Autonomic IPv6 Edge Prefix Management in Large-scale Networks

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draft-ietf-anima-prefix-management-04

Sheng Jiang
Brian Carpenter
Qiong Sun
Zongpeng Du
Overview

• This is a chartered work item to validate the application and reusability of Anima components.

• If a prefix manager ASA needs more address space:
  – It discovers peers by GRASP Discovery message for the PrefixManager objective.
  – Then negotiates with a discovered peer for the needed address space using GRASP messages.

• In a single administrative domain, the network operator floods the PrefixManager.Params objective to announce default parameters.
Main Changes in 03 and 04 drafts

• draft-ietf-anima-prefix-management-04:
  ① add more explanations about the solution
  ② add IPv4 options
  ③ remove PD flag

• Also, it is claimed in the document that
  – This document is not a complete functional specification so that not all details are included
  – The main purpose is to describe the architectural framework utilizing the components of ANI (Autonomic Networking Infrastructure)
An IPRAN Example

Introduced as explanations for Section 6.1 Example of Prefix Management Parameters

- An IPRAN network is used for mobile backhaul, including radio stations, RNC (in 3G) or the packet core (in LTE), and the IP network between them as shown in Figure 1.

IPRAN entities:
- ASG1
- RSG1
- RSG2
- ASG3

3GPP entities:
- eNB (Evolved Node B)
- RNC (Radio Network Controller)
- SGW (Service Gateway)
- MME (Mobility Management Entity)
An IPRAN Example (Cont.)

• If ANI/GRASP is supported in the IPRAN network, the network nodes should be able to negotiate with each other, and make some autonomous decisions according to their own status and the information collected from the network.
  – ASG should be able to request prefix from RSG
  – CSG should be able to request prefix from ASG
IPv4 Extension

• **Proposed Edge Prefix Objective Option**
  – objective = ["PrefixManager", objective-flags, loop-count, [length, ?prefix]]

• **Option1**: the PrefixManager Objective could be extended to support IPv4 by adding an extra flag
  – objective = ["PrefixManager", objective-flags, loop-count, prefval]
    • pref4val = [version4, length4, ?prefix4]
    • pref6val = [version6, length, ?prefix]

• **Option2**: a separate but similar objective could be defined for IPv4, for example:
  – objective = ["PrefixManager4", objective-flags, loop-count, [length4, ?prefix4]]
Remove PD Flag

• **Old Edge Prefix Objective Option**
  - objective = ["PrefixManager", objective-flags, loop-count, [PD-support, length, ?prefix]]

• It is unnecessary to use PD to allocate prefix when we've already negotiated a prefix, so it is removed

• **Proposed Edge Prefix Objective Option**
  - objective = ["PrefixManager", objective-flags, loop-count, [length, ?prefix]]
Remove PD Flag (Cont.)

• Analyses about the relationship between ANI/GRASP based prefix management and DHCPv6 PD are added in Section 4.3
  – There are use cases where the ANI/GRASP based prefix management approach can work together with DHCPv6 PD [RFC3633] as a complement
  – For example,
    • ANI/GRASP based method can be used intra-domain, while the DHCPv6 PD method works inter-domain (i.e., across an administrative boundary).
    • Also, ANI/GRASP can be used inside the domain, and DHCP/DHCPv6-PD be used on the edge of the domain to client (non-ANI devices).
Abstract Deployment Overview

• For calcification, some abstract deployments are also added in Appendix, including
  – A.1. Address & Prefix management with DHCP
    • DHCP Deployment Model without a Central DHCP Server
    • DHCP Deployment Model with a Central DHCP Server
  – A.2. Prefix management with ANI/GRASP
    • Proposed Deployment Model using ANI/GRASP
Thanks
Comments?
Deployment Model based on Config Server Provision

The purpose of the Appendix is to help in understanding the mechanism of the document.

It should be noted that these are just examples, and there are many more deployment models.

Figure 2: DHCP Deployment Model without a Central DHCP Server
A More Common DHCP Deployment Model

Figure 3: DHCP Deployment Model with a Central DHCP Server

- Dynamic provisioning changes to edge routers are avoided by using a central DHCP server and reducing the edge router from DHCP server to DHCP relay.
Proposed Deployment Model using ANI/GRASP

Figure 4: Proposed Deployment Model using ANI/GRASP