Autonomic IPv6 Edge Prefix Management in Large-scale Networks

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draft-ietf-anima-prefix-management-04

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Overview

- This is a chartered work item to validate the applicati on and reusability of Anima components.
- If a prefix manager ASA needs more address space:
  - It discovers peers by GRASP Discovery message for the Pre fixManager objective.
  - Then negotiates with a discovered peer for the needed ad dress space using GRASP messages.
- In a single administrative domain, the network opera tor floods the PrefixManager.Params objective to ann ounce default parameters.

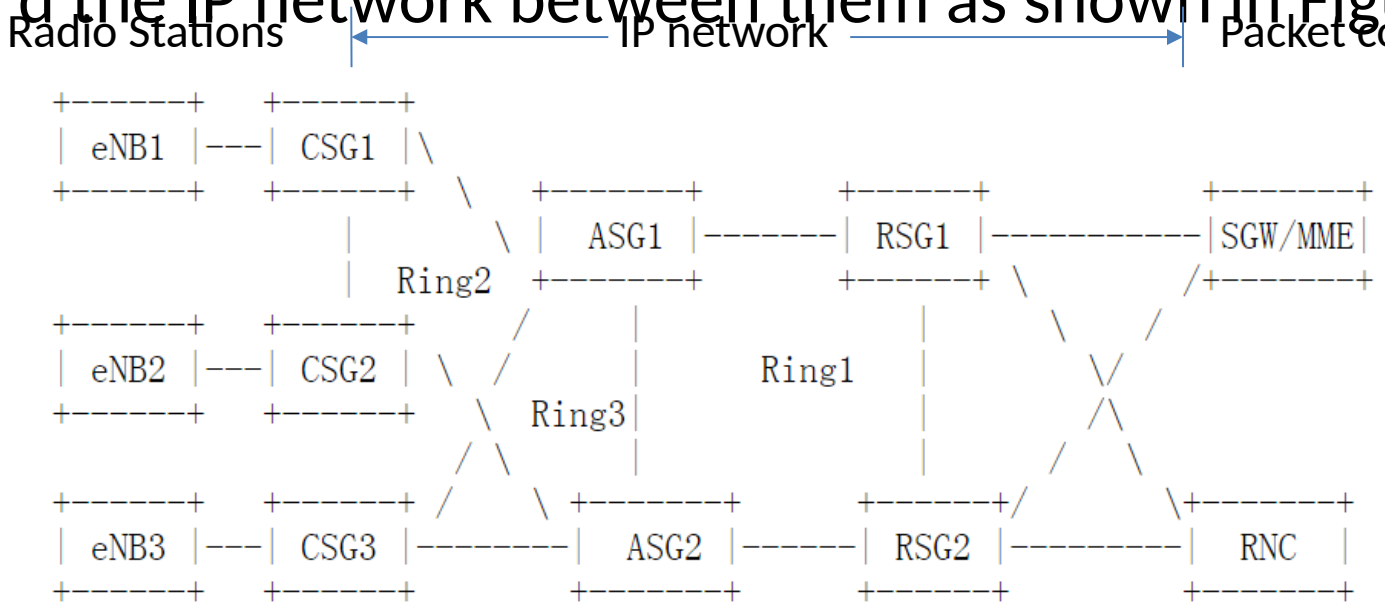
Main Changes in 03 and 04 drafts

- draft-ietf-anima-prefix-management-04:
  - ① **add more explanations about the solution**
  - ② **add IPv4 options**
  - ③ **remove PD flag**
- Also, it is clamed in the document that
  - This document is not a complete functional specificatio n so that not all details are included
  - The main purpose is to describe the architectural frame work utilizing the components of ANI (Autonomic Netw orking 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.



Ring1: ASG1->RSG1->RSG2->ASG2->ASG1
Ring2: CSG1->ASG1->ASG2->CSG2->CSG1
Ring3: CSG3->ASG1->ASG2->CSG3

IPRAN entities :
RSG(RNC Site Gateway)
ASG(Aggregation Site Gateway)
CSG (Cell Site Gateway)

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 autonomic 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 f or IPv4, for example:
  - objective = ["**PrefixManager4**", objective-flags, loop-count, [lengt h4, ?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 w hen we've already negotiated a prefix, so it is r emoved
- **Proposed Edge Prefix Objective Option**
  - objective = ["PrefixManager", objective-flags, loop-count, [length, ?prefix]]

Remove PD Flag (Cont.)

