

faelix.link/vuknof

BUILDING OUT TO LONDON DURING A CRISIS

MAREK ISALSKI — FAELIX

Who?

- ✘ Marek and Lou and Laura and Kennedy and more
- ✘ A bunch of @NetworkMoose



SALT + NETOPS = NETWORK AUTOMATION + ROUTING SECURITY

MAREK ISALSKI — FAELIX

The Story So Far...

- ✘ 2019-04: UKNOF43 MikroTik IPv6 routing vuln talk
 - ✘ Hinted about AS41495's future plans
- ✘ 2019-10: NetMcr40 post-migration tech talk
 - ✘ Mentioned shortcomings and follow-on actions
- ✘ 2020-04: UKNOF46 talk on operational experience
 - ✘ ...postponed till next time?
- ✘ 2020-05: "What Happened Next"

The Brief

- ✘ FAELIX is a consultancy member of UKWISPA
 - ✘ Another WISP consultant involved us in a project
- ✘ Pinnacom: WISP and temporary connectivity ISP
 - ✘ Broadcast (OB, studios, special locations)
 - ✘ Events (concerts, festivals, etc)
- ✘ Large core network upgrade, multi-site, resilience
 - ✘ Bringing their entire network to be more "in-house"
 - ✘ With third-line support from FAELIX's NOC

The Timeline

- ❖ 2019-11: initial introductions, scoping
- ❖ 2020-02: project initiation looks to be secure
- ❖ 2020-02-27: FAELIX contracts colo with LINX
- ❖ 2020-02-28: LINX delivers THW
- ❖ 2020-02-29: FAELIX racks up in THW (with no power)
- ❖ 2020-03-01: FAELIX racks up another customer in GVA



China lockdown



Equinix advisory

The Journey



THW: No Power Yet!



GVA: Installation



The Timeline

- ❑ 2020-02-29: FAELIX racks up in THW with no power
- ❑ 2020-03-13: Pinnacom agrees contract with FAELIX
- ❑ 2020-03-18: SSE delivers NNI
- ❑ 2020-03-19: Telehouse installs PDUs in THW
- ❑ 2020-03-22: SSE delivers first MAN-THW link



