Reserving N and N+1 Ports with PCP

draft-boucadair-pcp-rtp-rtcp
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M. Boucadair and S. Sivakumar
Scope

- Defines a new PCP Option to reserve a pair of ports (N and N+1) in a PCP-controlled device while preserving the parity and contiguity
- Use Cases:
  - Ease the NAT traversal for RTP/RTCP flows when “a=rtcp” attribute is not deployed
  - DS-Lite serviced CPE attached to an IPv4-only VoIP service platform

- The proposed PCP Option preserves
  - Port parity as discussed in Section 4.2.2 of [RFC4787]
  - Port contiguity as discussed in Section 4.2.3 of [RFC4787] (i.e., RTCP=RTP+1)
Benefits

• Does **not overload** the CGN with dedicated ALGs
  – Performance optimization

• **Simplifies** the Session Border Element (SBE)
  – e.g., SBC, P-CSCF, Outbound Proxy Server, etc.
  – Hosted NAT Traversal, media latching, etc can be avoided
  – Avoid overloading SBE and NAT device
    • *No need to issue frequent* REGISTER messages to maintain the NAT binding (case of SIP)
    • Activating Hosted NAT traversal in some operational network elements (e.g., SBC) impact severely the overall performance of the device (up to 60%)

• Works for **unidirectional** media streams (e.g., announcement server, IVR, etc.)
N/N+1 Option Format

This Option:

Name: Port Reservation Option (PORT_RESRV_OPT)
Number: TBA (IANA)
Purpose: Used to retrieve a pair of ports
is valid for OpCodes: MAP
Length: 0
May appear in: both request and response
Maximum occurrences: 1
Deployment Scenario

SIP UA MAY be embedded in the CPE

SIP UA

Embeds a PCP Client

Embeds a PCP Server

DS-Lite CGN

SBE

Internal IP@=192.168.1.2
Internal port number=5060
Transport protocol=UDP

(1) PCP MAP Request
Deployment Scenario

PCP messages are not issued each time a REGISTER message is to be sent. Lifetime of PCP mapping can be set to x hours.
Deployment Scenario

SIP UA

(1) PCP MAP Request

(2) PCP MAP Response

(3) REGISTER

Source IP Address: 192.168.1.2
Source Port Number: 5060

REGISTER sip:registrar.example.com SIP/2.0
To: sip:hostA@example.com
From: sip:hostA@example.com;tag=2112
Via: SIP/2.0/UDP 1.2.3.4:12340;branch=z9hG4bK7778
Call-ID: 1212541455454@example
Contact: "test" <sip:hostA@1.2.3.4:12340>
CSeq: 12 REGISTER
Content-Length: 0
Deployment Scenario

1. PCP MAP Request
2. PCP MAP Response
3. REGISTER
4. REGISTER
5. 200 OK
6. 200 OK

Source IP Address: 1.2.3.4
Source Port Number: 12340

REGISTER sip:registrar.example.com SIP/2.0
To: sip:hostA@example.com
From: sip:hostA@example.com;tag=2112
Via: SIP/2.0/UDP 1.2.3.4:12340;branch=z9hG4bK7778
Call-ID: 1212541455454@example
Contact: "test" <sip:hostA@1.2.3.4:12340>
CSeq: 12 REGISTER
Content-Length: 0
Deployment Scenario

SIP UA

(1) PCP MAP Request
(2) PCP MAP Response
(3) INVITE
(4) INVITE

Source IP Address: 192.168.1.2
Source Port Number: 5060

INVITE sip:hostA@example.com SIP/2.0
To: sip:hostA@example.com
From: sip:hostB@example.com;tag=2112
Via: SIP/2.0/UDP 1.2.3.4:12340;branch=z9hG4bK7778
Call-ID: 1212541455454@example
Contact: "test" <sip:hostB@1.2.3.4:12340>
CSeq: 8612 INVITE
Content-Type: application/sdp
Content-Length: 220

o=- 25678 753849 IN IP4 1.2.3.4
c=IN IP4 1.2.3.4
m=audio 18684 RTP/AVP 0 8

Embds a PCP
Client

Embds a PCP
Server

DS-Lite CGN

External IP=1.2.3.4
External ports=18684 and 18685

SBE

No need to issue these requests for each new session. Pair of ports may be reserved each x hours.
Deployment Scenario

(1) PCP MAP Request
(2) PCP MAP Response
(3) INVITE
(4) INVITE

Source IP Address: **1.2.3.4**
Source Port Number: **12340**

```
INVITE sip:hostA@example.com SIP/2.0
To: sip:hostA@example.com
From: sip:hostB@example.com;tag=2112
Via: SIP/2.0/UDP 1.2.3.4:12340;branch=z9hG4bK7778
Call-ID: 1212541455454@example
Contact: "test" <sip:hostB@1.2.3.4:12340>
CSeq: 8612 INVITE
Content-Type: application/sdp
Content-Length: 220

o=- 25678 753849 IN IP4 1.2.3.4
c=IN IP4 1.2.3.4
m=audio 18684 RTP/AVP 0 8
```
Deployment Scenario

1. PCP MAP Request
2. PCP MAP Response
3. INVITE
4. INVITE
5. 200 OK
6. 200 OK
7. ACK
8. ACK

Source IP Address: 192.168.1.2
Source Port Number: 15362
Source IP Address: 1.2.3.4
Source Port Number: 18684

Source IP Address: 192.168.1.2
Source Port Number: 15363
Source IP Address: 1.2.3.4
Source Port Number: 18685
Next Steps

• All received comments have been covered
  – Thanks Simon
• Adopt it as a WG document?