Autonomic Prefix Management in Large-scale Networks

ANIMA WG
IETF 91, November 2014

draft-jiang-anima-prefix-management

Sheng Jiang

Brian Carpenter

Qiong Sun

Motivation

- For validate the application and reusability of the components
- In large networks, prefix management still depends on human planning. Management of IPv6 prefixes is rigid and static after initial planning.
- The autonomic networking mechanism is to dynamically and autonomically manage IPv6 address space in large-scale networks, so that IP addresses can be used efficiently.

Intended User & Administrator Experience

- Normal users should see no difference.
- For administrators of a large-scale network, the management of IPv6 address space needs much less effort. Ideally, administrators just configure a single IPv6 prefix for the whole network and the initial prefix length for each device role.

Requirements

- The requesting router (also between prefix repositories) needs to know the prefix length it should request.
- The requesting router needs to know what device to send the request.
- The requested device should have enough resource for the request. If no, there should be some follow-up.
- Currently, human configuration or human intervention are needed to meet these requirements.
- The autonomic network mechanism should support network to incrementally grow.
  - Hierarchical delegation does not work

Discovery and negotiation

- A prefix requesting device that needs new or more address space
  - firstly discover peer devices that may be able to provide extra address spaceb
  - by sending out a Generic Discovery & Negotiation protocol (CDNP) [draft-carpenter-anima-gdn-protocol] Discovery message that contains a Prefix Objective option
- A peer device receiving a Discovery message with a Prefix Objective option
  - respond with a GDN Response message the available prefix length matching the request, if it is able to provide such a prefix
  - Or return a GDN Response message, which contains a longer prefix length (smaller address space) that it can provide, if the peer device does not have enough resource
  - Or a divert option that indicates another potential providing device
- Till find a providing device or settle down for smaller prefix

Prefix Management Intent

- With in a single administrative domain, the network operator could manage all their devices with role set
- A prefix management intent, which contains all mapping information of device role and their default prefix length, should be flooded in the network
- Upon receiving the prefix management intent, every device can decide its default prefix length by matching its own role
- Both discovery and negotiation and prefix management intent flooding should go through the Autonomic Control Plane (ACP) [draft-behringer-anima-autonomic-control-plane]
- Intent flooding mechanism is currently missing (stated as out of scope for now)

Comparison with prefix assignment in homenet

- Homenet focuses on prefix and address assignment in a home network
  - with precondition that the home border router has already been allocated one or multiple IPv6 prefixes
  - prefix assignmentand address assignment by a flooding protocol
  - mentioning the support to downstream DHCPv6 prefix delegation
- Potential overlap
  - Both use DHCPv6 prefix delegation (in different scenarios)
  - Prefix assignment is also part of prefix management
  - Flooding protocol may be reusable

Comments are welcomed!

Thank You!