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

draft-tsou-pcp-natcoord-09
IETF 85-Atlanta, November 2012

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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.

• In this case, the Home Gateway would need the external address and restricted port-set
  – 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
Why do we need PCP extension?

- PCP based extension is more suitable for the following situation:
  - Operators who do not have existing DHCPv4 server.
  - PPP extension can only be used when TC is deployed in BRAS, but not for higher layer.
  - Dynamic port-set allocation when one subscriber needs multiple port-sets when necessary.
  - Operators planning to migrate the DS-Lite AFTR to behave as a port range router

- A new Opcode is defined
  - Avoid overloading MAP
  - Ease separating the port-range function from the handling of individual mappings
Changes since -07

- Update the PORT_SET_Nonce field to 96 bit
- Encode the port-set in contiguous port mask, and remove the Cryptographically_Random_Port_Range option
- Add coexistence with MAP
  - Normally, the PCP server for MAP_PORT_SET will not run NAT. So the PCP server will not usually run MAP and MAP_PORT_SET OpCode for the same subscriber.
  - In case the PCP server keeps the NAT bindings for some special-purpose applications, the external address and the port allocated to the subscriber should be consistent with the ones in MAP_PORT_SET response.
Changes since -07 (cont’)

• Add security consideration
  – The same security considerations discussed in [I-D.ietf-pcp-base] have to be taken into account.

• Add failover consideration
  – Section 14 in [I-D.ietf-pcp-base] and [I-D.boucadair-pcp-failure] can be applied.
  – The amount of Mapping entries in MAP_PORT_SET PCP server is much less than MAP. Therefore, the cost of state synchronization has been greatly reduced in MAP_PORT_SET.

• Ensure that the PCP server will not allocate overlap port-set and only assign individual port-set mapping.

• Remove the sentence indicating no-NAT a special feature of MAP_PORT_SET in PCP-controlled device.
Comments from ML/Vancouver

• The sentence indicating no-NAT a special feature of MAP_PORT_SET in PCP-controlled device is not accurate.
  – *Solved => section 1*

• How does pcp-natcoord ensure the subscriber's equipment and the service provider equipment have the same configuration?
  – *Indicate PCP server uses Internal address as an index and only non-overlap port-set mappings can be allocated. => section 3.3*

• The Client MUST use a different Mapping Nonce for different MAP_PORT_SET requests. What breaks?
  – *Explained in ML*

• Which UDP port does the CPE send that PCP request, if it does not yet already know the port range assigned to the CPE?
  – *Explained in ML. MAP_PORT_SET can be sent over either address family when Internal address is different.*

• PCP server should not support multiple port-set mappings for one subscriber.
  – *RECOMMENDED to configure the server to assign the maximum allowed port set in a single response. => Section 3.3*
Running Code/Implementation

• Running code

• Implementation
  – China Telecom
  – France Telecom
  – Huawei
  – Fiberhome
  – Broadcom
  – GreenNet
  – Yamaha

• We already have run field trial/test in China Telecom
Interop Test

• We have run an Interop test among 5 participants.
  – PCP Clients
    • Huawei
    • Yamaha
    • BII
    • Fiberhome
    • GreenNet
  – PCP Server
    • Huawei
    • BII
    • GreenNet
  – PCP Error Process
    • Huawei
    • BII
    • GreenNet

• The test result is quite good, and it is simple to implement.
Next Steps

- We have solved all the technical problems.
- We have running code/implementers/Interop/Field Trial.
- Adopt the document as WG item?