- Analyses about the relationship between ANI/GRASP bas ed prefix management and DHCPv6 PD are added in Sec tion 4.3
  - There are use cases where the ANI/GRASP based prefix manag ement approach can work together with DHCPv6 PD [RFC363 3] as a complement
  - For example,
    - ANI/GRASP based method can be used intra-domain, while the DHCP v6 PD method works inter-domain (i.e., across an administrative bou ndary).
    - 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 a re also added in Appendix, including
  - A.1. Address & Prefix management with DHCP
    - DHCP Deployment Model without a Central DHCP Serve r
    - 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 P rovision

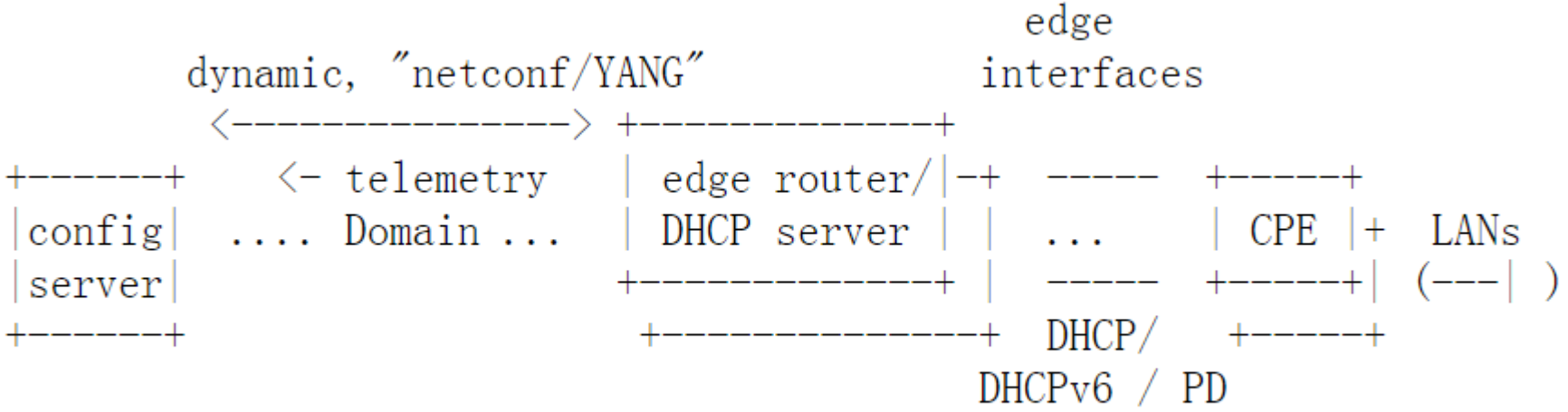


Figure 2: DHCP Deployment Model without a Central DHCP Server

- The purpose of the Appendix is to help in understanding the mech anism of the document
- It should be noted that these are just examples, and there are man y more deployment models

A More Common DHCP Deployment Model

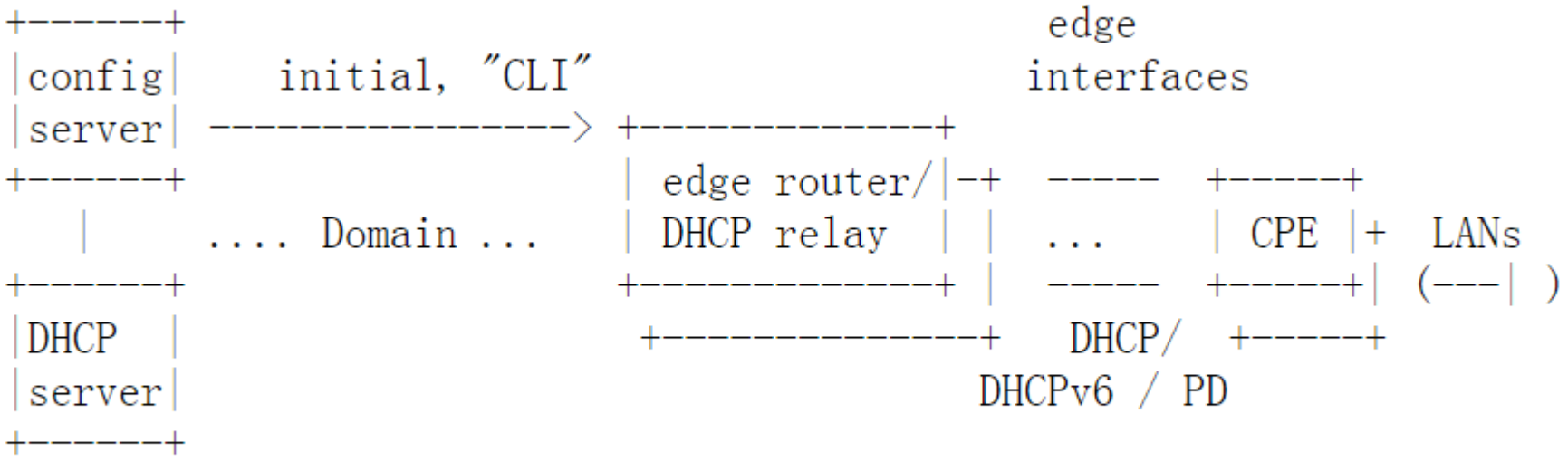


Figure 3: DHCP Deployment Model with a Central DHCP Server

- Dynamic provisioning changes to edge routers are avoided by using a central DHCP server and reducin g the edge router from DHCP server to DHCP relay

