NZNOG 2017 Internet Deployment

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Josh Bailey
(a.k.a CyberNetworking Committee)

NZNog network experiment

Inbox x

Chris Lorier 11/23/16

to dave, Josh, me

Hi Dave,

I am looking for opportunities to get Faucet, our openflow switch, deployed in production settings. I was wondering if there was any chance we could get it deployed at NZNog and I was told you were the person to talk to.

Dave Mill 11/24/16

to Josh, Chris, me

Hi guys

This shouldn’t be an issue.

...

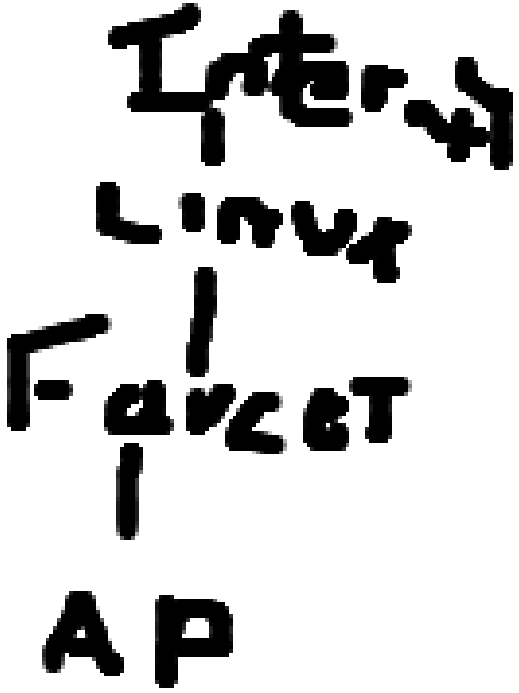
We can then blame you for any issues

Thanks!

Opportunities like this don’t come around very often, and are a huge help for a project like ours

