**QUESTnet
September 2018**

GIGCITY
ADELAIDE

gigcity.com.au

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Today's Session

- SABRENet
- The GigCity Adelaide Program
- Who is EscapeNet?
- Our take on GigCity Adelaide
- Solution Objectives
- Hardware / Software / Technology Choices
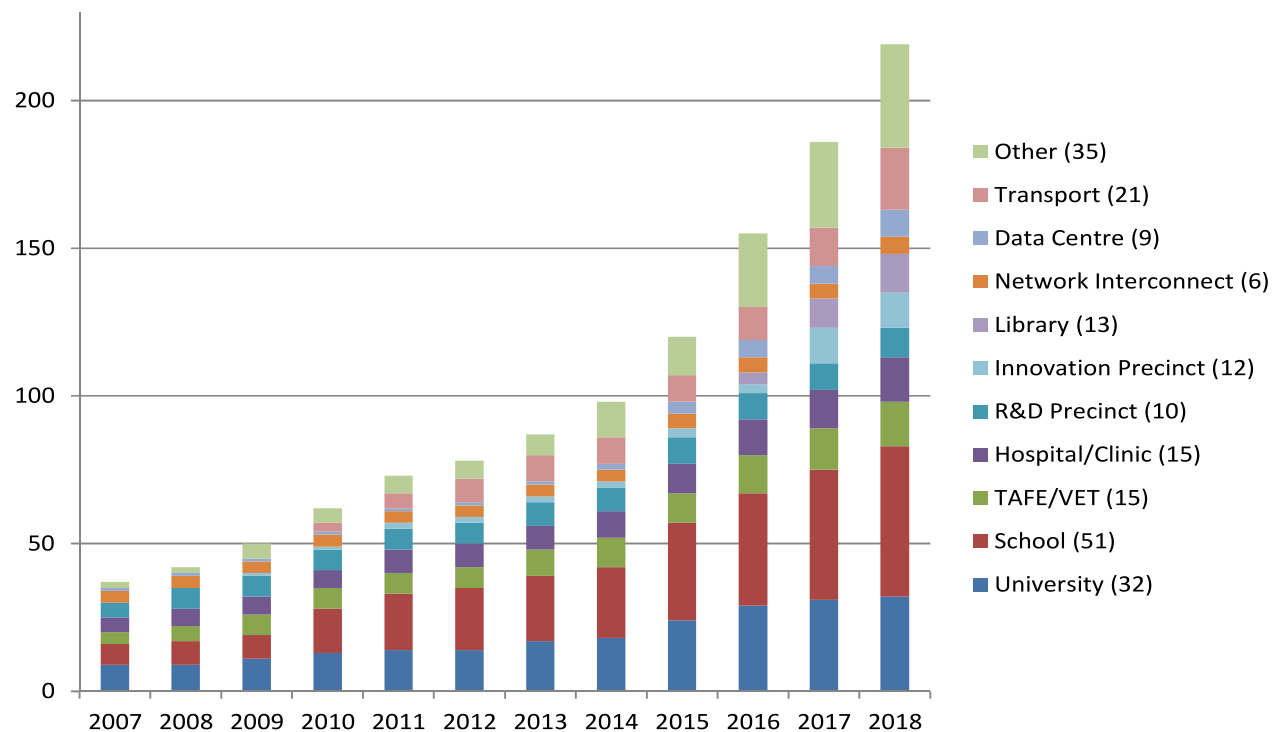- Improving Your Network
- Questions

SABRENet

- Owned by three universities and Government of South Australia. Not-for-profit public company and charitable institution.

- Google "SABRENet QUESTnet2014" - Collaboration

- Update 2018
  - 400+ km of cable
  - 200+ sites (more than double since 2014)
  - includes "support for innovation" within approved purposes

- Still with dark fibre as sole product

SABRENet

SABRENet Fibre Connected Sites

Legend:
- Other (35)
- Transport (21)
- Data Centre (9)
- Network Interconnect (6)
- Library (13)
- Innovation Precinct (12)
- R&D Precinct (10)
- Hospital/Clinic (15)
- TAFE/VET (15)
- School (51)
- University (32)

GigCity Program

- June 2016, SA Government announced $4.65m for GigCity Program providing gigabit services to designated innovation precincts.

