PCP Informational Elements: Open Issues

PCP WG

November 11, 2010

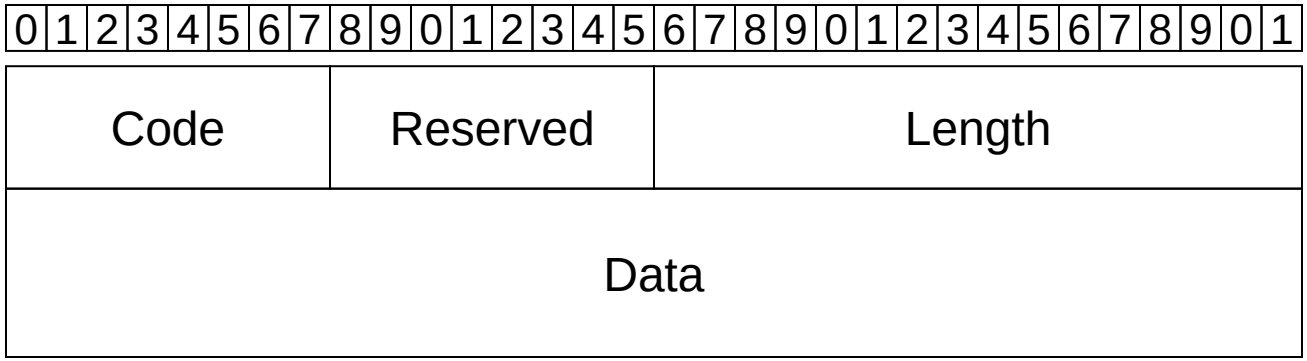
Extensibility Needs & Motivations

- Why PCP should be extensible?
  - The base PCP should be **simple**
    - Only core functions should be specified in the base PCP document
  - We **don't understand yet all the use cases** and the requirements (e.g., firewall scenario, stateless NAT, etc.)
  - **Frozen** PCP message format may not be adapted for advanced usages of PCP, and therefore a version change would be required each time a new need appears!
  - Trade-off between **flexible format *vs.* minimizing implementation complexity**
    - (Mandatory) Fixed field + (Optional) Variable objects

Extensibility Mechanism in PCP

- Two means are proposed so far
  - Allow to define new OpCodes in the future
    - Examples
      - **PCP LIST MAPPING**: Retrieve a list of active mappings
      - **PCP GET EXTERNAL IP ADDRESS**: Get the external address assigned by the NAT; mainly useful for stateless NATs
      - **PCP GET PERCEIVED IP ADDRESS**: Get the perceived IP Address and port as seen by the PCP Server
      - **PCP PING/PONG**: Check the availability of the PCP Server (both the PCP service and IP reachability)
  - Informational Elements
    - TLV objects
    - Optional

IE as a TLV object



- IE codes to be maintained by IANA
- IEs can be enclosed in PCP Request and PCP Responses
- PCP Server does not generate PCP Error messages if they failed to parse an IE

Open Issues #1

- How to notify the PCP Client that an IE is not supported by the PCP Server
  - Implicit
    - Every IE in the request needs to be present in the response if supported by the PCP Server?
  - Explicit
    - Define a dedicated IE which will copy the list of unsupported IEs when issuing the response?
    - Define a dedicated IE which lists only the codes of unsupported IEs?

Open Issues #2

- In some scenarios, a PCP Server might send an unsolicited IE to the PCP Client
  - Examples:
    - Capability IE: provides the capabilities of the PCP Server
    - Report IE: includes various reports from the PCP Server such as Count of mapping, Epoch, errors, port quotas, etc.
    - Error-Sub Code IE
    - Perceived IP Address/Port IE
  - Do we allow this or should we define a dedicated OpCode?

