Building Networks for non-facilities based Operators

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Limelight Networks

The days when any operators owned end to end network components are gone.

What is non Facilities Based ?

- Facilities based operators have traditionally been incumbent Telcos, Cable operators, and more established ISPs.
  - The older the network, the more facilities it tends to accumulate
- Non Facilities based operators or providers are those that do not own Layer 0-2, but operate their own Layer 3 networks
  - Service differentiation, and quick start

Who could be non-FBO

- Internet Service Providers with a specific focus
- R&E Networks
- Government Networks
- Customer Networks
  - Banks
  - Departmental Stores
  - Any fairly large corporation

Facilities includes

- Layer 0
  - Fiber/Ducts on the ground (or overhead)
  - Co – Location Services
    - Including wireless towers
- Layer 1 – 2
  - Managed Layer 1 (λ , wavelenghts)
  - Managed Layer 2 (Ethernet services, IPLC etc)
  - VPLS / MPLS based Layer 2 services

Backbone Links

- Buying dark fiber or λ for Backbone link is the norm.
    - When buying dark fiber access, operators will need to look at
        - Quality of the fiber
            - How old it is. How well it's laid. How many λ or colors you can push across the fiber.
            - Will the fiber work well with your choice of *WDM vendors' equipment
            - Fiber Paths – to make sure your primary and backup are not on the same paths

Backbone Links

- Layer 1 / 2
  - At wavelength levels, it's mostly 10G and primary concern is whether you get LAN PhY or WAN Phy, and if your equipment on both ends of the circuit works
  - Managed Layer2 services
    - Simple Port based Vlans
    - QinQ
    - VPLS based solutions

Backbone Links Gotchas

- Questions you need to ask
  - How is broadcasts handled
    - Do you intend to put a router /CPE at each end?
  - How many VLANs or circuits can I scale to ?
    - Obsoletes out port based vlan services
  - What protocols am I going to run on it ?
    - OSPF ? – multicast needs to work
    - IPv6 , ISIS, or even MPLS
    - Does your provider support MTU > 1500

Backbone Links

- If your business is 'Internet' then building redundancy rather than buying redundancy is the norm

- Generally you limit Backbone circuit providers to a fewer FBOs so that you can work with them quickly to solve problems.

Access Networks

- Access or end sites are connected to Access Networks

- Most of the rules of Backbone Access apply, but some may not

- You apply the same set of rules, then lower the expectation

Access Nets

- Redundancy
  - This may be something that could be traded off in some instances
    - Can you make your redundancy work through 'regular' internet access through a 3rd party provider ?

- Protocols
  - Generally end-sites see less protocol being used, but you still list the protocols you want to run.
  - MTU > 1500 bytes ?

Access Nets

- Rather than buy /lease from a few, Access Nets by design for non-FBO are spread across multiple or many providers.
  - Aim is to try to get it done with fewer providers
- Access Nets also need to incorporate various technologies
  - It's better if you can make it uniform and that should be the aim.

Experiences from different $JOB

- At 10G λ , some circuits may not be compatible with the interfaces on your routers.

- A lot of Layer2 operators run their own networks at 1500MTU – meaning whatever service you get may be < 1500 MTU
    - Specially truer if it involves ill designed QinQ and/or VPLS/MPLS.

- Operators also seem to not realize that IGMP and Multicast could be used by other protocols (like OSPF)

Experiences from different $JOB

- Troubleshoot and deal with the circuit/service at the very beginning. Even if you don't intend to run certain services immediately, test it on the service
  - It's much more difficult to make changes on a running network
  - You can delay start of billing until the service is workable.

Some observations

- The understanding of their own Layer 0 to 1 product seems to be better with
  - Non Telco Facilities Companies
    - Power companies, railways etc.

- The understanding of their own Layer 2 product seems to be better with
  - ISPs

Thanks