Using PCP To Coordinate Between the CGN and Home Gateway Via Port Allocation

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Context Reminder

• The requirement on CGN processing capability grows with increasing subscribers
• Delegating NAT function to the Home Gateway will offload the burden on CGN
• Application scenario: Lightweight 4over6
  – Given, PCP is already used to instruct individual mappings and PCP provides a flexible means for port set management, we need to extend PCP with the ability to reserve port sets instead of individual mappings
Changes Since -04

- Define a new OpCode to request a range of ports: MAP_PORT_SET
  - Avoid overloading MAP
  - Ease separating the port-range function from the handling of individual mappings

- Define two Options to assign port sets:
  - Port Range: To convey contiguous and non-contiguous port-set
  - Random Port Range: To convey pseudo-random port-set
Procedure Overview

- Two port-set PCP Options MUST be supported

- Several policies can be enforced in the PCP Server’s side
  - Size of the port range to allocate
  - Enable random port sets
  - Allow several port sets
  - Port Quota
  - Assign WKP

- The PCP Server MUST maintain a binding for each port set allocation
  - \{PCP Client IP Address, (External IP Address, Port Set)\}
Procedure Overview (Cont’d)

• Generating a MAP_PORT_SET Request
  – Contains at least one of the port-set Options
  – PREFERE_FAILURE can be used if required
  – It is up to the PCP Server to assign a free port set

• Renewing a MAP_PORT_SET Mapping
  – Lifetime refresh: Similar to the base PCP specification

• Processing a MAP_PORT_SET Request
  – The whole port-set should be treated consistently
  – If an error is encountered, use an appropriate error code from the list defined in the base PCP specification
Port Set Example

**Case 1:** 12356 is within the allocated PR1 to 2001:db8::1

**Case 2:** There is no port set binding matching the destination port

**IPv4-in-IPv6 Packet**
- DEST IPv6@=2001:db8::1
- DEST IPv4=1.2.3.4
- DEST Port=12356

**IPv4-in-IPv6 Packet**
- DEST IPv4=1.2.3.4
- DEST Port=8080
Next Steps

• Discussion
  – Is there a justification to allow THIRD_PARTY Option to be used for MAP_PORT_SET?
  – The current version focuses on Lw4over6, is there a use case for double translation?

• Adopt the document as WG item

• You can download the source code of MAP_PORT_SET from
  – http://sourceforge.net/projects/pcppportsetdemo/
Port-Set Options implementation

• CPE2
  – PCP Client with Port_Range Option and NAT Support

• Carrier Grade NAT
  – PCP Server with Port_Range Option and NAT bypass Support

• Web Server
  – Configure NAT Pinhole on CPE2

• More Info
  – Open source code: http://sourceforge.net/projects/pcpclient/?source=directory