Analysis of Port Control Protocol Deployment in Mobile Networks

draft-chen-pcp-mobile-deployment-01

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Motivations

- Usage in a mobile network is a indispensable case to PCP

  - The current PCP base specification explicitly mentions the benefits to reduce battery consumption (see the introduction)

- It may not be sufficient to directly adopt PCP in mobile case without any consideration regarding the particular context

- It's highly desirable to document specific considerations encouraging devices with low battery resources to embed a PCP client (e.g. mobile terminal, advanced sensors, etc.)

  - This document helps in promoting the introduction of PCP in such contexts

Changes since IETF#83

- Version 00~01
  - More proponents joined the work
  - Analyze PCP benefits and deployment options in Mobile
  - Identify major issues when PCP is adopted in a mobile context
  - Analyze PCP applicability to those issues and possible workarounds

Benefits & Issues

- Restoring Internet Reachability

- Keep-alive Message Optimization

- Safeguard from NAT sessions hijacking

- Energy Saving

- Balance Resource Assignment

- PCP Server Discovery

- MN and multi-homing

- Retransmission

- Unsolicited Messages Delivery

- Selected IP Traffic Offload (SIPTO)

P1: PCP Server Discovery

- Issues: DHCPv4 is not widely available in 3GPP network on a wide scale. I-D.ietf-pcp-dhcp can't be applied in the case

- Solutions
  - Use default router
    - Requires PCP server in default router (e.g., NAT in default router, or proxy PCP requests)
  - Use SRV to resolve PCP Service
  - Define a Well-Known PCP Name
  - Use PTR resolving (require operational planning, may not scale effectively)
  - Extending Protocol Configuration Options (PCO) in 3GPP spec (require additional 3GPP efforts)

P2: multi-homing

- Issues: PCP basically presumes to be applied in a single-homed model. However, multiple PDP contexts are allowed on a MN, on which multi-homed situation is retained

- Workaround: a MN has to be able to manage multiple PCP server case

P3: Retransmission

- ## Issues
  - Initial PCP requests force mobile to become active
  - PCP's retransmissions cause mobile node to always be active
  - Becomes worse with multiple PCP clients

- ## Solutions
  - Synchronize (delay) initial PCP transmissions with radio link timers
  - Synchronize PCP retransmissions with radio link timers

P4: Unsolicited Messages Delivery

- Issues
  - Radio link is normally incapable of multicast
  - Care should be taken when unsolicited messages are required
    - the mapping changed due to renumbering
    - the PCP server (or NAT) lost its state
  - A uni-cast delivery is required to inform hosts, which are likely multiple thousands of hosts that were served by a PCP server would be implicitly paged.
- Since such messages are of significance to UE learning; Operators should guarantee the delivery

P5: Selected IP Traffic Offload (SIPTO)

- Issues
  - traffic would be offloaded at a particular points; the host could not determine which egress path packets would take
- Solutions
  - 1/ UE discovers all PCP Servers
  - 2/ This can be notified to the UE by configuring several PCP Names
  - 3/ The UE has to contact all these PCP Servers
  - Another potential solution has been documented in I-D.rpcw-pcp-pmipv6-serv-discovery
  - More considerations should be taken into account in 3GPP network, in which radio layer ID is used, instead of 5-tuples, to identify the local offload context. Mapping functions between ID& 5-tuples are needed

Next Steps

- Is this a valid input to WG?
- Adopt it as a new work item?