

IPv6 Site Renumbering Gap Analysis

[draft-liu-6renum-gap-analysis-01](#)

Bing Liu

Sheng Jiang

IETF 81@Quebec

July 2011

Gap Analysis-structure

- The structure of gap analysis followed a renumbering event procedure clue:
 - Managing prefixes
 - Address configuration
 - Address relevant entries update
 - Renumbering event management

We are trying to cover **ALL** aspects of renumbering by this structure. **[need your comments]**

Overall Goals for IPv6 Renumbering

- **Prefix delegation**: automatic, accurate in aggregation and coordination
 - **Address configuration**: automatically achieved through standard protocols, with minimum human intervene.
 - **Address relevant entries update**: processed integrally, error-prevented.
 - **Management**: managing the renumbering events
- [Open Question] Do we need a "One-Click" fully automatic renumbering technology? Is it possible to be realized?
- [Open Question] Do we need recommendations for site address management tools?
- [Open Question] Is session survivability within our scope?

What has been done

- RFC2894: router renumbering for IPv6
- RFC4192: procedures for IPv6 site renumbering without a flay day
- RFC4076: stateless DHCPv6 renumbering requirements
- RFC5887: renumbering issues in IPv4/IPv6
- [draft-chown-v6ops-renumber-thinkabout-05]

- Lots of issues were analyzed in RFC5887 & [draft-chown], but many of them are out of 6renum scope or unsolvable. This draft intends to identify the valuable and solvable issues, dig out some undiscovered gaps, and try to give solution suggestions.
- **[Note]: This initial version draft is just to provoke discussion rather than definite conclusions.**

Managing Prefixes

- When renumbering an enterprise site, a short prefix may be divided into longer prefixes for subnets.
- Prefix delivery, delegation, aggregation, coordination between branch sites, need be carefully managed
- RFC2894 could add/change routers' prefixes, but it seems hasn't been used (at least not widely used)
- DHCP-PD(RFC3633) is being widely used for prefix delegation and provision.
- **[Open Question]** Is DHCP-PD enough for all scenarios of renumbering prefix process?

Address Configuration

--Host address configuration

➤ **ND and DHCP are two basic automatic address configuration methods in IPv6 networks. They may be used parallel in a network for address configuration, which may cause issues:**

-Dynamic prefix learning

DHCP-configured hosts may ignore RA prefix advertisement, so that they can't learn the new prefixes through ND when an uplink is added.

-DHCP&SLAAC conflict

Administrators may mis-configure the prefixes in RA and DHCP messages to be different.

-"M" debate

"M" bit in RA indicates there is DHCP available. This could cause SLAAC-Configured hosts ambiguous behavior, since there's no clear specification in the protocols (neither in RFC4861 nor 4862).

Host address configuration(continue)

➤ **DHCPv6 reconfiguration not yet for bulk usage**

DHCPv6-reconfiguration messages could be initiated by server to trigger clients restart DHCP sessions. As it can be considered as “stateful” renumbering, maybe it’s not proper for bulk usage.

[Open Question] But is there any requirement, so that we can consider the issue as a gap?

➤ **RA prefix lifetime limitation**

In RFC4862 it is specified that, if the previous *RemainingLifetime* is longer than two hours, it is impossible to reduce a prefix’s lifetime less than two hours for security consideration. (only if the RA is not authenticated, e.g. with SEND)

[Open Question] This limitation makes an immediate renumbering event is limitation (more security risk)? Or other trade-off solution?

Address Configuration

--Router address configuration

➤ **Learning new prefixes**

As described in RFC5887, in a multihomed site, the interior routers would need a mechanism to learn which upstream providers and prefixes were currently valid to only advertise these prefixes to hosts.

➤ **Restart after renumbering**

RFC2072 mentioned that some routers cache IP addresses in some situations. So routers might need to be restarted as a result of site renumbering.

[Open Question] It seems only happen on the old type of routers?

➤ **Router naming**

RFC4192 suggested that switches and routers should use domain names for configuration to better support renumbering.

[Open Question] Router naming is not a new capability, which is already supported in some scenarios (e.g. IPsec VPN). The gap is probably the education of network administrators?

Address Configuration

--static addresses configuration

[Open Question]

driven) avoidance a lost cause? How to limit the
places where static addresses must be used (e.g.
FQDN and autoconf .etc) ?

➤ ULA

[Open Question]

help to prevent interior site renumbering caused by
ISP.
ISP.

Address relevant entries update

--DNS records update

RFC3007(Secure DNS) is a candidate for dynamic DNS update.

[Open Question]

1. Some argued RFC3007 could be potentially widely deployment, some didn't 2. Any requirement of developing new (maybe lightweight) mechanism/protocol for dynamic DNS update?

➤ DNS data structure optimization

A6 records (RFC2874) could make zone files update easier.

➤ A6 records (RFC2874) could make zone files update easier.

➤ DNS authority

When the service hosts are optimized DNS records are sufficient as substitutes A6?

➤ change the records since DNS zones are out of the administrative control.

➤ change the records since DNS zones are out of the administrative control.

[Open Question]

[Open Question]

Whether it is only an operational issue or additional

--filters update

Filters such as ACLs, ingress filtering .etc may spread in various devices as firewalls, routers, gateways. Management is needed.

[Open Question]

need to be distinguished? Is dedicated management system needed?

➤ **Filter update automation operation**

[Open Question] Can update operation be achieved through standard interface/protocol?

Address relevant entries update

Address relevant entries update

➤ In hosts

Hosts may record addresses of servers such as DNS resolver/server, radius server, etc. Hosts may also record addresses of other hosts or routers.

While renumbering, the hosts must update the records if the these addresses changed.

➤ In routers & servers

[Open Question] Routers and servers may also record others' addresses.

Renumbering event management

- **Renumbering Notification**
- **Renumbering Notification**

Notifying the nodes to be aware of a renumbering event may make sense. E.g. as 4192 suggested, “reducing the delay in the transition to new IPv6 addresses applies when the DNS service can be given prior notice about a renumbering event”

[Open Question] Lack of this kind of mechanisms. A gap?

- **Synchronization Management**
updates, and of reducing the SLAAC lease time and DNS TTL. [Gaps TBD]
For example, as described in RFC 5887, synchronizing the SLAAC and DNS [Gaps TBD]

renumbering process may be needed. [Gaps TBD]
• **Renumbering Monitoring** network event, mechanisms to monitor the

Miscellaneous

mobile is disconnected. change of home agent address while mobile is disconnected.

- ▶ **Multicast**
- ▶ **Multicast** mentioned, If the RP (Rendezvous Point, RFC3956) address changes, then the group addresses must also be changed. The embedded address is used by routers to determine the RP address. Applications must use new group addresses if the RP address is not available on the old address.

Comments are appreciated

leo.liubing@huawei.com

jiangsheng@huawei.com

July 27-2011, @Quebec