Proposed Deployment Model using ANI/GRASP

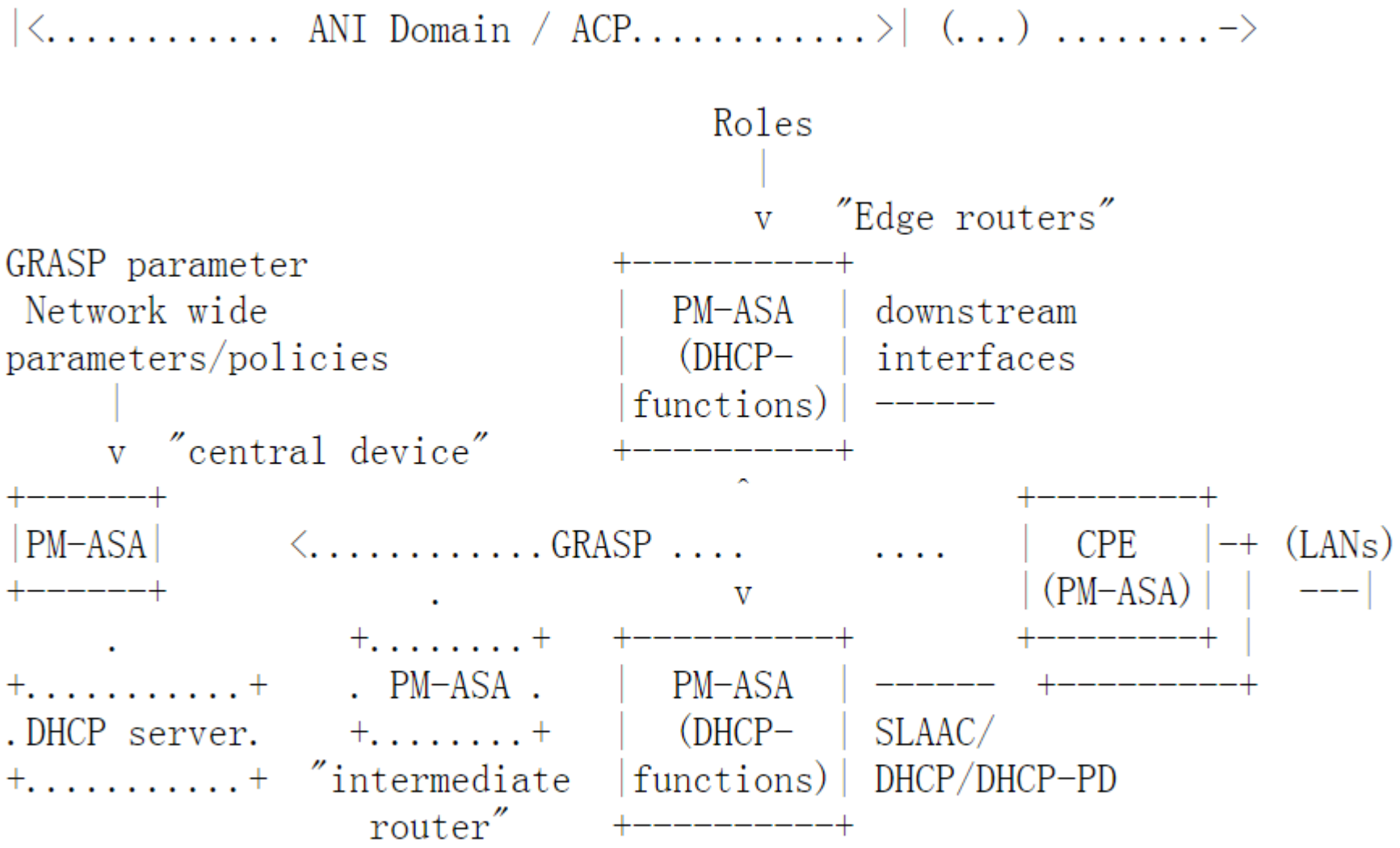


Figure 4: Proposed Deployment Model using ANI/GRASP