Europe lockdown

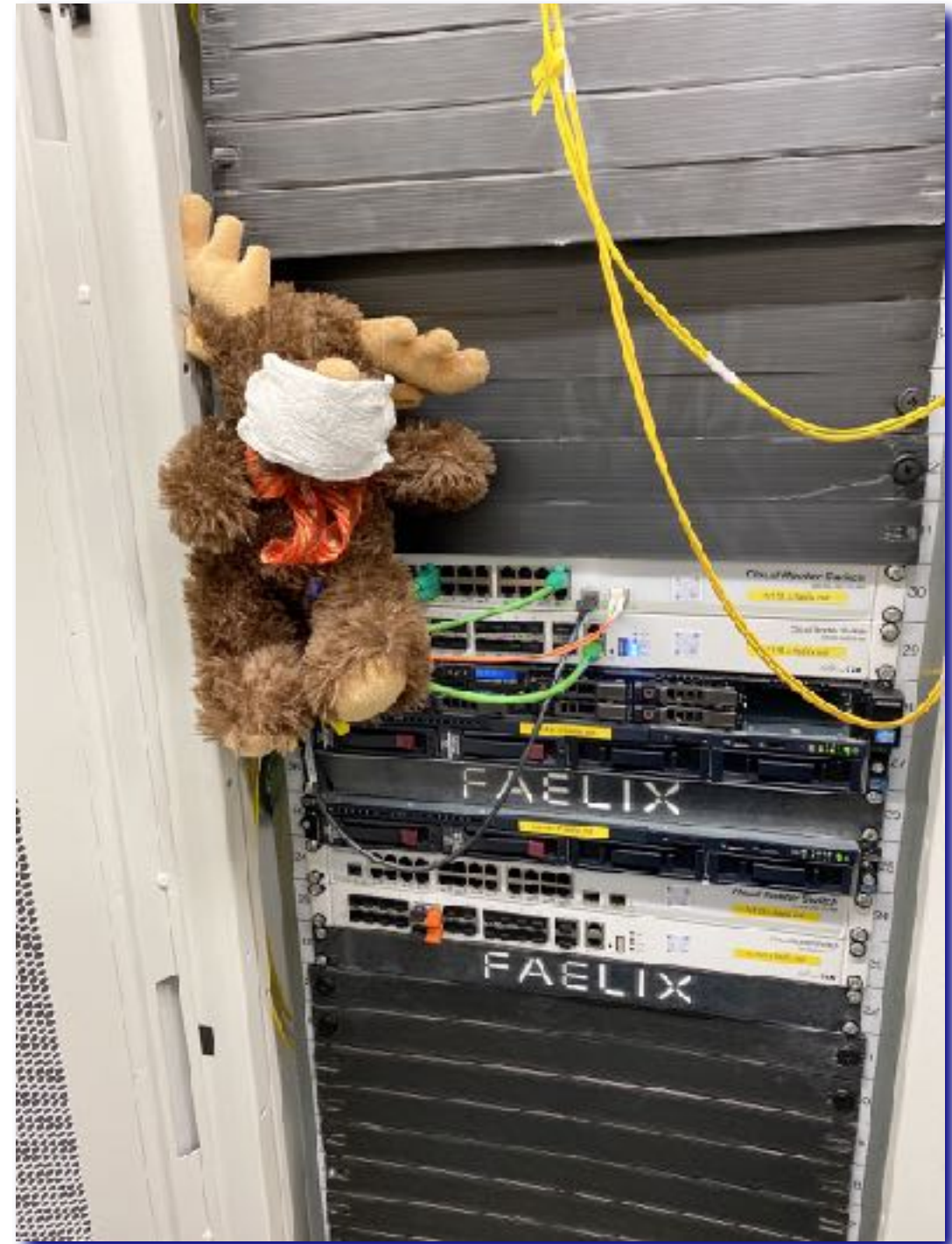


Equinix lockdown



UK lockdown

Remote Hands with PPE



LON1

- ✘ 2020-03-22: FAELIX has working THW rack
- ✘ 2020-03-31: customer gear is racked and connected
- ✘ 2020-04-01: LON1 ConneXions port order goes in
- ✘ 2020-04-02: LON1 handed over

LON1



FAELIX

@faelix

Hello, London. AS41495 is in you.

195.66.227.175	4	36874	309183	299419	257591169	0	0	26w6d	47
195.66.227.176	4	41364	35257	38770	257591169	0	0	3w3d	34
195.66.227.177	4	205892	176494	176464	257591169	0	0	15w6d	5
195.66.227.178	4	61012	444509	489296	257591169	0	0	44w0d	1
195.66.227.179	4	59900	131125	143388	257591169	0	0	12w6d	234
195.66.227.180	4	41107	192596	211961	257591169	0	0	19w0d	0
195.66.227.181	4	33531	466424	513151	257591169	0	0	46w1d	1
195.66.227.182	4	41495	523	513	257591169	0	0	07:44:26	23
195.66.227.183	4	50877	252599	266076	257591169	0	0	12w0d	10
195.66.227.185	4	24516	0	0	1	0	0	2w0d	Active
195.66.227.186	4	263009	65231	64487	257591169	0	0	2w6d	382
195.66.227.187	4	136106	28372	27388	257591169	0	0	2w3d	1233
195.66.227.188	4	268331	18758	19287	257591169	0	0	6d03h	6
195.66.227.189	4	209568	102126	112379	257591169	0	0	10w0d	1
195.66.227.190	4	200147	410254	410161	257591169	0	0	36w6d	4
195.66.227.192	4	206483	177407	105200	257591169	0	0	17w4d	2



LINX

10:26 PM · Apr 2, 2020 · [Twitter Web App](#)

LON1

- ❖ 2020-03-22: FAELIX has working THW rack
- ❖ 2020-03-31: customer gear is racked and connected
- ❖ 2020-04-01: LON1 ConneXions port order goes in
- ❖ 2020-04-02: LON1 handed over
- ❖ 2020-04-02: send out the peering requests

LON1



FAELIX
@faelix

@aaisp [TY204G] let's do this!

