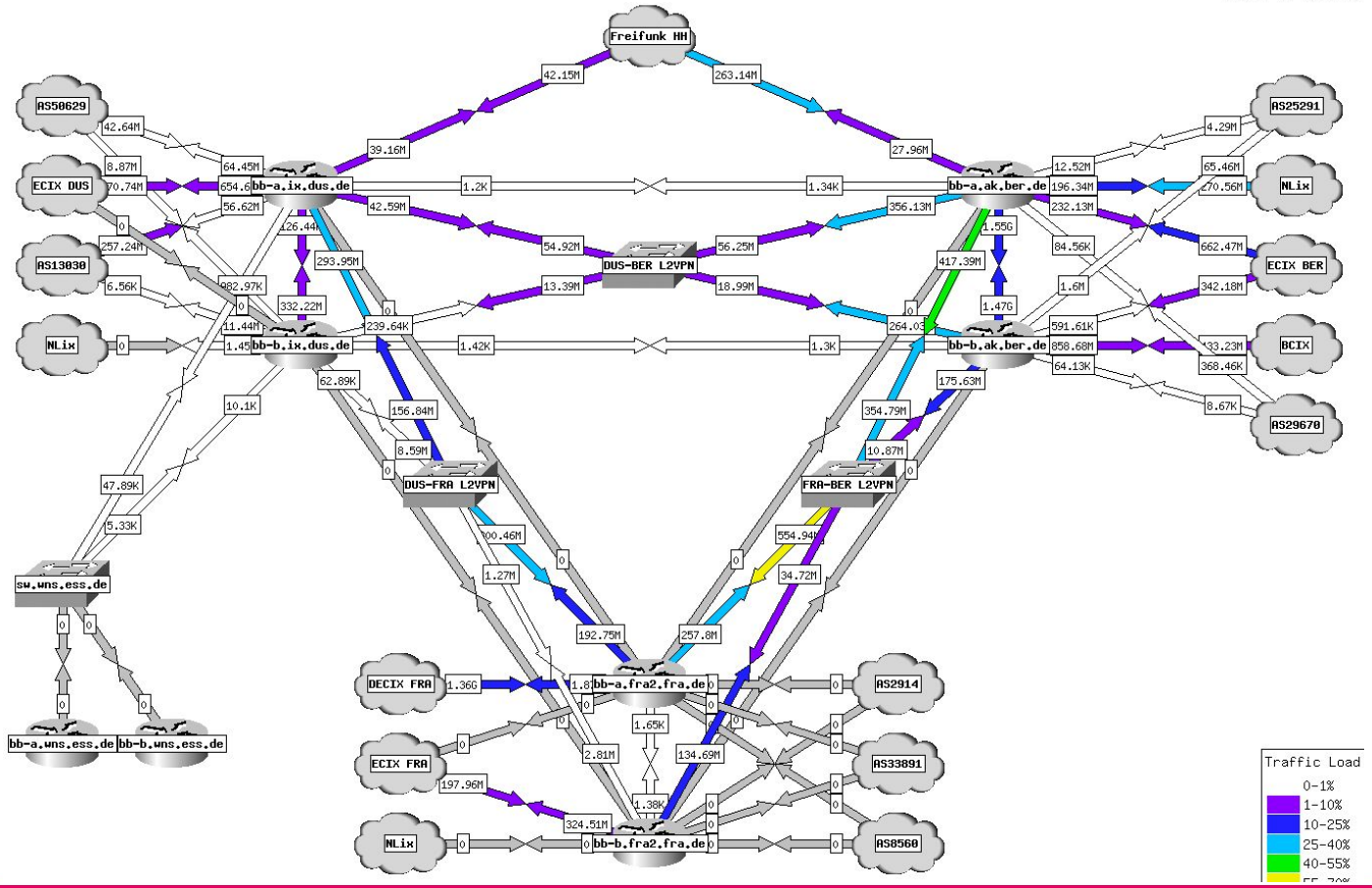
8.5


AS201701 / BER
RUNNING FOR 10 DAYS
imgflip.com

