Default Router and Prefix Advertisement Options for DHCPv6

draft-droms-dhc-dhcpv6-default-router-00.txt

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Outline

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- History

- Option specifics

- Open issues

- Summary

Motivation

- Some network operators wish to deploy IPv6 without the use of Router Advertisements (e.g., discussion on NANOG)

- They desire a single protocol/mechanism for managing all configuration information (rather than multiple mechanisms)

- Desire tighter control/management of which addresses used by which devices

- Already will use DHCP; do not want to be forced to use RAs at same time

- Minimize operational changes from existing IPv4 deployment when deploying IPv6

  - No gratuitous changes please!

- "Rogue RA Problem" discussed extensively in v6ops, etc.

  - Can cause immediate connectivity failures

  - Extensive experience/mechanisms already exists with managing "rogue" dhcpservers in IPv4, do not see point of developing analogous mechanisms for RAs

- "I want to do this, I did it with IPv4, it works, why can't I can't do this with IPv6"

- "Why does IPv6 take away options that were available in DHCPv4?"

Proposal

- Define DHCPv6 "default router" and "on-link prefixes" options

    - Allows site to disable use of RAs

- Not intended to be used in edge networks (where diverse set of users running diverse set of devices connect)

- Most useful where operator controls both network and the devices that connect (e.g., broadband access)

- Not useful in edge networks where operator cannot ensure that all devices will support the options

History

- DHCPv4 defined Default Router Option in RFC 1533 (1993)

- When DHCPv6 was developed, DHCPv6/IPv6 community made conscious decision NOT to define a default router option in DHCPv6

  – Preferable to use RAs than have multiple ways to configure same parameter

  – "Minimize Diversity" discussed in draft-iab-ip-config

- Conscious decision not to define all DHCPv4 options in DHCPv6

  – Define them on demand, in response to requests from operators

  – We are getting that request now from operators

- Increasing pragmatism of late to listen to what those deploying IPv6 are saying

  – Not necessarily helpful to just say "RAs are architecturally cleaner" in response

  – Operators generally want to minimize operational changes when deploying IPv6

DHCP Default Router Option Details

- RAs already contain mechanism to:

  - Advertise self as a "default router"

  - Includes lifetime for expiring the information

  - Lifetime is not used for determining router "liveness"; Neighbor Unreachability Detection (NUD) handles dead gateway detection

  - Simply adds router to "Default Router List"; Client will only use while NUD shows the router to be working

- DHCPv6 Default Router Option

  - Same semantics as RA option: simply adds router to Default Router List

  - If advertised router doesn't work, client will stop using it

  - "Rogue" DHCP servers have similar impact as "rogue" RAs

DHCP Prefix Information Option

- Option itself defines a prefix (prefix and prefix length), Valid and Preferred Lifetime

- Indicates with prefixes are to be considered "on-link"

- Semantics identical to RA Prefix Information Option with "on-link" bit set

Open Issues

- RAs also include other stack configuration parameters

  - Should we also define DHCPv6 options for MTU, Cur Hop Limit, Reachable Time and Retrans Timer?

- Need to work out timing for when DHCP should renew the information

  - Currently DHCP renews based on T1/T2 timers that are unrelated to option lifetimes

- Need to work out details on how to handle overlapping information received from DHCP and RAs

  - Should one have higher priority?

  - Should not affect current deployment model for RAs

- M&O bits: shouldn't client just invoke DHCP when there are no RAs?

  - Goal is to use in environments where no RAs exist; or do we require RAs that say "use DHCP?"

  - Clients "allowed" to invoke DHC when no routers present, but could be stronger

Summary

- Operators are requesting a Default Router/Prefix Option for DHCPv6

- We should be pragmatic in meeting the needs of those interested in deploying IPv6