IPv6 Host and Application Considerations

You built an IPv6 network, now what?

The Basics

- At some point you will realize the whole reason you are building a network is to support hosts
- Fundamentally you need to understand how hosts and their applications behave to make sure what you are building works
- So far, we have a very good understanding of how to do this in IPv4

- But there are some pretty big gaps in our understanding around IPv6 and dual-stack…

The Landscape

- Service Provider
- Data Center / Webscale / Cloud
- Enterprise
- SMB / Commercial
- Home
- Industrial / IOT

Foundations

- Getting an IP address
  - SLAAC verse DHCPv6 – righteousness sucks
- Getting DNS resolver information
  - 6106 verse 3315 – righteousness sucks more!
- Knowing your default gateway
  - And how to secure it
- Multihoming
  - With and without BGP

OS	RFC 6106	RFC 3315
Windows	No	Yes
OS X	Yes	Yes
Linux	Yes	Yes
iOS	Yes	Yes
Android	Yes	No

Poor Assumptions

- IPv4 design principals carry over to IPv6
- Hosts will behave the same as they do on an IPv4 network
- I require feature parity between IPv6 and IPv4
- I do not have to do an IPv6 address plan because I plan to dual-stack
- We will only turn up IPv6 at the edge for a transition solution
- I can test out IPv6 on my production network

Why?

- IPv6 is technically different in many ways from IPv4, you need to take those considerations into account in your design
- Hosts now have RFC 6724 influencing source and destination address selection. Remember, every host has at least a couple IPv6 addresses
- You likely are fine with functional parity. For example, logging
- IPv4 address plans are designed around constraints, start fresh, also you need to understand RFC 6555 or Happy Eyeballs
- The moment you turn up an edge service you will have to test it
- I don’t know why but many engineers test in production – remember, IPv6 is on by default and preferred! Think about it…

Key Takeaways

1. New paradigm in host (RFC 6724) and app (RFC 6555) behavior
2. For most situations it looks and feels like IPv4
3. Except when it doesn’t!
4. Get training and a lab going, experience is key
5. Design w/ IPv6 in mind, don’t assume your IPv4 knowledge is enough to get you through this
6. It is best to deploy IPv6 verse shutting it off. It is the same amount of effort!

CALIFORNIA IPv6 TASK FORCE

Questions

- What is the documentation address space for IPv6?
- How is DHCPv6 fundamentally different than DHCP?
- What impacts will Wi-Fi have on IPv6 (think multicast)?
- In a dual-stack network, which protocol takes preference?
- What well known public cloud providers have IPv6 support today?
- Why do the weekends have the highest reported utilization of IPv6?
- What prefixes were demoted from RFC 3484 to RFC 6724? Why?
- Who were the original RFC authors for IPv6? (1883 and 2460)

Questions

- If you are running SLAAC and DHCPv6 how many addresses will you have by default?
  - link-local, SLAAC temporary, SLAAC privacy/eui-64, DHCPv6, solicited node for SLAAC/link-local, solicited node for DHCPv6, solicited node for SLAAC temporary – so 7 potentially 8 if SLAAC and link-local are not the same last 24
- If you have multiple RAs how does the host know which one to use as a default gateway?
  - If the RA has a preference (H/M/L) then that determines order, otherwise, RFC 6724 will determine source/destination
- How is this more complex with multihoming and no BGP?
  - The hosts have to make the routing and source/destination address selection process decision
- Impact in Data Centers and Cloud Technology?
  - Containers and cloud scale solutions will require IPv6 to solve some of the challenges around predictive addressing and resource discovery plus scaling services

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