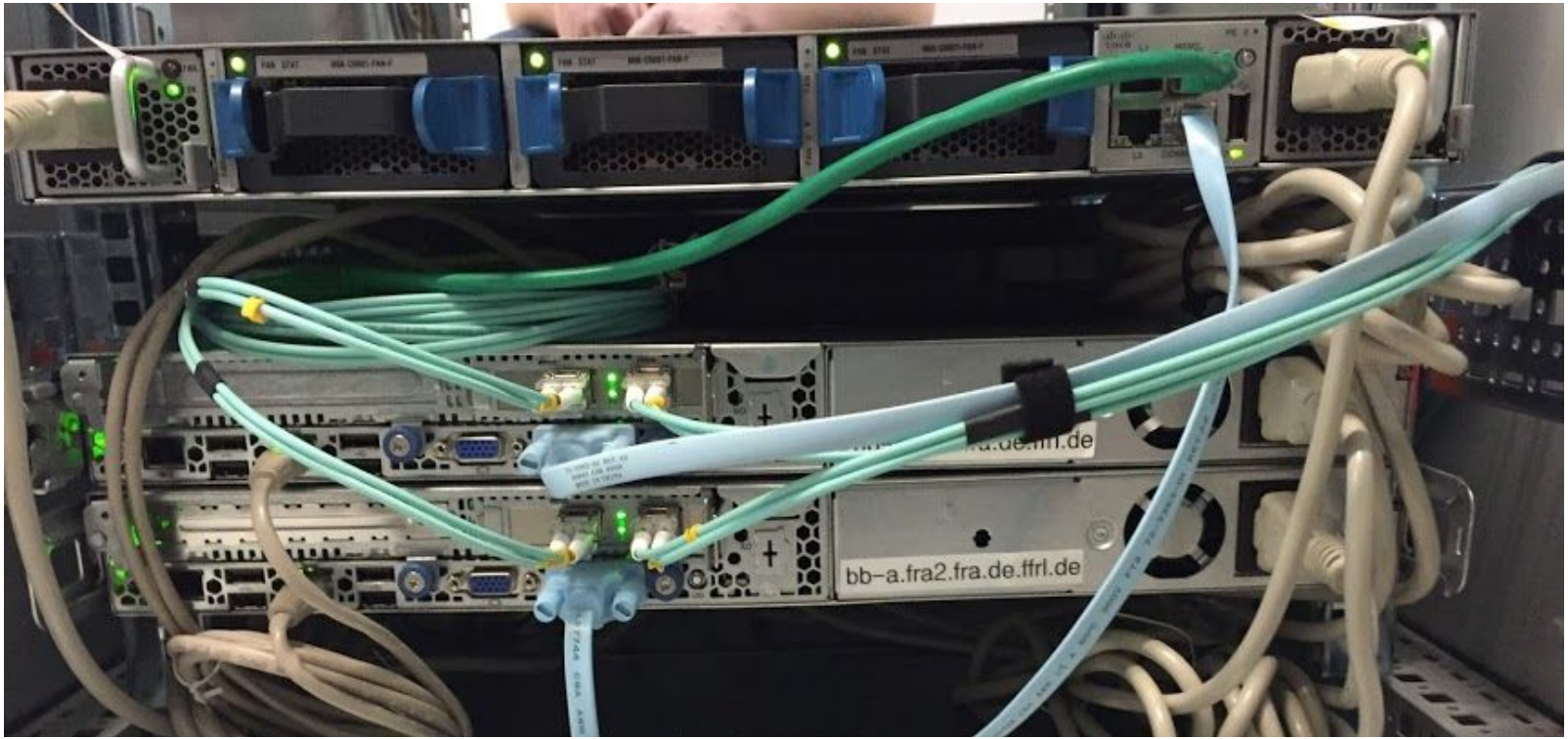
Quagga at work

Replaced with BIRD. No pain.