(firing off a @SaltStack state.highstate against our peering router @LINX_Network)

```
export: TRANSIT-out-IPv4
soft-reconfiguration:
  - inbound
"2001:7f8:4::50e8:1":
  remote-as: 20712
  description: AS20712 (ASISP) @ LINX LON1
  address-family:
    ipv6-unicast:
      maximum-prefix: 50
      prefix-list:
        export: auto-AS-FAELIX
        import: auto-AS-AA
      route-map:
        import: LINXLON1-in-IPv6
        export: TRANSIT-out-IPv6
      soft-reconfiguration:
        - inbound
```

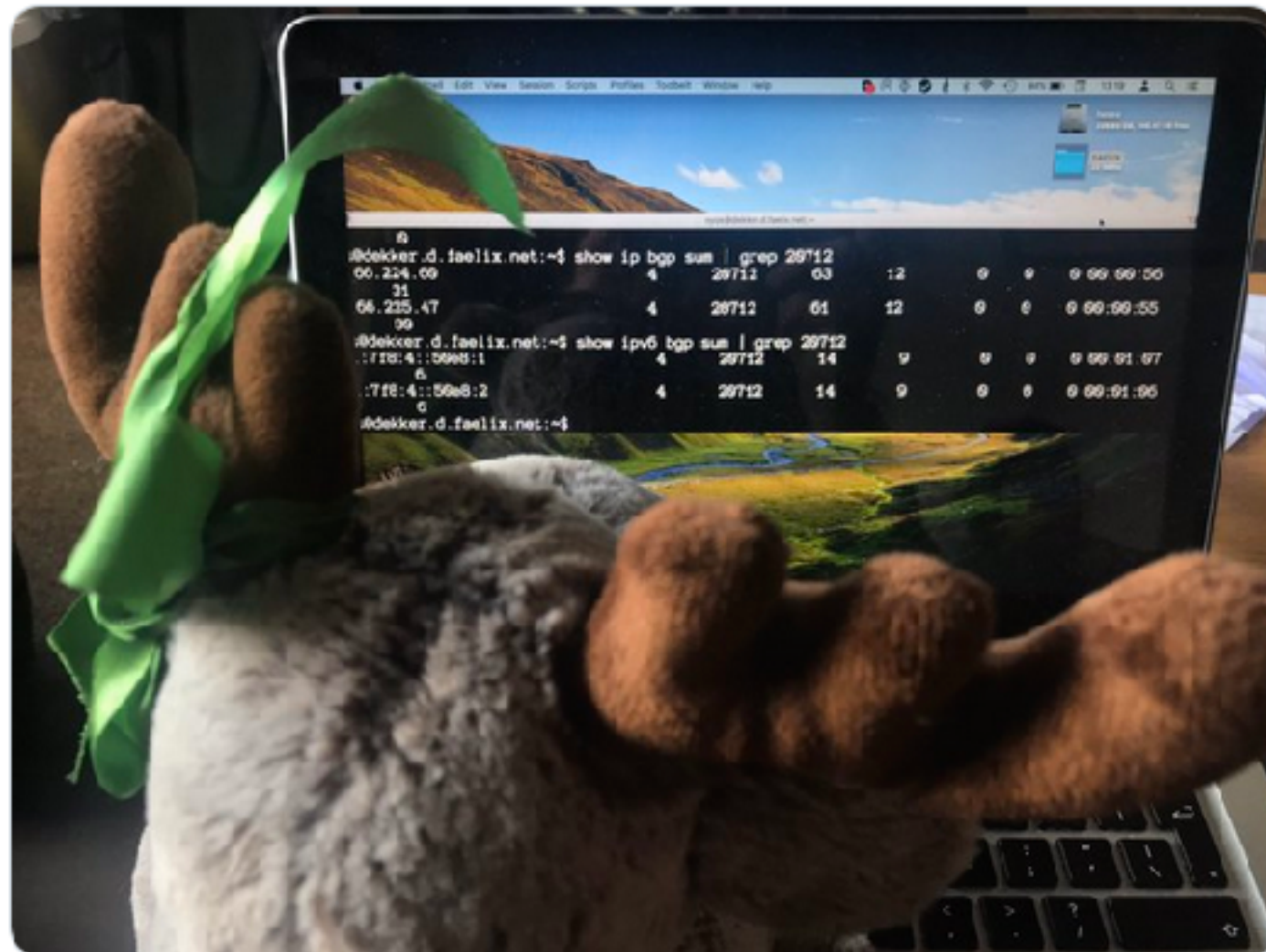
LON1



Network Moose
@NetworkMoose

Replying to @faelix @aaisp and 2 others

Thanks for peering, Ignis! 🦌❤️🦎

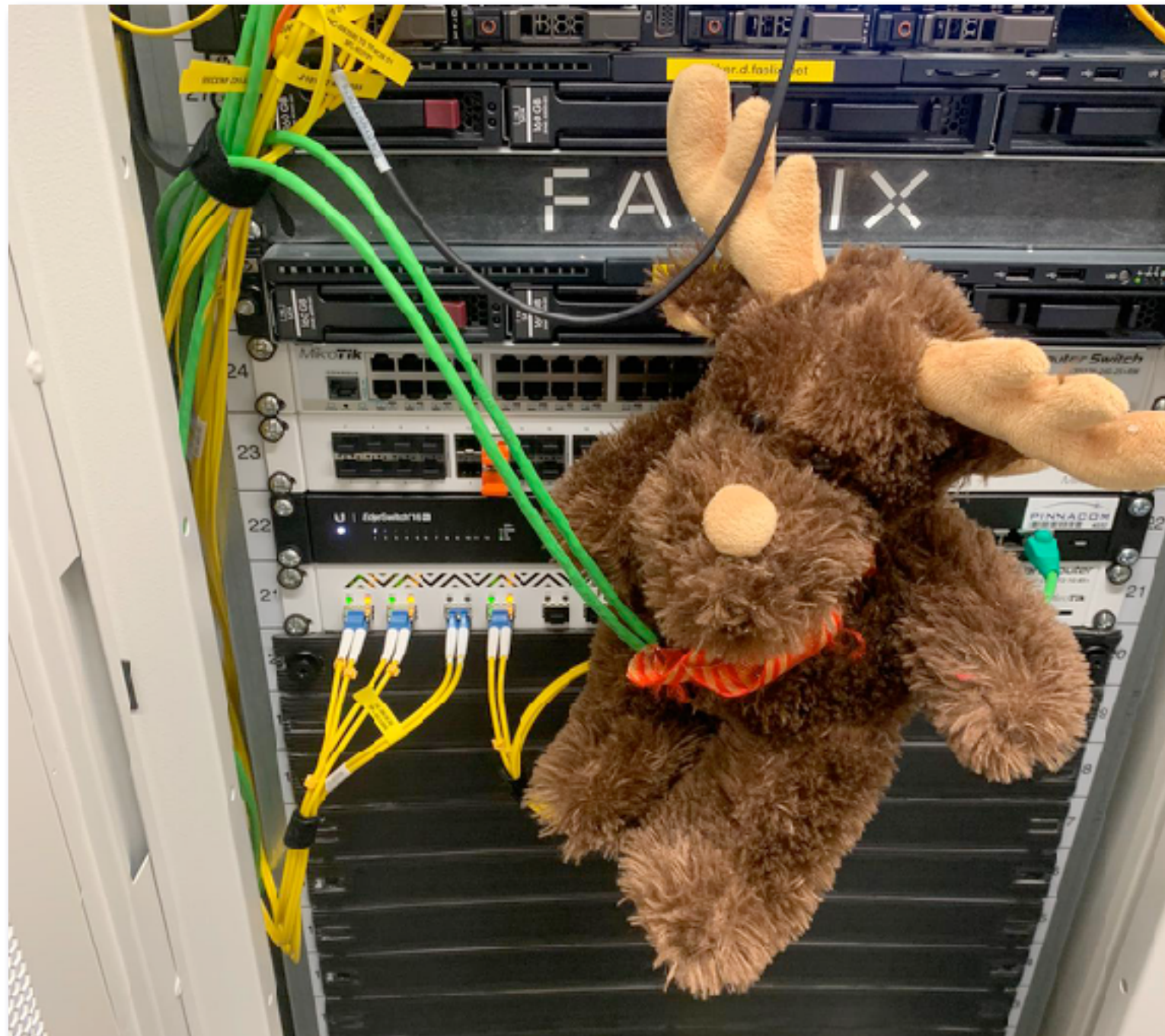


1:21 PM · Apr 3, 2020 · Twitter for iPhone

The Race

- ❖ 2020-03-13: Pinnacom agrees contract with FAELIX
- ❖ 2020-03-14: find out THN RFS date is 2020-05-06
- ❖ 2020-03-14: and that Interxion RFS is 2020-06-01

Customer is in THW!



