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Customer IPv6 Delivery

The Nextgen Experience

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Agenda

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- Nextgen Network's strategy
  - Just get a prefix and turn it on!?!?
  - Scope of the project
  - Hardware considerations
  - Software considerations
- Designing the solution
  - Address planning
  - Network configuration
  - Network security
  - OSS and BSS support
- Product delivery
  - Peering and transit
  - Product synergy
  - Selling the solution…

Just get a prefix and turn it on!?!?

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- Things are not quite that easy…

- Getting an IPv6 allocation is the easy part
- There are other boxes that need to be ticked:
  - Getting support from management
  - Setting the scope of the project
  - Business case development
- And then the real work starts…
  (it helps to have a decent lab configuration!)

Scope of the project

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- IPv6 for customer Internet services only, but…
- All supporting services must be included natively or with application layer gateways where needed
- Out of scope:
  - Internal corporate network (managed by another part of the company with third party services)
  - Management networks (lots of legacy non-IPv6 equipment, many stakeholders) – but migration is underway to a multi-protocol MPLS platform so future IPv6 is possible/desirable)

Hardware considerations

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- Audit network elements where IPv6 is required:
  - Routers
    - Capability (hardware components/revisions)
    - Scaling (FIB table limitations)
  - Firewalls
  - Switches cannot be totally ignored (may be layer-3 aware), e.g.
    - QoS mapping or implementation
    - Packet filtering
    - Load balancing
    - Switch management (out-of-scope for project)

Software considerations

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- Selecting IPv6 technologies:
  - Native IPv6 / dual-stack
  - 6PE
  - VPN-IPv6 / 6VPE
  - Tunnelling support (to be assessed)
  - Multicast requirement (not at present)
- MPLS capabilities and requirements (e.g. FRR)
- Scaling
  - FIB table limitations
  - Filters, etc.
- Routing policy support

Address planning

- Typical IPv6 assignment is /32 (this provides an equivalent number of **subnets** as **hosts** in the IPv4-Internet)
- Spend some time analysing requirements:
  - Infrastructure
  - Geographic/topological aggregation capability
  - Plan types of assignments (within reason):
    - /64 – links and small customers
    - /56 – medium customers
    - /48 – large customers
  - Permit demand-driven expansion of either of the above
    - 16 x /36 'regions' with /40 for assignments (+4 bits for growth)
      - 2,097,152 /64 links and 2,097,152 small assignments
      - 16,384 medium assignments and 128 large assignments
  - Individual requirements will vary

Network configuration

- Originally considered 6PE (limitations with LDP/FRR)
- 6PE with T-LDP (complex and lacked IPv4 symmetry)
- Native dual stack (RSVP/PW provided IPv4 symmetry, Nextgen network is all PE routers with fully meshed PW's)
- IGP – Nextgen uses OSPFv3 with authentication (relies on IPsec, see RFC 4552 – transport mode SA, ESP or AH)
- MP-BGP
- Routing policy:
  - IPv4/IPv6 specific cases are the exception, not the rule
  - Bogon filtering based on CYMRU recommendations
  - Identical BGP community support for IPv4 and IPv6
- eBGP peering uses separate IPv4 and IPv6 sessions
- Support incremental deployment on existing infrastructure

Peering and transit

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- Peering:
  - This is not that hard (most AU IX's have IPv6 support on route-servers)
- Transit:
  - Quick solution is tunnelling (e.g. to HE) but do you want this for a production service?
  - Tier 1 international provider services are here (and the situation is improving)
  - 'Tier 1' domestic provider services are now available (all but one have been established)
- You should be able to use existing circuits, and the same should apply for your customers!

Product synergy

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- As previously noted, ideally all functionality in your IPv4 service should be available in your IPv6 service (Nextgen is there for the basic service and getting there for 'optional extras')
- Customer options, interaction and interfaces should all be the same (within limitations, e.g. lack of ATM/POI support)
- Can be ordered as an add-on for existing services
- Currently an option for new services (but should it be automatically included?)
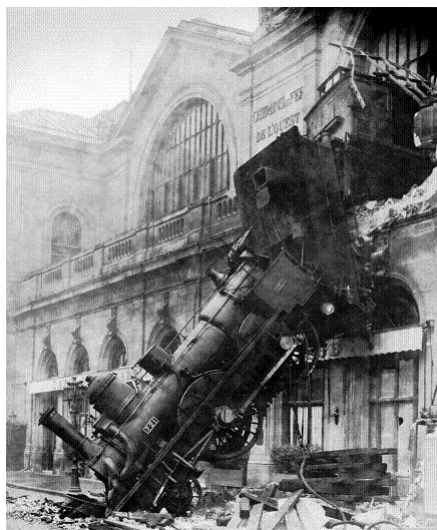
Selling the solution…

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- Internally (to Operations/Sales/Marketing) as well as externally:
  - Documentation
  - Training
  - Collateral
  - Education

- How hard is it when you consider the alternative! (You have probably seen this before…)

The alternative!

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References and thanks

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1. http://www.team-cymru.org/
2. http://test-ipv6.com/
3. http://ipv6-test.com/
4. IPv6 Now "Easy IPv6, The Lookup Book"
5. Vocus for initial lab connectivity

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Questions?