- 14 precincts identified for connection

- Based on use of SABRENet fibre platform

- SABRENet contracted to deliver the Program to 2020

- SABRENet conducted open tender for selection of a service provider partner – EscapeNet
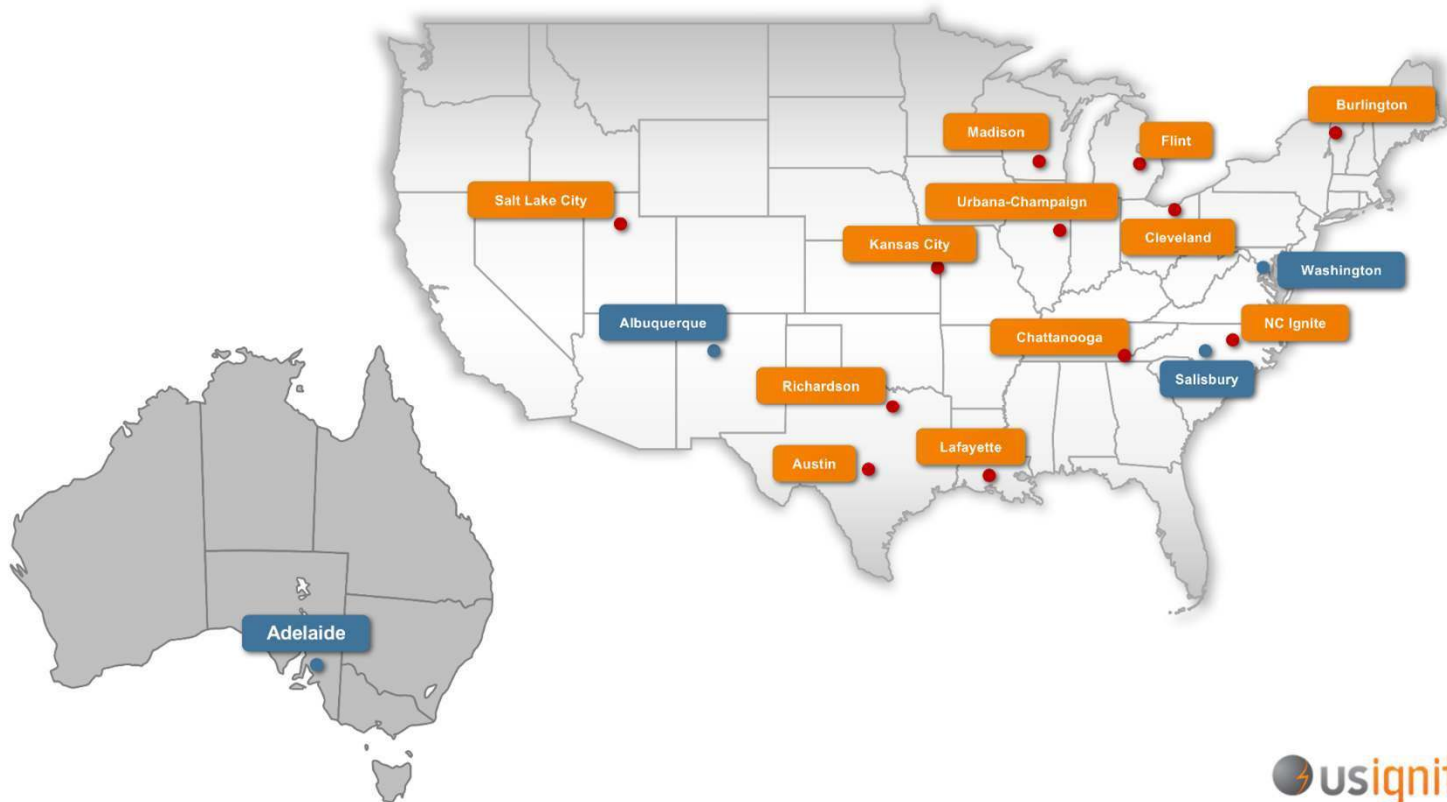
GigCity Program

- Targeted at startups, co-working and innovation precincts

- Affordable services

- One month contract period for users

- Data centre access within GigCity network

- Access to local and interstate cloud services

- Highly resilient network

- Inclusion in US Ignite

US Ignite

GigCity Program

- 2017-18 State Budget: $2.9m for Stage 2 precincts plus extension of Program to 2021

- Fifteen Stage 2 precincts in Adelaide selected by SA Government EOI process

- Stage 2 precincts include redevelopment sites at former Royal Adelaide Hospital and GM Holden plant

- SA Government is considering options for extension of GigCity services to Innovation Hubs and businesses in Whyalla and Mount Gambier

Who is EscapeNet?