The Race

- ❖ 2020-03-13: Pinnacom agrees contract with FAELIX
- ❖ 2020-03-14: find out THN RFS date is 2020-05-06
- ❖ 2020-03-14: and that Interxion RFS is 2020-06-01
- ❖ 2020-03-31: Pinnacom in THW
- ❖ 2020-04-01: "heightened level of urgency"
- ❖ 2020-04-30: customer target date



Five
Existing
Providers

Supply Chain



FLEXOPTIX
@flexOptix



The 1G transceiver you are looking for is currently not in stock?

-Why not look for the "industrial or higher distance version"; OR

-Why not use the 10G SFP+ to build a 1G link?

Check out our blog for available solutions

[ow.ly/cz6b50z0Qop](https://www.flexoptix.net/blog/cz6b50z0Qop) #Flexoptix #Transceivers



1G SFP LX

Universal SFP Transceiver - ✓SMF  1.05 Gbit/s - 1.25 Gbit/s ✓LC-Duplex ✓FLEXBOX ready - configure to almost ...

 [flexoptix.net](https://www.flexoptix.net)

7:58 AM · Apr 1, 2020 · [Hootsuite Inc.](#)

Planning the Migration

- ❑ Establish contact with third party providers
- ❑ Work out available interconnection options
 - ❑ Direct interconnection if possible in timeframe
 - ❑ Alternative L2 handoff to FAELIX on other NNI
 - ❑ Else bridge into EoIP tunnel over peering/transit
- ❑ Agree NOC availability to swing paths for handoff
- ❑ Try to get old configs from existing MSP

Supply Chain

- ❌ Used third party provider for SD-WAN termination
 - ❌ Cannot interconnect in reasonable time and cost
- ❌ SD-WAN box in inventory could act as head-end
 - ❌ Needs appropriate ££££ license
 - ❌ Vendor doesn't sell direct
 - ❌ Distributors aren't answering the phone



Virtual
Appliance
on Trial
License

Meanwhile

- ✘ Get on with LIR things:
 - ✘ aut-num, route, route6, RPKI
- ✘ Iterate:
 - ✘ Trial config
 - ✘ Test assumptions
 - ✘ Template, “playbook script” for migration
- ✘ Collaborative chat via self-hosted Mattermost



LON1



marek 22:28

looks a bit different now:

ping6 2a06:ca40::1 works 😊

✦ Image Pasted at 2020-3-31 22-28.png

```
route-server> show ipv6 bgp 2a06:ca40::/29 longer-prefixes
BGP table version is 0, local router ID is 64.62.142.154
Status codes: s suppressed, d damped, h history, * valid, > best, = multipath,
               i internal, r RIB-failure, S Stale, R Removed
Origin codes: i - IGP, e - EGP, ? - incomplete
```

Network	Next Hop	Metric	LocPrf	Weight	Path
* i2a06:ca40::/29	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i
* i	2001:7f8:4:2::a217:1	0	100	0	41495 44749 i



alexk 22:29

It's alive!

LON1

- ✘ 2020-04-02: Pinnacom applies to join LINX
- ✘ 2020-04-03:

LINX New Member Applications: Week Ending 3rd of April 2020



From [Mark Stokes](#) on 2020-04-03 16:14

 [Details](#)

Name.....: Pinnacom
Membership type.....: Full member
Registered country.....: United Kingdom
AS number.....: 44749

Regards
LINX

Migration Night #1

- ✘ 2020-04-10: lifting the majority of the network
- ✘ 15:00: pre-planning call
- ✘ 16:00: work with old MSP to establish L2 interlink
- ✘ 17:00: now learning routes from inside old network
 - ✘ oh no, some assumptions might be wrong!
- ✘ 18:00: start work with old MSP to migrate circuits
- ✘ 22:00: conclude maintenance window
- ✘ 23:00: finish testing, things looking good, zzz...

Migration Night #1

❌ 2020-04-10: lifting the majority of the network

❌ 2020-04-11:



alexk 08:42

I'll do that!

Just got off the phone with that wisp customer

And spoke to two more



marek 08:43

Yeah?

What's up?



alexk 08:43

Speeds on the wisp have improved by nearly double



marek 08:43



INTERLUDE

isbgpsafeyet.com



Jerome Fleury
@Jerome_UZ

We've just launched isbgpsafeyet.com to encourage transits and ISPs to deploy RPKI Origin Validation and make BGP Hijacking a thing of the past. Test if your ISP is susceptible to hijacks! Fantastic work from [@lpoinsg](#), [@adamfschwartz](#).