Open Issues #3

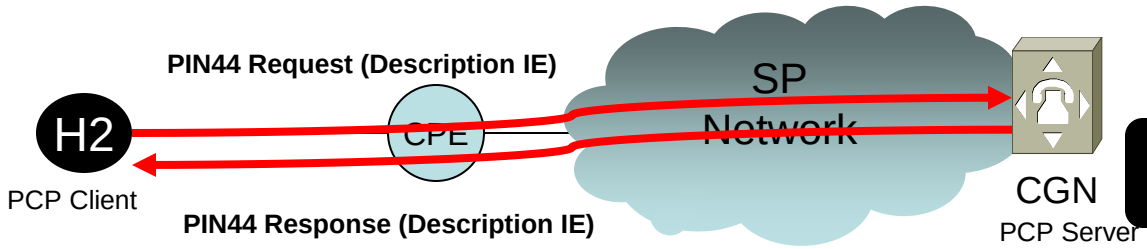
- Do we need a flag to indicate a mandatory-to-be-honored IE?
  - E.g., DSCP marking policy for instance
  - Having the M bit may be seen as a contradiction with the IEs being optional
  - Check the conflict with the use of mandatory-to-be-honored-request flag if defined

Appendix

IE Examples

- Extensions to PCP will be defined in separate document(s)
  - The procedure to define new IEs is (to be) described in the base PCP document
- The following slides show a list of examples
  - These examples are not for discussion per se
  - …but are here for illustration purposes

Examples of Informational Elements



Excerpt of the mapping table

Internal IP Address	Internal Port	External IP address	External Port	Description
10.1.2.3	5060	1.2.3.4	16597	To access my WebCam from ouside

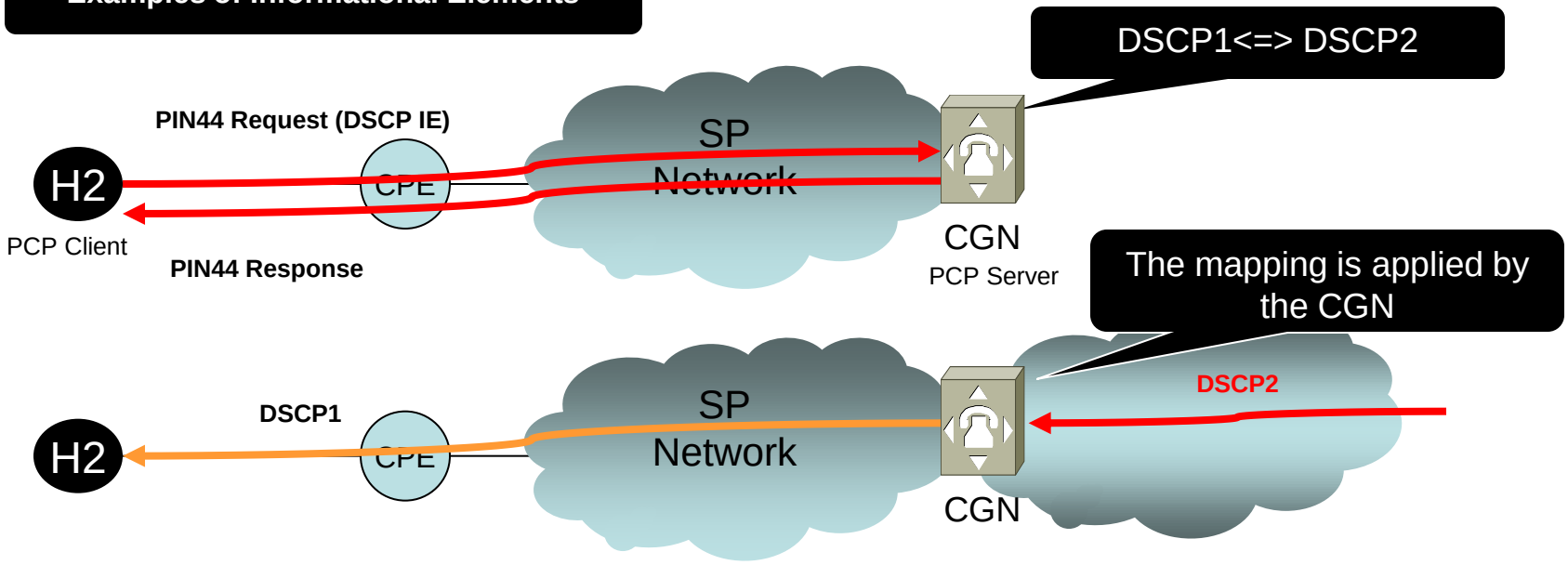
Description IE Code	Reserved	Variable (Max 16bytes)
Data		

