Site renumbering using router renumbering protocol

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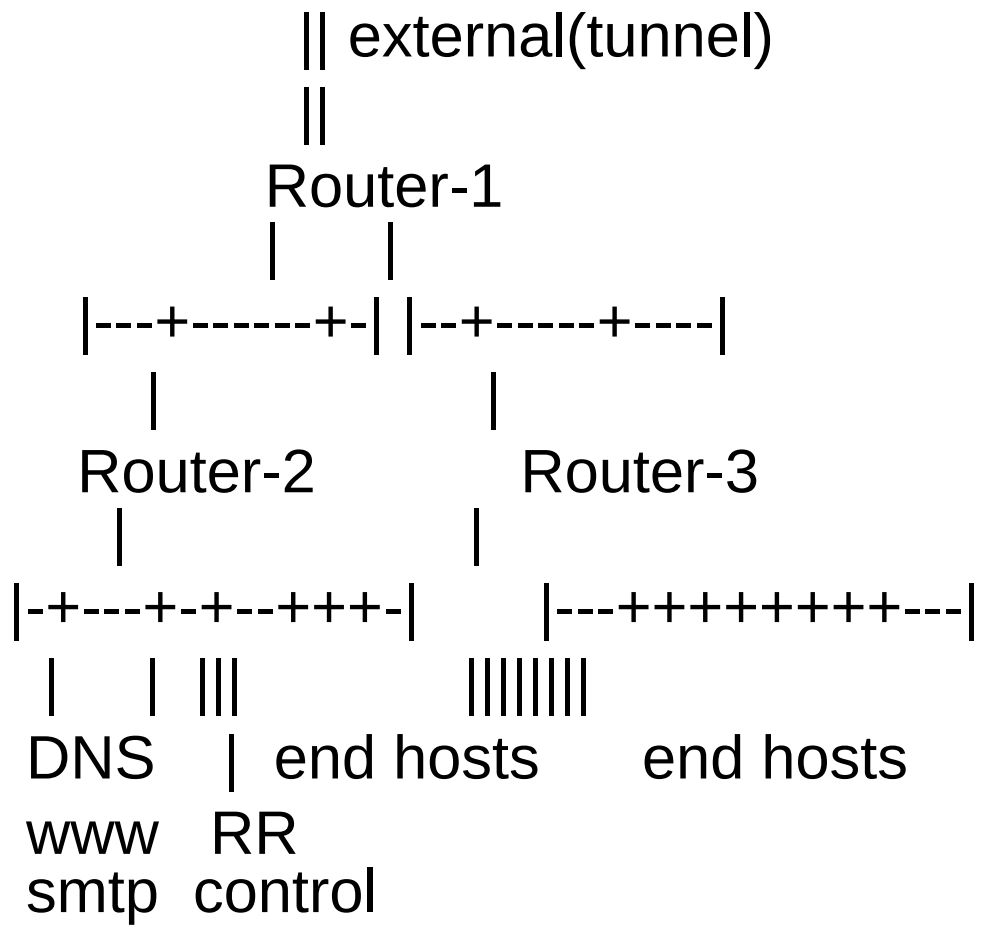
Motivation

- Auto site renumbering using Router Renumbering (RR) Protocol (RFC 2894).
  - We’ve already implemented it, but we needed more experiences.
- Experiment of site renumbering
  - Not just renumber addresses, but with practical applications.
    - DNS, mail, WWW, ...
- Establish a guide of how to renumber a site.

Site environments

- A "SOHO" office.
  - 3 routers, 4 ethernet segments, 1 external link (i.e a leaf site).
  - /48 IPv6 global prefix.
    - use common IDs for site-local subnet IDs and global SLA IDs:
    - e.g.: 3ffe:501:aaaa:1001::/64 and fec0:0:0:1001::/64 for a same single subnet.
  - a separate DNS domain.
    - AAAA only, no secondary server
  - all routers and hosts were based on KAME *BSD
- Stateless autoconfiguration for end hosts.
- Routing
  - RIPng and PIM-DM.
    - without any filtering and aggregation.
- Applications
  - DNS: BIND 9.0.1
  - SMTP: postifx
  - WWW: apache

Network topology



Renumbering procedure(1/2)

- Address (prefix) renumbering
  - Change the /48 prefix to a different /48 one.
  - Did not change subnet IDs and the physical topology.
    - e.g.: 3ffe:501:aaaa:1001::/64 ->2001:200:bbbb:1001::/64
  - using RR protocol.
    - from a control terminal.
    - RR messages were sent to ff05::2.
    - authenticated by AH with manual key config.
  - routers automatically decreased the lifetimes and advertised the new prefix.