- Local Adelaide-based internet service provider with over 22 years experience.

- Provides internet access, telephony and web hosting services to business and residential customers across Australia.

- Local Australian Support

- Very proud to be associated with GigCity.

The GigCity Vision

- Project Appeal - Aligned Ideals/Interests
  - Benefitted South Australia
- PRICE – Affordability, Flexibility, Suitability!
- Affordable to buy, build and support
- Product set for wide range of customers
  - Internet Access
  - Ethernet Virtual Circuits (EVC or Layer 2 circuits)
  - Cloud connectivity (Azure, AWS etc)
  - Access to local DC (Your DC, Adam, Intervolve)

Solution Objectives

- Innovate
- Cost Efficient
  - Merchant Silicon
  - Explore White Box Solutions
  - Challenge of Control Plane Software
- Modern Network Design
  - Stability & Efficiency
- Automation Key Component
  - Efficiency
  - Empower the user, the cloud way.

Network Design

- Loosely CLOS (leaf/spine) design
- All Layer 3
- /31 links + OSPF (infrastructure only) + BGP
- No layer 2
  - Avoid sing failure domain
  - Scalable
  - No Spanning Tree
  - Avoid indiscriminate forwarding
  - Simplified fault finding
- Layer 2 services, like EVC, built on layer 3 foundation
- Efficient, Active-Active via ECMP

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SOUTH
AUSTRALIA

Government
of South Australia

Control Plane Software

- Commenced with Cumulus
- VXLAN vs MPLS
- Feature set support
  - Must include carrier features
  - Usual carrier features BGP+EVPN, OSPF, BFD, HQoS etc.
- IP Infusion - OcNOS
  - Started by founder of Zebra
  - Carrier focused
  - Products used as building block for various multinational vendors

IP Infusion

"We selected IP Infusion because they are an established software house, their company DNA is being a protocol stack vendor, and their strategic focus on the service provider market. In IP Infusion, we've chosen a partner with the reputation in the open networking industry of providing carrier-grade quality network operating systems and having expertise in MPLS, VPLS, and EVPN," said Richard Petrie, LINX CTO

VXLAN

- **V**irtual EX**t**ensible **LAN** (**VXLAN**) is a network virtualisation technology that attempts to address the scalability problems associated with large cloud computing deployments.

- It uses a VLAN-like encapsulation to encapsulate Ethernet frames within UDP datagrams.

VXLAN

- No layer 2 ☺
- Overcomes 4k VLAN restriction
- No dependency on Spanning-Tree protocol by leveraging Layer-3 routing protocols
- Scalability, convergence, and resiliency of a Layer-3 network

Hardware

- White box Networking Solution
  - Agema, Quanta Mesh, Super Micro, Dell, Mellanox
- Traditional vendors Cisco
- Arista
  - Lawsuit
  - Price
  - Support
- Support - We wanted $1B+ company
- Bright box

Hardware Chosen

- Dell S4048T-ON &S4048-ON
  - 48x10Gbps port switch
  - 6 x 40gbps
  - Line rate

- Dell S6010-ON
  - 32x40gbps port switch
  - Can breakout to 4x10Gbps
  - Line rate

Compromise

- OAM Y.1731
- Traffic Engineering (TE)
- Bandwidth Reservation (RSVP)
- It's not a Cisco!