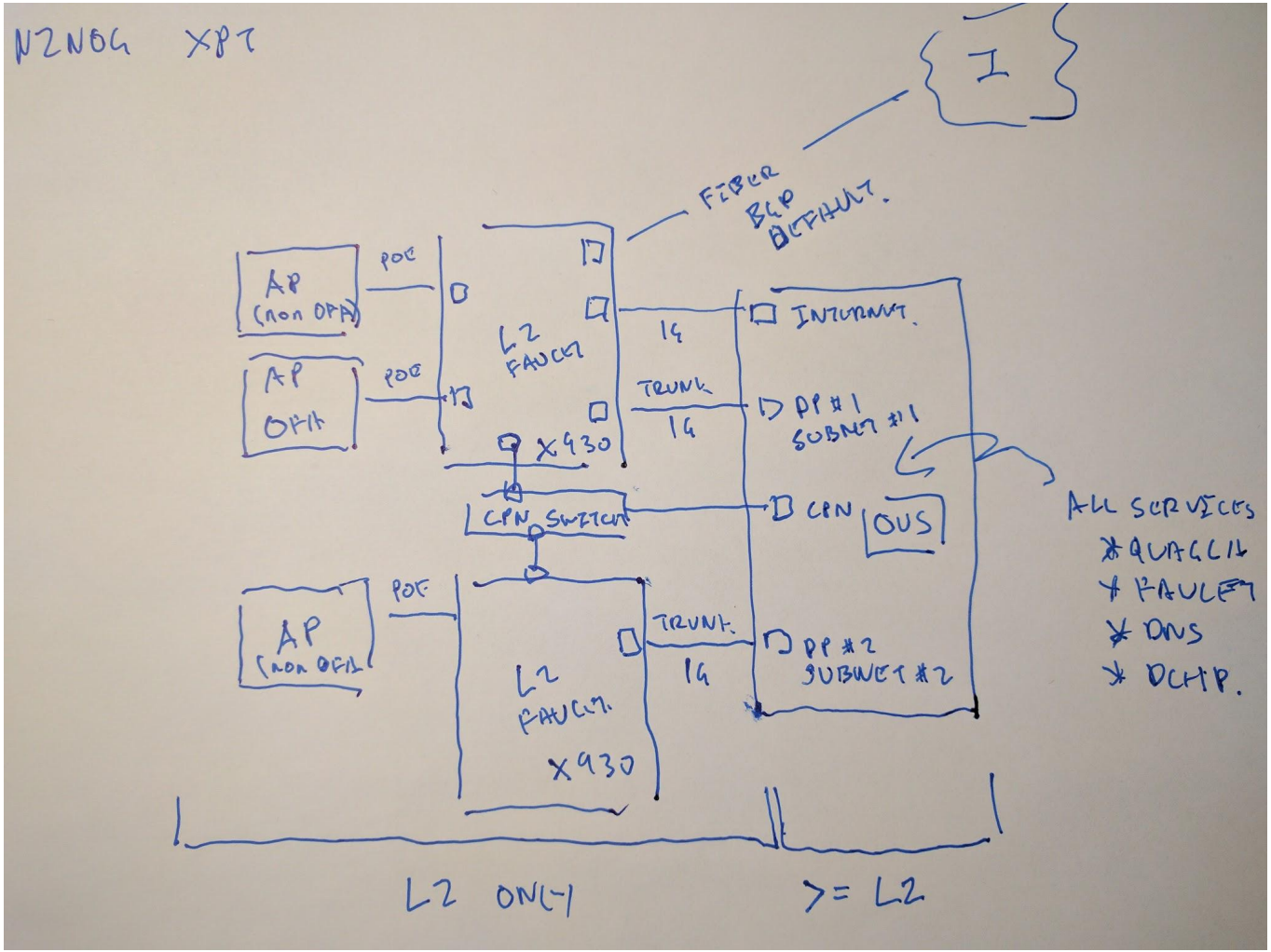
NZNOG Requirements

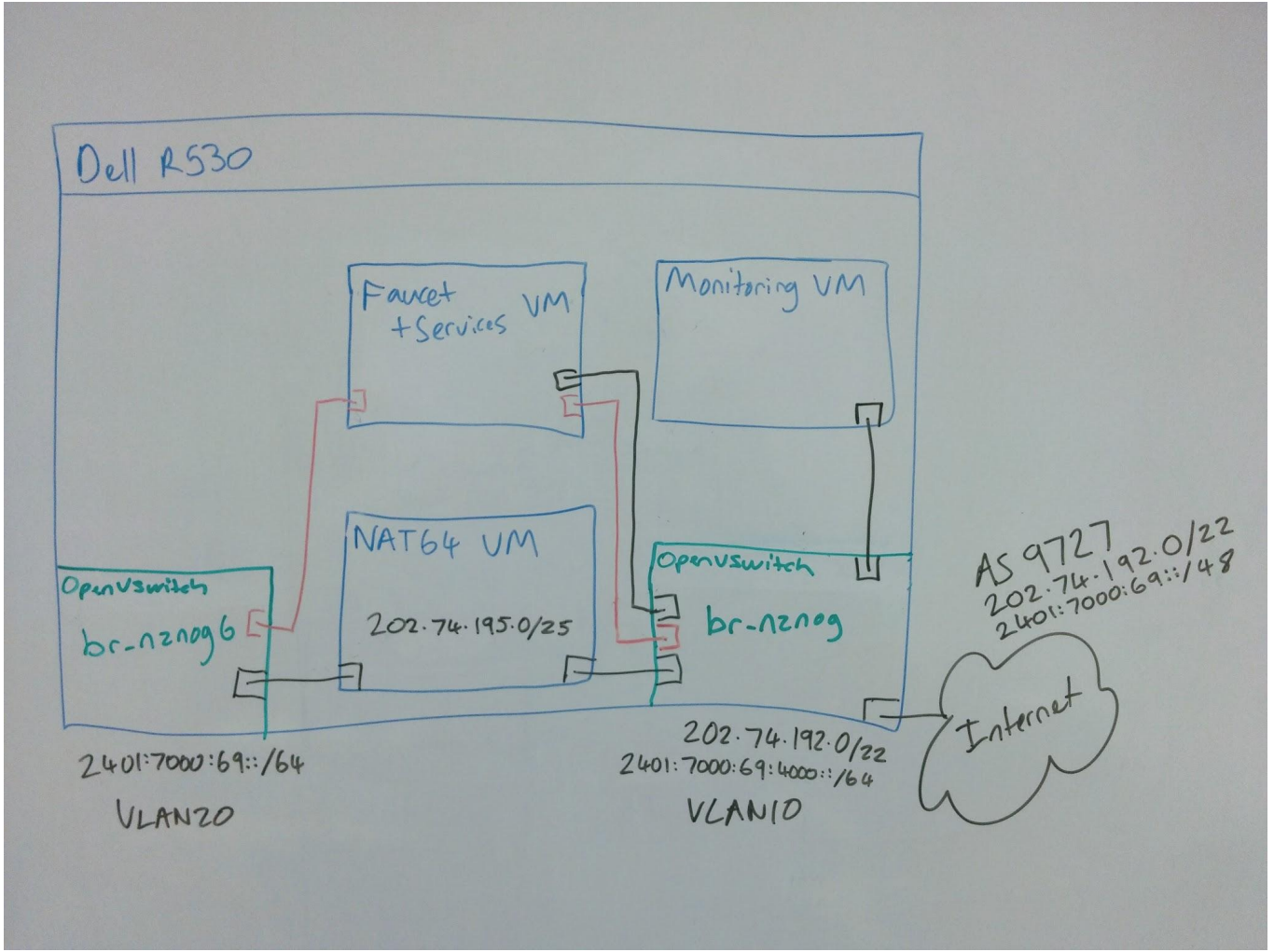
- UFB Dark Fibre circuit to Vibe Communications
- BGP (/22 & /48)
- IPv6
- DHCP & RAs & DHCPv6
- Recursive DNS (DNSSEC validating)
- BCP-38
- Wifi (2.4ghz & 5ghz)