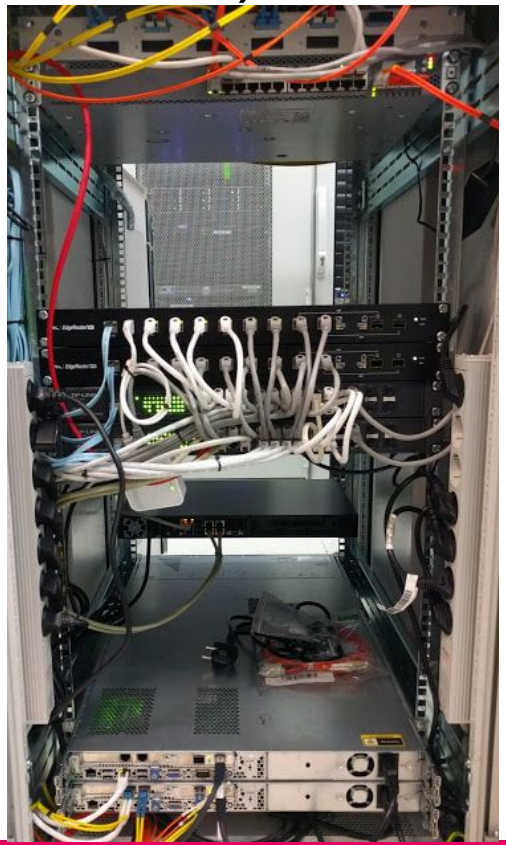
Created: Jul 13 2016 22:



fra2.fra.de.ffrl.de



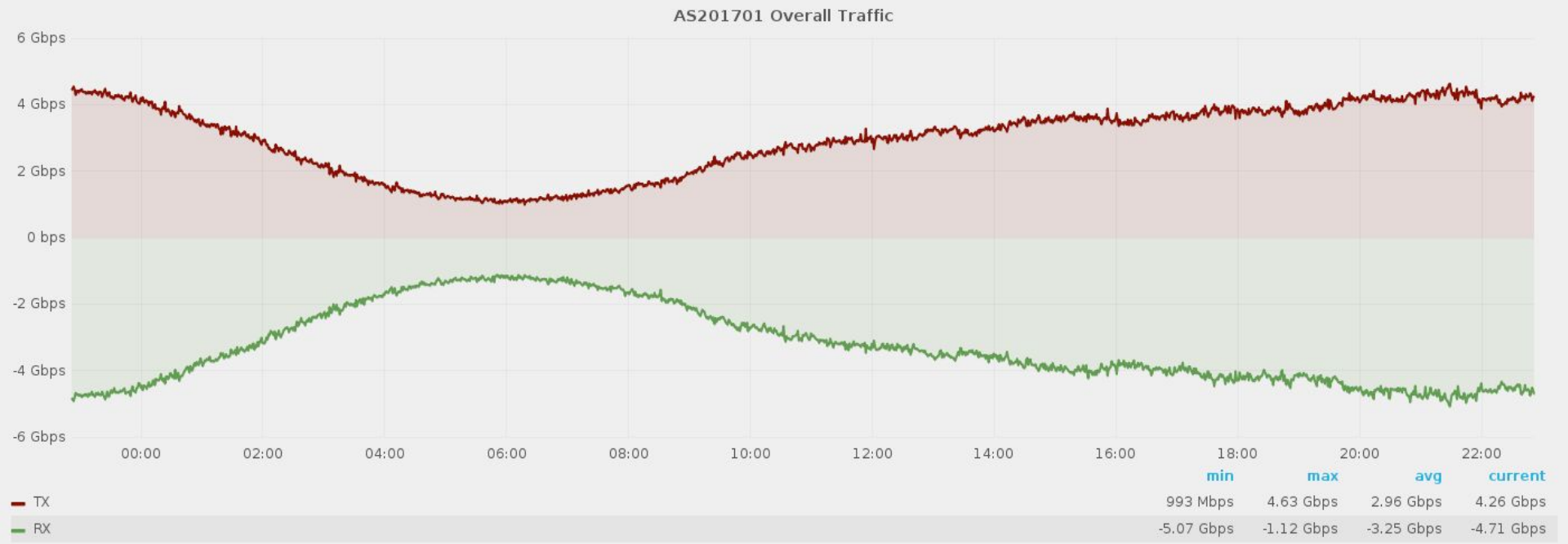
ix.dus.de.ffrl.de (and some more)



Todo Q3/2016

Toby says:
USE MOAR
BANDWDITH
http://stats.emfcamp.org
#42
HACK42.NL
HACKERSPACE АРНЕМ

Traffic Level



Many thanks to Sponsors and Supporters!