Portal

- Angular JS Framework
- Empowers User
- Automation
    - Provisioning
    - Modification
    - Reporting
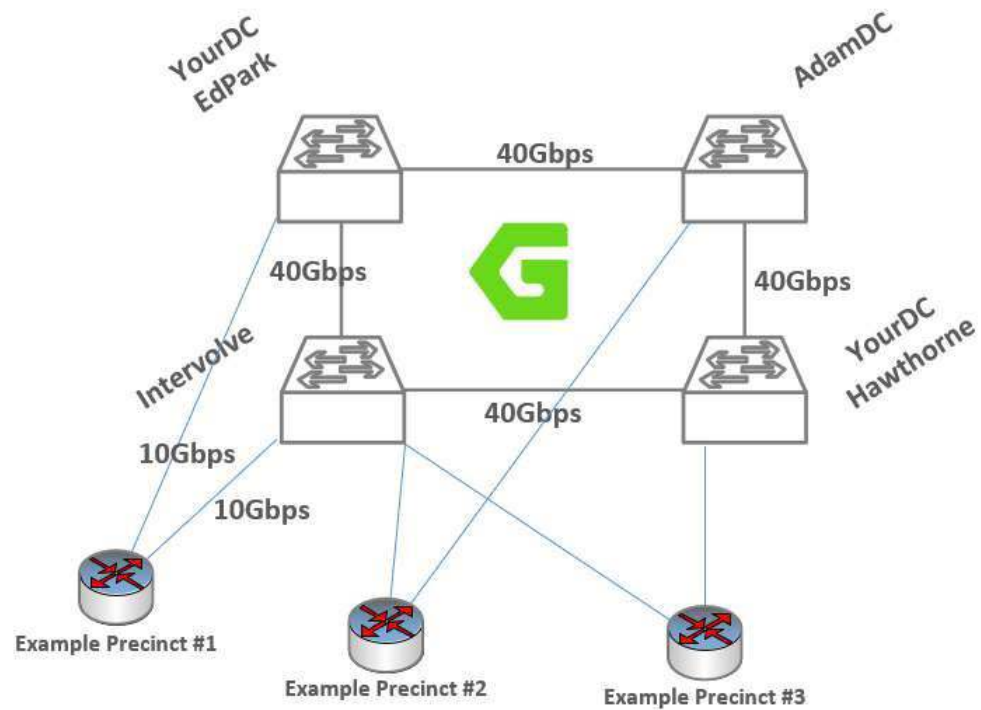   - Information Gathering for Faults (Future Work)
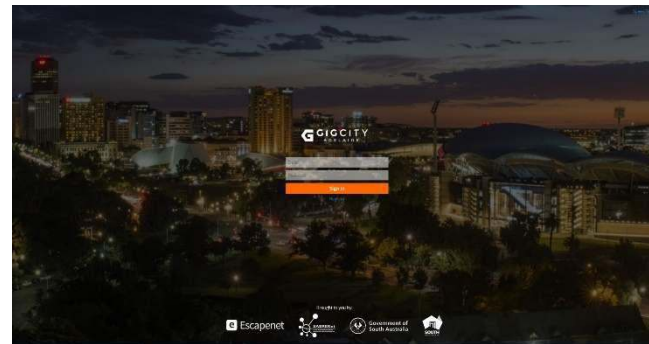
The Ansible Glue

