Project CARDIGAN
An SDN Controlled Exchange Fabric

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(deck shamelessly ripped from Dean Pemberton)

Networking is

Networking is boring

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Networking is in a bit of a rut.

- Ethernet
  - 10M Ethernet
  - 100M Ethernet
  - 1G Ethernet
  - 10G Ethernet
  - 100G Ethernet

- Routes
  - 50,000 routes
  - 100,000 routes
  - 442,341 routes

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What if we took a moment and thought about things in a different way?

- What would that look like?
- Maybe it changes nothing
- Maybe it changes some small things
- Maybe it changes some big things

Software Defined Networking

SDN is to Networking as Open Source is to Operating Systems

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- NZ ISP Citylink says Internet Exchanges (IXes) need work.
- There is a real need to demonstrate production use of SDNs
- A community of SDN expertise is growing in New Zealand and they need a project to focus on
- Citylink and REANNZ were considering SDNs as a future direction

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What is an Internet Exchange?

- It's a network fabric that participants connect to
- They advertise their networks
- Any packet you place into the exchange finds the appropriate destination

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What an Internet Exchange is NOT

- A Router
- A Switch
- A Layer 3 Switch
- A Hardware forwarding Router

It's just a place you poke two things...

Advertisements for things you'll accept

and

Packets you want to get rid of

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Project Cardigan - Phase 1

Deploy an SDN Controlled Fabric connected to an Internet Exchange. The fabric should participate as an exchange member.

Completed December 11, 2012
OpenFlow Controller (running on a VM)
Custom VANDERVECKEN code (based on RouteFlow)
Quagga

Pica8 3290
PicOS v1.6 (based on OVS v 1.9)

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Project Cardigan - Phase 1

From the WIX looking glass

```
Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
202.7.0.119     4  9483   24345   27397        0    0    0 07:21:59        1
```

WooooooHoooooo

I've peered with the route servers and advertised a route!

Networking is still boring

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Project Cardigan - Phase 2

Configure fabric to operate as a full Route Server.

Completed December 11, 2012
Looked at the WIX looking glass page and configured sessions on the fabric for all existing WIX participants.

Anyone can now peer across the fabric.

Networking is still boring

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Project Cardigan - Phase 3

Deploy a DISTRIBUTED SDN-controlled fabric connected to an Internet Exchange and pass production customer traffic across the fabric.

Completed January 23, 2013
custom Inter-Switch-Link code care of Joe Stringer and Chris Lorier

Pica8 3780
Control Plane Network extended via L2 VLAN
Data Path extended via dark fibre
BIG THANKS TO CITYLINK

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Project Cardigan - Phase 3

You said "pass production customer traffic"

Yep. REANNZ office network was connected at one side of the fabric. Routes advertised into the fabric and traffic passed across the fabric and out onto the exchange.

Big thanks to Dylan Hall and REANNZ

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What next?

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Project Cardigan - Phase n

- Scale data plane performance
- See what we can do to make Layer 2 P2P and P2MP services richer.
- Get the IX fabric to enforce IX policy
  - Strictly enforce routing and security policy
  - Prevent misdirected traffic
  - Prevent crafted BGP packets from exploiting policy
  - Simplify operations
  - Increase reliability

Networking is almost not quite boring

Project Cardigan - Thanks

Prophecy Networks
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Pica8
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