Is BGP Safe Yet? No. But we are tracking it carefully

BGP leaks and leaks and hijacks have been accepted as an unavoidable part of the Internet for far too long. Today, we are releasing isBGPSafeYet.com, a ...

blog.cloudflare.com

4:37 PM · Apr 17, 2020 · [Twitter Web App](#)

Pride comes...



FAELIX
@faelix



Guess we were doing this before it was cool. [#rpki](#) [#bgp](#)



Jerome Fleury @Jerome_UZ · Apr 17

We've just launched isbgpsafeyet.com to encourage transits and ISPs to deploy RPKI Origin Validation and make BGP Hijacking a thing of the past. Test if your ISP is susceptible to hijacks! Fantastic work from @lpoinsig, @adamfschwartz. blog.cloudflare.com/is-bgp-safe-ye...

9:45 PM · Apr 17, 2020 · [Twitter for iPhone](#)

...before a segfault

RPKI KICKED OUR BUTT!

```
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(zlog_backtrace_sigsafe+0x67) [0x7f43747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(zlog_signal+0x113) [0x7f4374798833]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(+0x712e5) [0x7f43747b92e5]74798833]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /lib/x86_64-linux-gnu/libpthread.so.0(+0xf890) [0x7f43735c2890]92e5]74798833]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(range_lookup+0x65) [0x5576bbe42415]92e5]74798833]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(modul_bgpd_rpki.so(+0x5042) [0x7f436fa1d042]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(pthread_call+0x60) [0x7f43747c6b00]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/x86_64-linux-gnu/frr/libfrr.so.0(+0xd1f) [0x7f43747965c8]b00]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/frr/bgpd(main+0x2ff) [0x5576bbdeeb6c]b00]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /lib/x86_64-linux-gnu/libc.so.6(__libc_start_main+0x45) [0x7f43747965c8]b00]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: /usr/lib/frr/bgpd(+0x3cb6c) [0x5576bbdeeb6c]_main+0xf5) [0x7f43747965c8]b00]]3747983d7]
Apr 17 08:22:42 aebl bbgp[1238]: in thread bgpd_sync_callback scheduled from bgpd/bgpd_rpki.c:509#0(24215).aborting...
```

... bgpd_sync_callback from bgpd/bgpd_rpki.c

Shout out to @wolf480pl@mstdn.io for
brainstorming this with me to be sure!

Fixed in
FRRouting
7.2.1

... AND NOW BACK TO OUR SCHEDULED PROGRAMME ...

Plan for THN and IXN

- Approached IXReach, Colt, Zayo, GTT, euNetworks, Bogons for services from THN+THW to Interxion
- Weighed up products, costs, timescales to deliver
 - But favouring diversity of providers from those we already have NNIs with in Manchester/Leeds and hope to use for our north-south backbone links
- Dark fibre from euN scored highest across criteria
 - euN RFS date to be same as IXN handover date

THN

- ✘ Colocation in THN via Voxility:
 - ✘ Their DDoS mitigation, for our entire AS-set
 - ✘ Slightly lower up-front capex
 - ✘ But required advance payment for new customer
 - ✘ UK bank account, so paying invoices is “familiar”

THN

- ✘ 2020-05-01: Europe is on Labour Day holiday!
- ✘ Delivery date 2020-05-05 was looking good until...
 - ✘ 2020-05-04: delays on PDUs
- ✘ Recommended our UK-based supplier
 - ✘ 2020-05-06: PDUs installed!
- ✘ ILK via LINX reseller cabling
- ✘ XCs to OOB and third party providers ordered
- ✘ 2020-05-07: time to get racking up!