- Automation via Ansible
  - Familiar tool
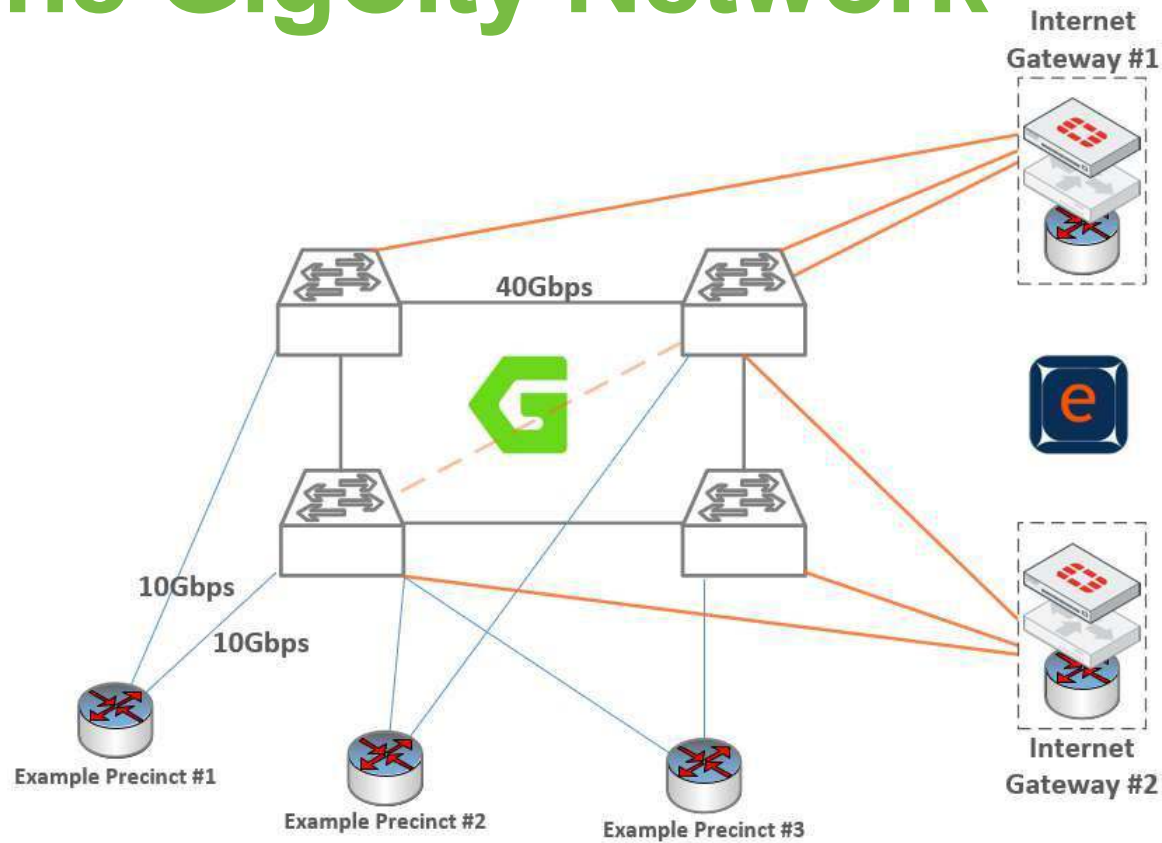 - Agentless
