RADIUS Extensions for CGN Configurations

draft-cheng-behave-cgn-cfg-radius-ext-01

Dean Cheng (dean.cheng@huawei.com)
Jouni Korhonen (jouni.nospam@gmail.com)

82nd IETF Taipei Taiwan
History

- 00 text - merged from two earlier drafts per suggestions
  - draft-cheng-behave-nat44-pre-allocated-ports-02
  - draft-cheng-behave-nat-fwd-port-radius-ext-00
- 00 text presented at RADEXT WG at Quebec meeting
- 00 text was listed as one “potential work” on BEHAVE WG Chairs’ slide at Quebec meeting
- Jouni Korhonen joined the work with much help
- 01 text posted in October
Motivation

- Scenario (in a broadband network)
  - User configuration is stored on a RADIUS server (user profile)
  - User’s broadband connection terminates at a BNG
  - CNG (e.g. NAT44) can be co-located on a BNG

- Problem to solve
  - For subscriber based CGN parameters, how to leverage the existing infrastructure in broadband network to configure & manage them?

- Solution proposed
  - Pre-configure per-user based CGN parameters on RADIUS server
    - Limit of IP sessions
    - Port forwarding mapping
    - These parameters propagated to BNG/CGN via RADIUS at user registration time
  - BNG/CGN conveys IP session allocation/deallocation details to RADIUS server
Configure NAT44 TCP/UDP Session Limit via RADIUS

User profile:
Username pwd, IPv4 address, CGN TCP/UDP, Session Limit

User

Service Request

BNG

NAT44/NAS

Access Request

Access-Accept

• CGN-Session-Limit (TCP/UDP ports)

Service Granted
(other parameters)

(NAT44 external port allocation and IPv4 address assignment)

AAA
Server

User profile:
Username pwd, IPv4 address, CGN TCP/UDP, Session Limit

Account Request

• CGN-Session-Limit (TCP/UDP ports)

PPPoe/DHCP

RADIUS
Change NAT44 TCP/UDP Session Limit via RADIUS

User profile: Username pwd, IPv4 address, CGN TCP/UDP, Session Limit

TCP/UDP Port Limit (1024)

CoA Request
- CGN-Session-Limit (TCP/UDP ports)

TCP/UDP Port Limit (2048)

CoA Response
- CGN-Session-Limit (TCP/UDP ports)
# CGN-Session-Limit Attribute

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Length</th>
<th>ST</th>
<th>Session Limit</th>
</tr>
</thead>
</table>

**Type** - TBA1 for CGN-Port-Limit

**Length** - 5 octets, total length of this attributes including Type and Length

**ST** - Session Type (8 bit) contains an enumerated value that indicates the applicability of the Session Limit as follows:

- 0: The limit as specified is applied to the sum of TCP ports, UDP ports and ICMP identifiers.
- 1: The limit as specified is applied to the sum of TCP ports and UDP ports.
- 2: The limit as specified is applied to TCP ports.
- 3: The limit as specified is applied to UDP ports.
- 4: The limit as specified is applied to ICMP identifiers.
- 5-255: These values are undefined.

**Session Limit** - This field contains the maximum number that is imposed to the total number of TCP ports, or UDP ports, or the sum of the two, or ICMP Identifiers, or the sum of the three, depending on the value in the Session Type field, that the specific user can use during CGN operation.
Report NAT44 TCP/UDP Port Allocation Range via RADIUS

User profile: Username pwd, IPv4 address, CGN TCP/UDP, Session Limit

CGN allocates a TCP/UDP port range for the user

CGN de-allocates a TCP/UDP port range for the user
CGN-Session-Range Attribute

Type - TBA2 for CGN-Alloc-Port-Range
Length - (12 plus the length of Local Session ID) octets

ST (Session Type) - 8 bits,
This field contains an enumerated value (refer to Section 4.1) that indicates the semantics of the Session Range.

A-bit Flag -
0: The specified range is for allocation.
1: The specified range is for de-allocation.
Reserved – set to zero by sender and ignored by receiver.

External Session Range Start:
This field contains the smallest TCP/UDP Port number or the smallest ICMP identifier number in the session range, which contains consecutive TCP/UDP ports or ICMP identifiers, depending on the value of Session Type.

External Session Range End:
This field contains the largest TCP/UDP Port number or the largest ICMP identifier number in the session range, which contains consecutive TCP/UDP ports or ICMP identifiers, depending on the value of Session Type.

External IPv4 Address:
This field contains the IPv4 address assigned to the associated subscriber to be used in the external realm.

Local Session ID:
This is an optional field and if presents, it contains a local session identifier at the customer premise, such as MAC address, interface ID, VLAN ID, PPP sessions ID, VRF ID, etc. The length of this field equals to the total attribute length minus 12 octets.
NAT44 Port Forwarding Configuration via RADIUS

User

Service Request

BNG
NAT44/NAS

Service Granted
(other parameters)

AAA Server

User profile:
Username pwd
IPv4 address
Internal port
External port

Access Request

Access-Accept
• CGN-Port-Forwarding-Map

Account Request
• CGN-Port-Forwarding-Map

PPPoE/DHCP

RADIUS

(User creates a port mapping for the user, and associates it with the internal and external IP address)
Change NAT44 TCP/UDP Port Mapping via RADIUS

User profile:
- Username pwd
- IPv4 address
- Internal port
- External port

User

PPPoe/DHCP

BNG
NAT44/NAS

AAA
Server

CoA Request
- CGN-Port-Forwarding-Map

CoA Response
- CGN-Port-Forwarding-Map
## CGN-Forwarding-Port-Map Attribute

<table>
<thead>
<tr>
<th></th>
<th>Type</th>
<th>Length</th>
<th>AF</th>
<th>Reserved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Internal Port</th>
<th>Configured External Port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Internal IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Type - TBA3 for CGN-Forwarding-Port-Map

Length - Depending on the value of the AF field, the length could be 8, 12 or 24 octets.

AF (Address Family) - 8 bits. This field contains an enumerated value that indicates the address family of the internal IP address for the mapping as follows:

0: no internal IP address
1: The internal address is an IPv4 address.
2: The internal address is an IPv6 address.
3-255: Values not defined.

Internal Port - The internal port for the CGN mapping.

External Port - The external port for the CGN mapping.

Internal IP address - if exists, contains the internal IPv4 or IPv6 address for the CGN mapping.
IANA Considerations (code point request)

- New RADIUS attributes:
  - CGN-Session-Limit (Section 4.1)
  - CGN-Session-Range (Section 4.2)
  - CGN-Forwarding-Port-Map (Section 4.3)
- CGN session type (Section 4.1)
Next step …

- Soliciting comments from BEHAVE WG…
- Requesting to be adopted as a BEHAVE WG document…