THN

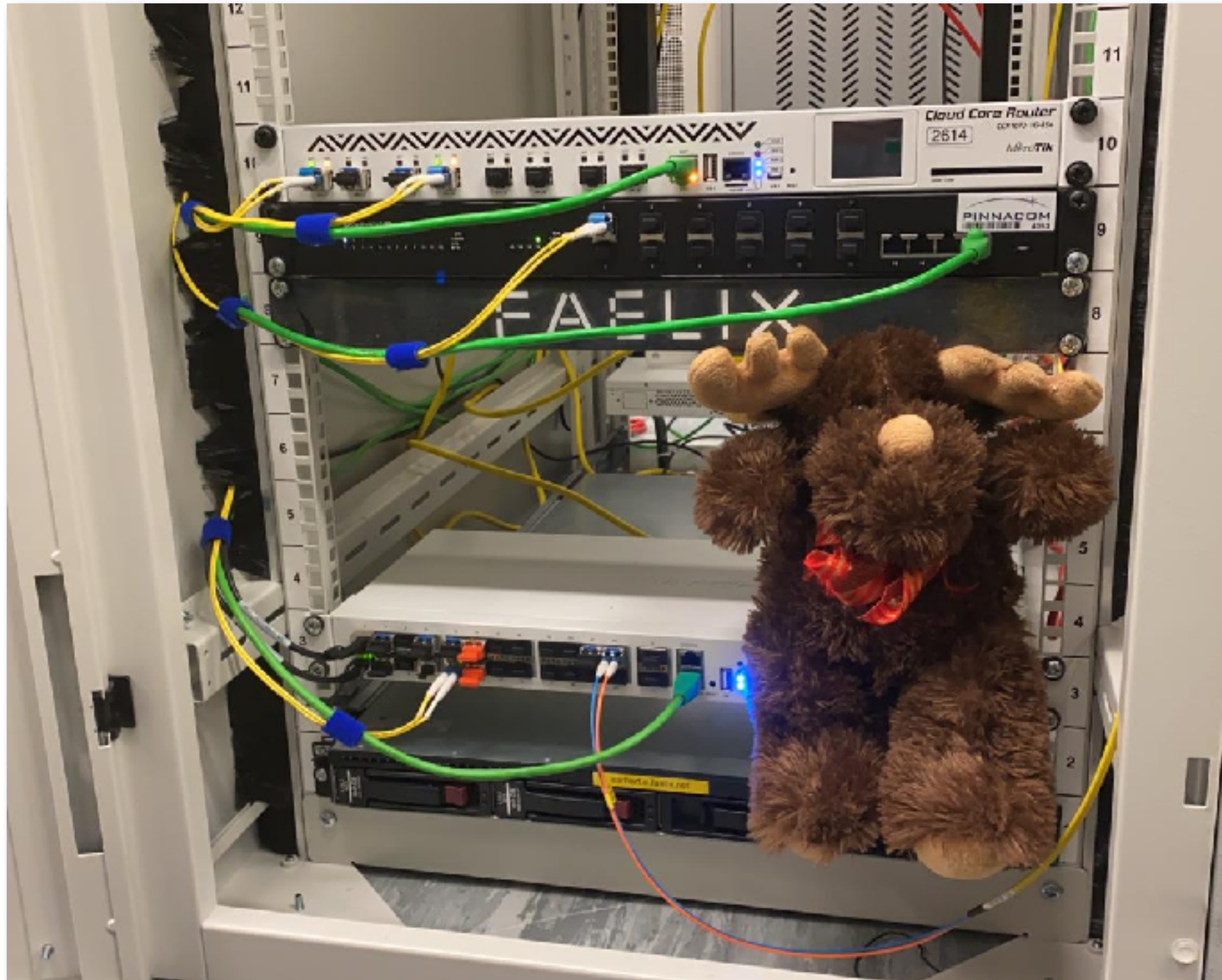
Due to Covid-19 social distancing requirements

Only one person at a time to use this lift

“I’m not allowed in the lift the same time as the moose”



THN





FAELIX
@faelix



Telehouse North: we have arrived!

Tx Power

-1.448 dBm

Rx Power

-1.674 dBm

9:39 PM · May 7, 2020 · [Twitter Web App](#)

TWO DOWN, ONE TO GO...

Questions?

With thanks to:

- Alex and Martin at Pinnacom
- Telehouse and Interxion
- LINX (Inga, Holly, Sion, Michal, Shahbaz, Michael, Andrei, Prachi...)
- Voxility (Virgil, George)
- SSE (Craig, Tincus, Graham, Robert)
- euNetworks (James, Konstantinos)
- Exa Networks (Richard)
- ICUK (Tim, Neil)
- Telcom (Thom)
- BMCTV (Tim)
- Laura
- Lou
- Hal
- Gary
- Network Moose