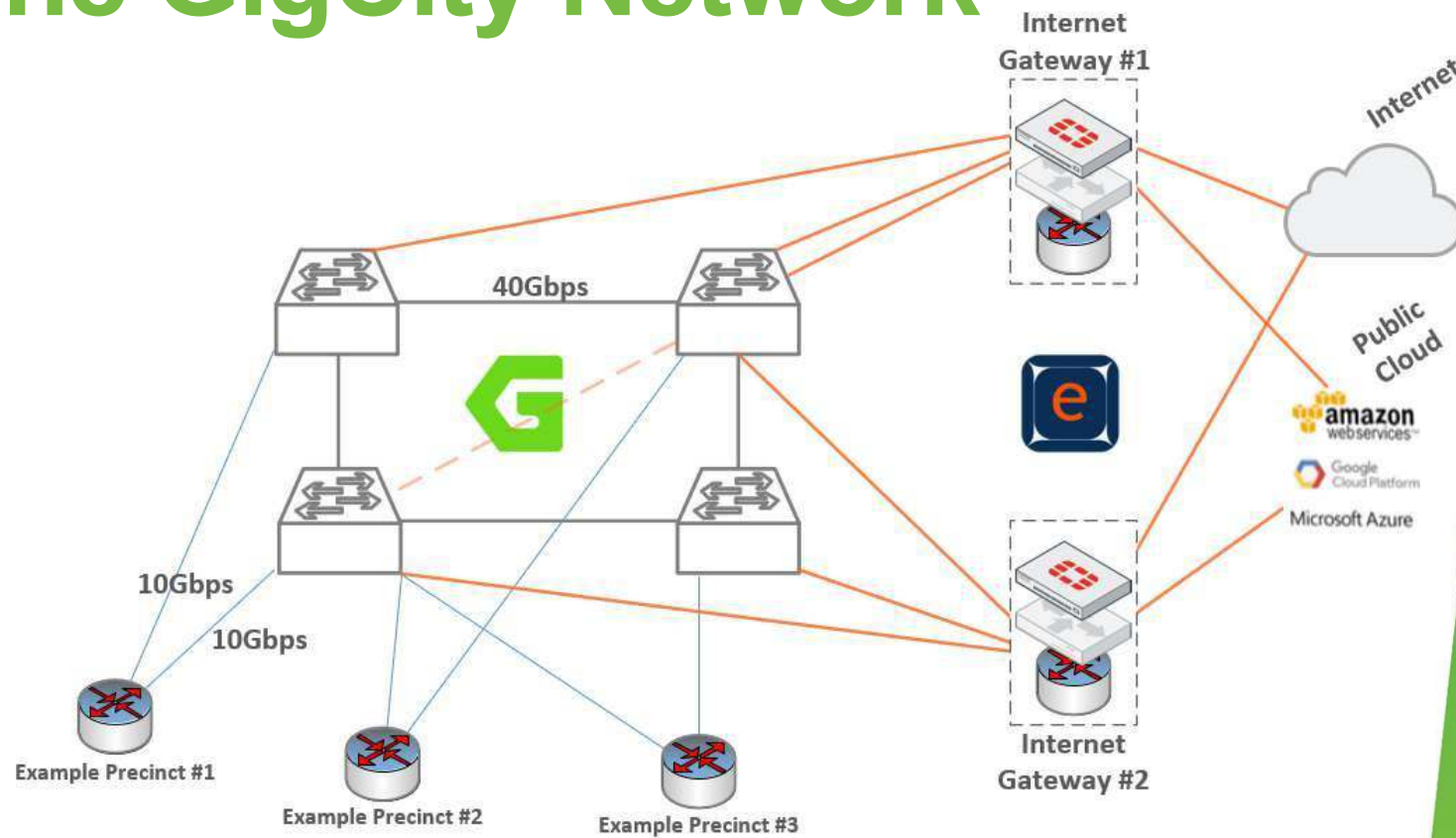- Configures the Network
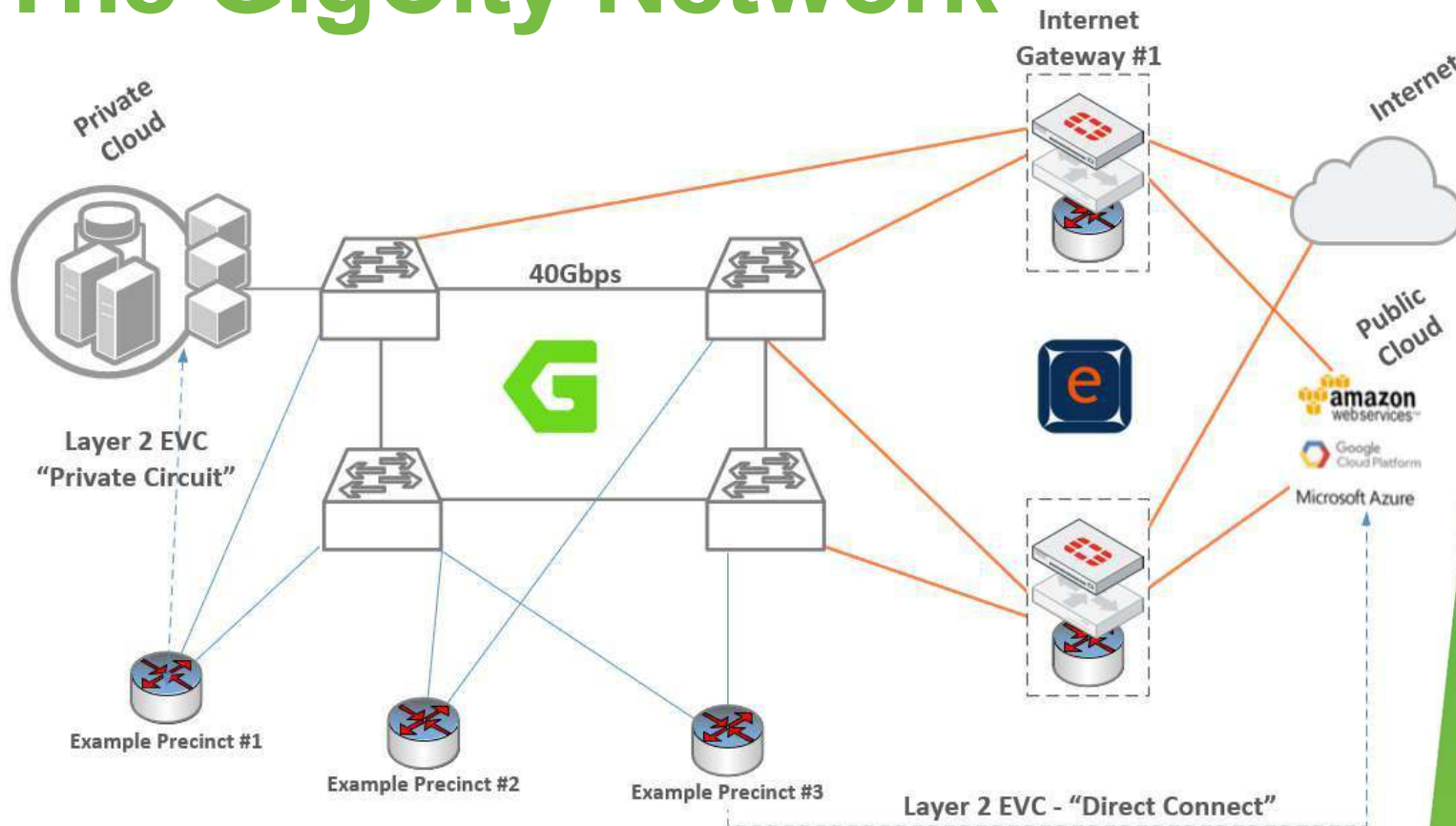- Making use of Netconf

