Reliable and Scalable NAT mechanism (RS-NAT) based on BGP for IPv4/IPv6 Transition

Chen Gang
Introduction

• Most of NAT processing is stateful, which will bring a high risk of single-point failure
• Multi-NAT mechanism is still restrained by a static configuration and localized mapping information
• The draft has proposed a RS-NAT mechanism to facilitate NAT load balancing and enhance network robustness
Load balancing mechanisms: IPv6-IPv4 scenario

The Control Plane

--------------------
          +-------+
          |        |
          |DNS64|   +-------+
          .
  +-------+      +-------+
|User|  -------|RS-NAT|-------|server|
+-------\         +-------/+-
 \                     /+-
  \                   /+-
--------------------

The Data Plane

① DNS-reply with prefix64::IPv4 address will lead the packet to different RS-NAT

② Each RS-NAT runs BGP and keeps BGP neighbor information. Based on that, Prefix-Assignment Algorithm is performed to decide which part of prefix64 a RS-NAT should carry

Prefix64 pool maintained by DNS64 could be averagely assigned to each RS-NAT, which will announce the prefix64 NLRI to USER network
Redundancy mechanisms

• When one of RS-NATs failed, two problems will be incurred
  – Problem A: there is no valid routes to the destination
  – Problem B: there is mapping information lost

• Redundancy solutions
  – For Problem A: each RS-NAT could advertise overlapped prefix64 with low priority in case other RS-NAT routers are failed
  – For Problem B: an address mapping attribute is defined to synchronized mapping state among RS-NATs
Address mapping attribute

Address mapping attribute is an optional transitive attribute

- mapping Type (2 octets):
  - IPv4-IPv4: mapping Type = 1
  - IPv4-IPv6/IPv6-IPv4: mapping Type = 2
  - IPv6-IPv6: mapping Type=3

- Length (2 octets): the total number of octets of the Value field
- Value (variable): The value is composed of the address mapping information
Thanks