

Default Router and Prefix Advertisement Options for DHCPv6

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

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Outline

- Motivation for options
- 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