The GigCity Network
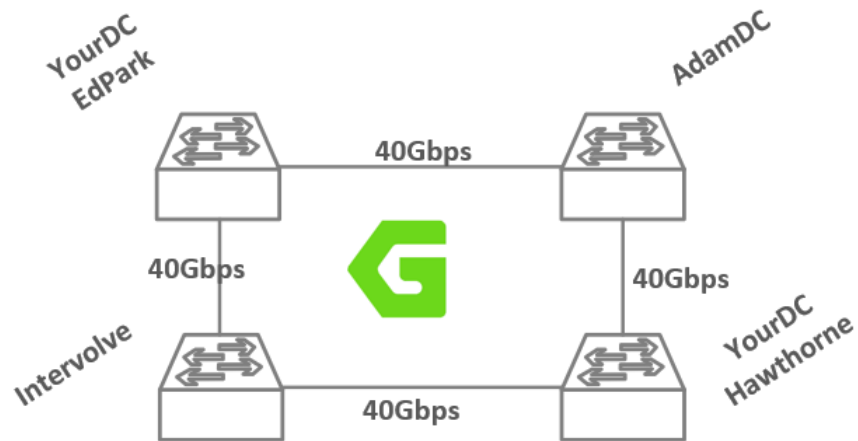
The GigCity Network

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Improving Your Network

- Think outside the box

- Listen to others

- Coding an essential skill

- Automate

- Look at all vendors

GigCity Adelaide

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SABRENet

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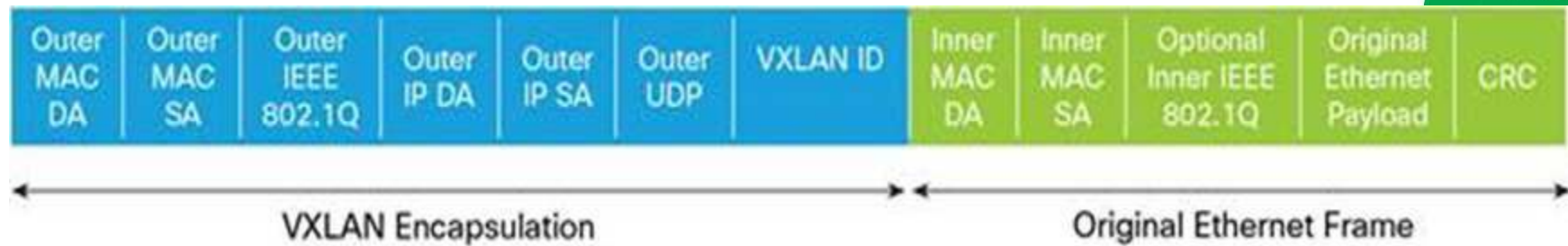**EscapeNet**

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VXLAN

- 50 bytes Overhead (ipv4)
- 20b ip + 8b udp + 8b vxlan + 1514b (original frame)
- Standard UDP packet to network
- BGP+EVPN efficiently manages BUM traffic.
- Vtep's arp for all remote destinations