IPv6 Addressing Exercise

ITU/APNIC IPv6 Infrastructure Workshop

21st – 23rd June

Phnom Penh

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Three Scenarios

- End user organisation (commercial or academic)
- Small Access provider
- Backbone Network Services provider

- Work in groups of two:
  - Hint: Keep It Simple!

Scenario One – Campus Network

□ Organisation has 10 buildings and one headquarter building

- Network from each building goes to HQ
- HQ has Internet access and one /48 from their ISP
- Each building has the following LANs:
  - □ Staff fixed
  - □ Staff wifi
  - □ Guest fixed
  - □ Guest wifi
  - □ IT Services
  - □ Administration/Finance
  - □ Network Core
- Develop an IPv6 Address plan for this Organisation
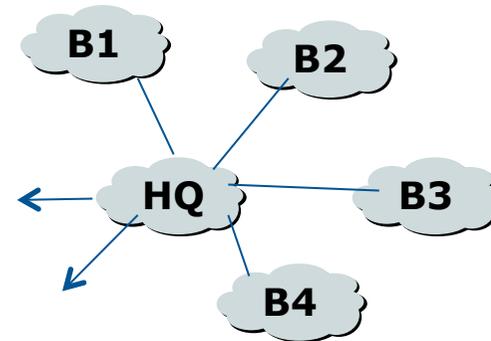
Scenario One – Campus Network

- Hints:
  - What subnet mask does a LAN get in IPv6?
  - Do point-to-point links need to be addressed?
    - And if so, how?
  - Organisation has 11 separate offices right now
    - Will the organisation expand?
    - What allowances to make in the plan?
  - Remember the assistance of nibble boundaries
  - What about addressing to give simple filters to ease infrastructure security?

Scenario One – do the exercise

Scenario Two – Retail ISP

- ISP provides Internet access to Broadband, Wireless and Small Hosting/content organisations
  - Their PoP is in just one location with the following considerations
    - ADSL Broadband Users
    - Wifi Broadband Users
    - Hosting Services
    - They also need to allow for ISP Service, Core Network, and office administration infrastructure
    - They get Internet access from two upstream ISPs
  - Develop an IPv6 Address plan for this Organisation
    - Do they use a /32 or a /48?
    - Why?

Scenario Two – Retail ISP

- Hints:
    - Learn from the previous scenario!
    - How will the multihoming work?
        - Should the provider go to RIR for address space (/32) or to each upstream provider (/48 from each)?
    - How much address space should a residential ADSL or Wifi user get?
        - /56? /60? /64? And why?
        - And how will this address space be delivered?
    - What should a hosting customer get?
        - Depends what is being hosted – one server, or just a virtual machine on a shared physical platform?

Scenario Two – do the exercise

Scenario Three – Backbone NSP

- Network Services Providers sells transit to ISPs, Content Providers, and large enterprises
  - They have 10 PoPs in their service region
    - They peer at two Internet Exchange Points
    - They get transit from two Global Tier 1 providers
    - Each PoP has at least two connections elsewhere in the network
    - Their ISP customers and Content Providers may or may not be multihomed
  - Develop an IPv6 Address plan for this Organisation
    - What address space do they need? A /32 or a /48?
    - Why?

Scenario Three – Backbone NSP

- Hints:
  - Learn from the previous two scenarios
  - ISPs tend to split address space into two parts
    - Trusted – for core network infrastructure
    - Untrusted – for distribution to customers
  - How should the ISP deal with the untrusted part?
    - They are multihoming and peering at IXPs

Scenario Three – do the exercise

Possible Solutions

Scenario One – Example

- Address block: 2001:db8:0::/48
- Loops: 2001:db8:0:0::NN/128
  - NN = 01 to FF
- PtPs: 2001:db8:0:00ZP::/64
  - Z = 1 to F, P = 0 to F
- LANs: 2001:db8:0:0Z0L::/64
  - Z = 1 to F, L = 1 to F

Scenario Two – Example

- Address block: 2001:db8::/32
- Loops: 2001:db8:0:0::NN/128
  - NN = 01 to FF
- Services: 2001:db8:0:1::/64
- BackbonePtPs: 2001:db8:0:1PP::/64
  - PP = 00 to FF
- ADSL Pool: 2001:db8:0100::/40
  - ADSL end-sites get /56
- Hosting1:   2001:db8:1000::/48
  - /64 per virtual machine
- HQ: 2001:db8:8001::/48
- WirelessBB Pool: 2001:db8:8100::/40
  - Wireless end-sites get /56
- Hosting2:   2001:db8:9000::/48
  - /64 peer virtual machine

Scenario Three – Example

- Address block: 2001:db8::/32
- Loops: 2001:db8:0:0::NN/128
  - NN = 01 to FF
- Services: 2001:db8:0:1::/64
- BackbonePtPs: 2001:db8:0:PXX::/64
  - P = 1 to F, XX = 00 to FF
- NOC   2001:db8:0:fff0::/60
- CustomerPtPs: 2001:db8:1:PYYY::/64
  - P = 1 to F, YYY = 000 to FFF
- Enterprise1:   2001:db8:1000::/40
  - /48 per Enterprise (gives 256)
- Enterprise2:   2001:db8:8000::/40
  - /48 per Enterprise (gives 256)
  - HQ included as one of the Enterprises