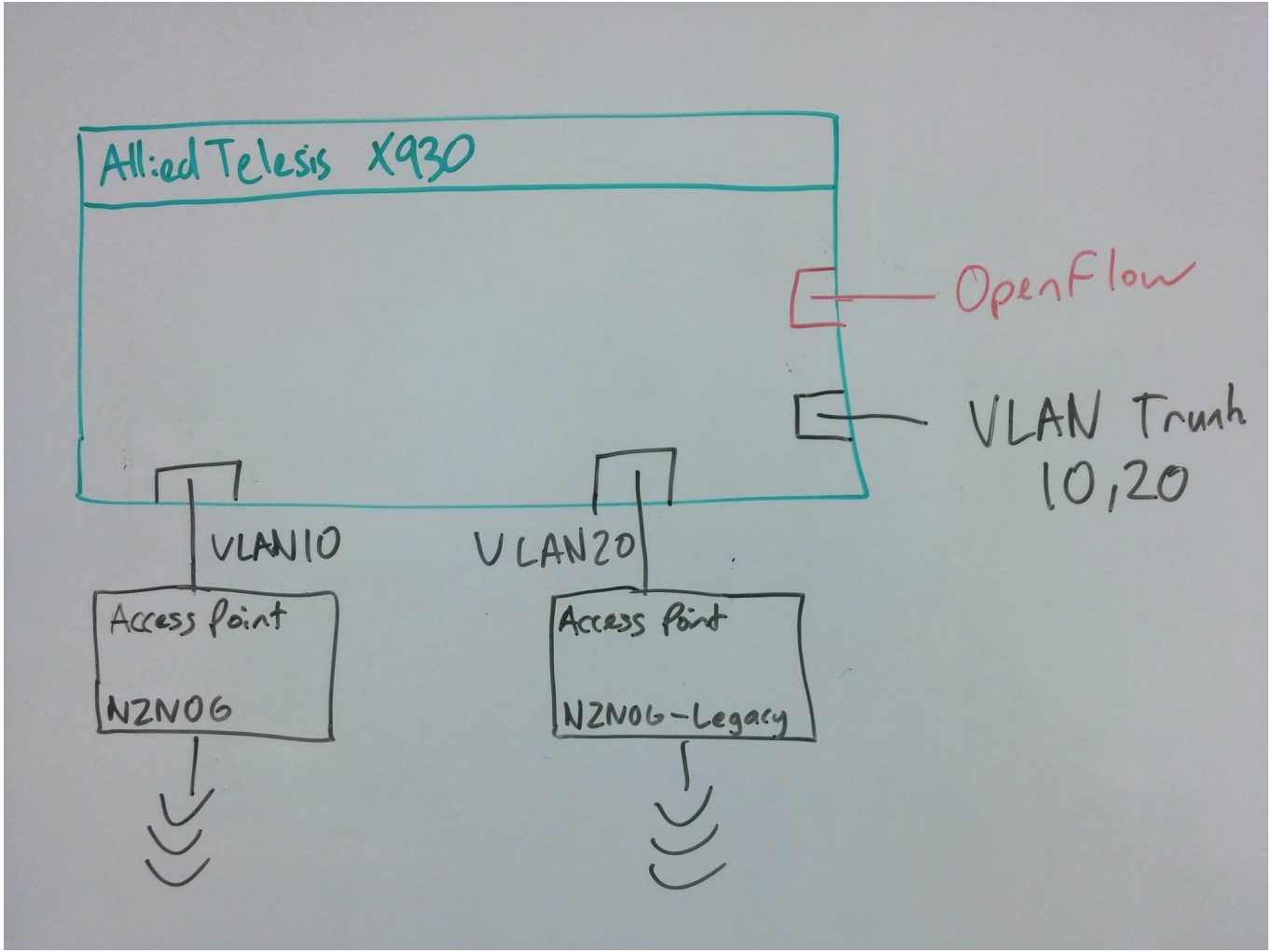

Linux
AP

Faucet

- Open source python network controller developed right here in NZ
- Centralised controller for switching (& experimental routing)
- OpenFlow v1.3
- VLANs / ACLs / BGP / Supports hardware offload for NFV workloads
- https://github.com/REANNZ/faucet


N2NOC XPT
I
FIBER
BGP DEFAULT.
AP (non OFA)
AP OFA
POE
POE
L2 FAUCET
X930
1G
TRUNK
1G
INTERNET.
PP #1 SUBNET #1
CPN SWITCH
CPN
OUS
AP (non OFA)
POE
TRUNK
1G
L2 FAUCET
X930
PP #2 SUBNET #2
ALL SERVICES
* QUAGGLE
* FAUCET
* DNS
* DCHP.
L2 ONLY
>= L2


Dell R530
Faucet +Services VM
Monitoring VM
NAT64 VM
202.74.195.0/25
OpenVSwitch
br-nznog6
OpenVSwitch
br-nznog
AS 9727
202.74.192.0/22
2401:7000:69::/48
Internet
2401:7000:69::/64
VLAN20
202.74.192.0/22
2401:7000:69:4000::/64
VLAN10


Allied Telesis X930
OpenFlow
VLAN Trunk
10,20
VLAN10
VLAN20
Access Point
N2NOG
Access Point
N2NOG-Legacy

Ansible

- To ease deployment of all individual pieces we used Ansible
- Each “network function” is an Ansible role
  - DNS
  - DHCP(v6)
  - BGP
  - Open vSwitch
  - Virtualisation
  - Monitoring
- Backed by public github repo
  - Aiding remote collaboration
  - https://github.com/wandsdn/nznog-ansible