Associate a free description text with a mapping

The PCP Server limits the length of the description text

It returns the stored description data to the PCP Client in the PCP Response

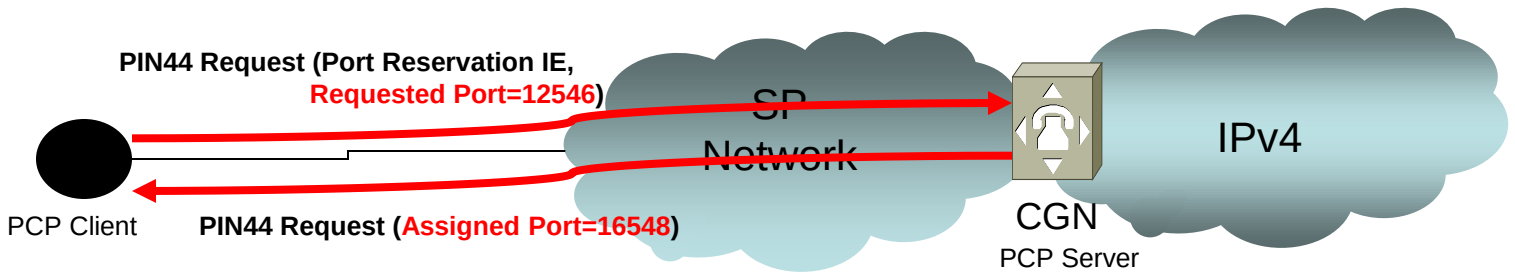
Examples of Informational Elements



DSCP IE Code		Reserved	0x04
Dir	DSCP In	DSCP out	0000..0

Apply a DSCP marking policy

Examples of Informational Elements

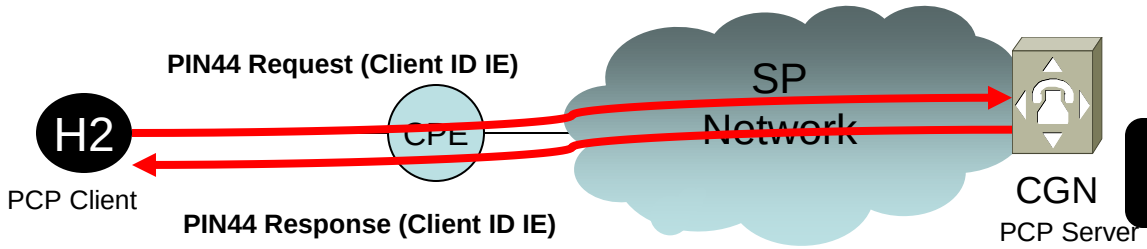


Port Reservation IE Code	Reserved	0x02
Value		

Port Reservation Option: Preserve parity, preserve contiguity

Other options can be supported such as RTP/RTCP port set

