DHCPv4 and DHCPv6 in Dual-Stack networks

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draft-ietf-dhc-dual-stack-merge-01
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Previously…

- Problem is to understand how a node should configure itself in a dual-stack environment, where both DHCPv4 and DHCPv6 may be used.
- Issues documented:
  - draft-ietf-dhc-dual-stack-04 (in RFC Ed queue)
  - Concluded to use separate servers and merge data, rather than add IPv4 options to DHCPv6.
  - Noted that deployment experience is minimal.
  - Next step to document merging ‘best practice’.
Dual-stack scenarios

- May expect a ‘slow’ transition towards IPv6
- Dual-stack common in the interim
- Dual-stack on the wire
  - But not all services might be dual-stack
  - Probably see service by service upgrades
    - For example, DNS before NTP
  - Some links may be IPv4-only or IPv6-only
- Need to ensure configuration information is available and consistent across the site
  - Whether obtained via DHCPv4, DHCPv6 or both
Moving forward…

- The merge draft is in its formative stages
  - draft-ietf-dhc-dual-stack-merge-01
  - Lays out possible tools to use
  - Discusses approaches
  - No conclusions yet

- Need to review list of tools
- Decide any BCP recommendations
  - Draft would initially be Informational though
  - Because of (lack of) DHCPv6 deployment status
Potential tools

- Add a DHCP preference option
  - Server informs host which DHC service to prefer
- Add a client dual-stack indicator DHCP option
  - Host can inform server it is dual-stack and will use both protocols (so server could omit information)
- Use DUID
  - Server knows what information client already has
  - Possibly useful to use server DUID too (multihoming)?
- DHCPv6 option to tell client to use DHCPv4
- Use IPv4 mapped addresses in DHCPv6 response
Use of DUID?

- Client can tell DHCP server(s) that it will use both DHCPv4 and DHCPv6
  - Then server can omit information already provided by other protocol
  - May be difficult if DHCPv4 and DHCPv6 servers separate

- Can we also use server DUID usefully?
  - Set server DUID the same for DHCPv4 and DHCPv6 servers in one common administrative domain?
  - Multihomed case could then be detected by use of different server DUIDs?
Where is the intelligence?

- Smartness in server
  - Inform server you are dual-stack
  - Use client DUID
- Smartness in client
  - Use preference option as hint for client

Note: we assume in an administrative domain that DHCPv4 and DHCPv6 management is consistent
  - In practice should be common interface to administrator, even if DHCPv4/DHCPv6 services are not on same server
Mapped addresses

- The client preference option would allow lists to be sorted in a basic way
  - e.g. if two IPv4 DNS servers (dns4a, dns4b) and two IPv6 servers (dns6a, dns6b) are known about, and DHCPv4 is preferred, the list would be dns4a, dns4b, dns6a, dns6b

- Using IPv4 mapped addresses adds flexibility of a fully ordered list, if preferring DHCPv6, e.g.
  - dns4a, dns6a, dns4b, dns6b
  - Do we need that flexibility?

- Considered by some an ‘ugly’ solution
  - Note: we are not passing mapped addresses on the wire
What about resilience?

If we use server smartness, and omit the IPv6 NTP server information in a DHCPv4 reply to a client that has already used DHCPv6, what happens if IPv6 connectivity fails?

This implies we should use the preference option and supply the client with all information?

i.e. client must remember DHCPv4 and DHCPv6 server replies and remember preference option

This may be natural for some services, e.g. the order in which entries are put into /etc/resolv.conf for DNS
So...

- We need to discuss the way forward
- Is the set of tools complete?
  - Anything that should be added or struck off?
- Which solution path should we take?
  - Client or server intelligence? Both?
  - Need to handle IP version resilience?
- Is this work timely?
  - DHCPv6 deployment minimal - limited experience
- Comments?