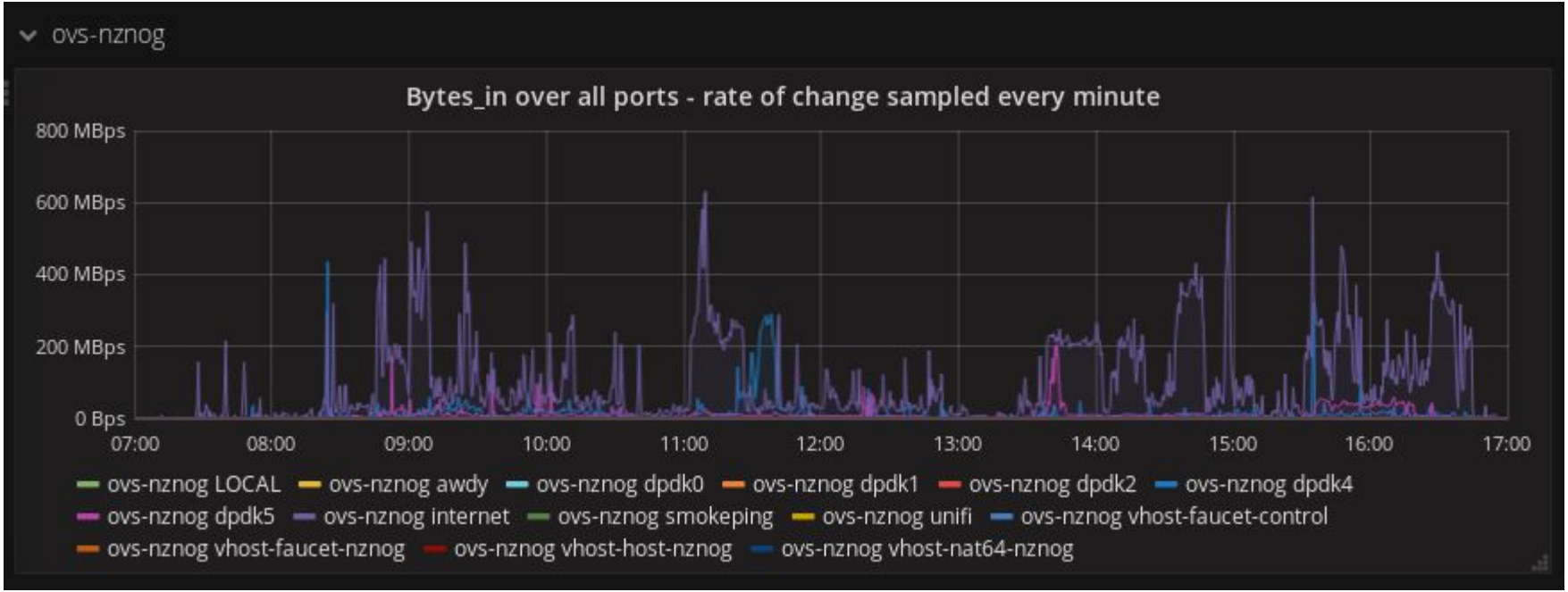
Testing

- Typical Faucet deployments are small - unsure of extent of scalability
- Find bottlenecks in controller
- Iperf3 TCP VM-VM performance 5.59 Gbits/sec
- Can spin up many Dockers (~500) on single machine to test MAC & FIB learning
  - https://github.com/gizmoguy/docker-network-tester
- Fix code paths that generate CPU load
- Rinse & repeat

Scaling & Performance

- Have to be careful about aging & resolving hosts
- Our attempts to optimise host learning were thwarted by RFC 4941

Real-time Statistics



Reflections

- L3 Architecture needs additional thought
- Tests are great!
- No substitute for (large quantities) of real traffic

Thanks!

- NZNOG Committee
- Software
  - Faucet developers
  - OpenvSwitch (hi Joe!) & DPDK developers
- Hardware
  - Allied Telesis
  - Go Wireless
- Internet
  - Vibe Communications
- Admin staff
  - InternetNZ & Trinity Wharf & Elite
- NZNOG Attendees

Questions?

- https://github.com/wandsdn/conference-sdn-nfv-network
- https://faucetsdn.github.io
- https://github.com/REANNZ/faucet
- https://lists.geant.org/sympa/info/faucet-users