Examples of Informational Elements



Excerpt of the mapping table

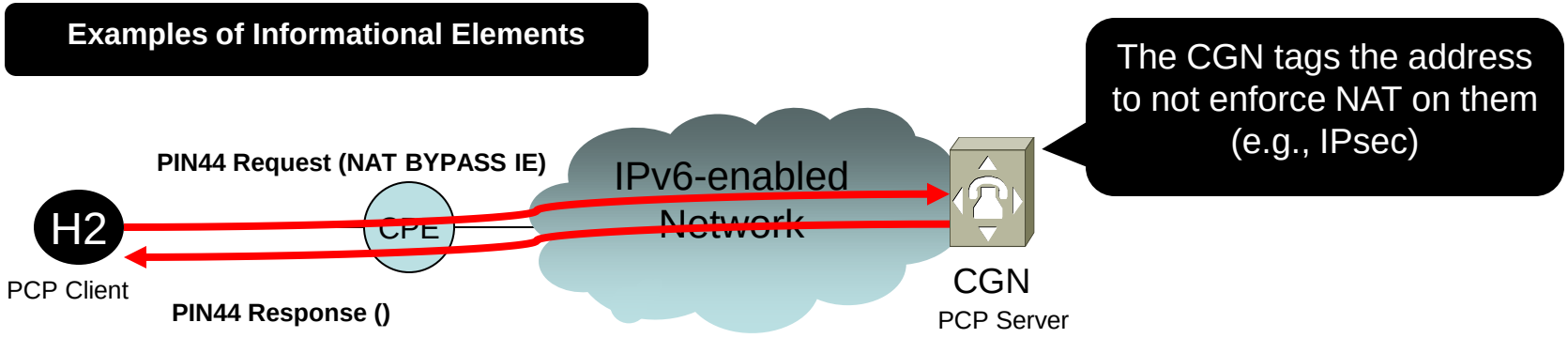
Client-ID	Internal IP Address	Internal Port	External IP address	External Port
45767321397231	10.1.2.3	5060	1.2.3.4	16597

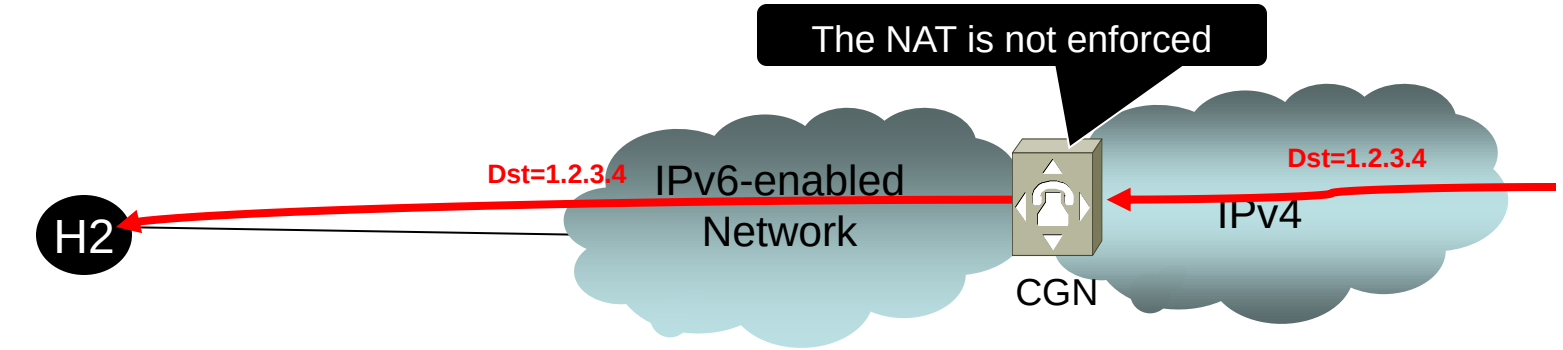
Client ID IE Code	Reserved	Variable (Max 16bytes)
Data		

Persistent PCP Identifier during CP reboot or IP address change

Avoid stale mapping entries in the PCP Server
Allows to refresh the mapping when a new IP prefix/address is assigned

Examples of Informational Elements





NAT BYPASS IE Code	Reserved	0x00

Transparent NAT traversal