- FYI: examples of RR commands

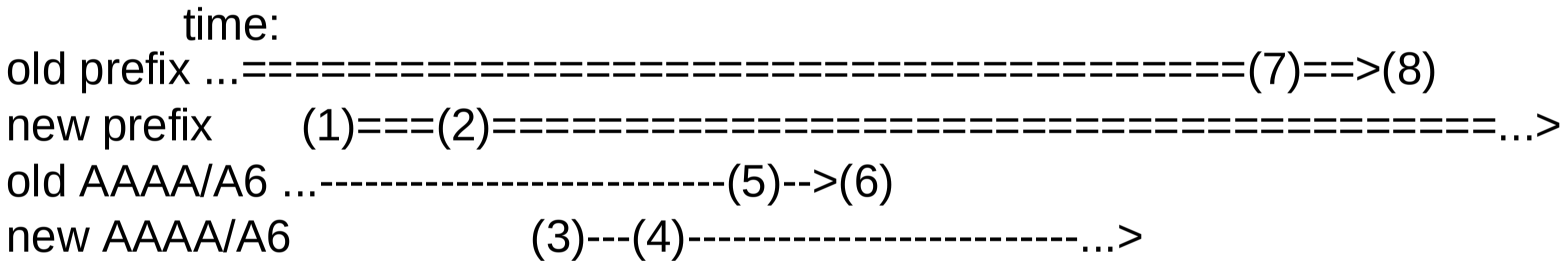
```
seqnum 1 {
        add match-prefix fec0:0:0:: /10 use-prefix 2001:200:bbbb:: /48 keeplen 16;
};

seqnum 2 {
        change match-prefix 3ffe:501:aaaa:: /48 use-prefix 2001:200:bbbb:: /48 keeplen 48 {vltime 7200
pltime 30 rrf_decrvalid on rrf_decrprefd on};
};
```

Renumbering procedure(2/2)

- DNS renumbering
  - AAAA records only.
  - by hand, but it was quite easy to replace the records.
    - old: foo.kame.net IN AAAA 3ffe:501:aaaa:1001::1
    - new: foo.kame.net IN AAAA 2001:200:bbbb:1001::1
- Routing configurations
  - unicast: basically do nothing, routers automatically stopped advertising old prefixes, and started advertising new ones.
  - multicast: completely do nothing.
- Other applications
  - not depend on addresses.
  - no reconfig, no restart.

Relationships between adress renumbering and DNS renumbering



(1) Advertise the new prefix
(2) Confirm that the new prefix is operating stable enough
(3) Advertise new address onto DNS
(4) Confirm that the new prefix is advertised stable enough
(5) Remove DNS entries for old prefix
(6) Confirm that old DNS entries are gone
(7) Set preferred lifetime = 0 for old prefix (deprecated)
(8) Set valid lifetime = 0 for old prefix (addresses gone)

Considerations

- RR protocol will work well for a small site with a single management policy.
- Fixed /48 site prefixes are good for renumbering.
  - auto address renumbering works well.
  - DNS records can easily (or automatically) be rewritten.
- Auto RR wouldn’t be friendly with complicated security/routing policies.
  - filtering, aggregation...
  - auto renumbering is sometimes dangerous.
  - applicability should carefully be considered.
- Textual addresses should not be in configuration files.
  - DNS names should be used as much as possible.

TODO

- Improvements on automatic renumbering
  - typical configuration script of RR settings
  - reliability of RR procedures
  - automatic update of DNS records
    - script to rewrite existing records
    - using DNS dynamic update
    - try A6 and/or DNAME
- Considerations about DNS settings
  - clarification about deprecated addresses
  - upstream DNS
  - secondary servers
- Considerations about policies
  - can filtering or aggregation be updated automatically?
  - even if so, should they really be automatically updated?
- Documentation
  - feedback to draft-baker-ipng-renumbering-00.txt