Problem

- Stateful NAT44 in CGN
  - Fragile
  - Complex
  - Hard to scale up
  - Hard to log mappings
  - Doesn't like asymmetric routing
  - Etc.
Solution overview

- Each subscriber gets part of an external address (port set)
- The external address and port set are encoded in the internal address that is assigned to the CPE.
- The CPE restricts itself to its allowed port set.
- The stateless NAT44 only translates addresses, extracting the needed information from the address itself.
Address formats

Figure 2: Internal Address format

<table>
<thead>
<tr>
<th>Internal Prefix</th>
<th>External Suffix</th>
<th>Port Set ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3: External Address format

<table>
<thead>
<tr>
<th>External Prefix</th>
<th>External Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Swap

Move

Extract from L4

Check (no change)x3?
Fragment handling

• Address translation depends on L4 port number, therefore fragments need to be reassembled

• Same considerations as NAT64, text adapted from RFC 6146
Non-contiguous port sets

- Optionally, non-contiguous port sets can be used.
- Requires provisioning a port set **mask** to the CPE.

```
|0        |5
+-+-+-+-+-+
|1 1 1 0 1| Port Set ID (length n = 5 bits)
+-+-+-+-+-+
& & & & &
+-+-+-+-+-+
|1 1 1 1 1| Port Set Mask
+-+-+-+-+-+
| | | | |
V V V V V
+-+-+-+-+-+
|1 1 1 0 1 x x x x x x x x x| Port Set = 59392-61439
+-+-+-+-+-+
|0                                |16

|0        |8
+-+-+-+-+-+
|0 0 1 0 1 1 1 1| Port Set ID (length n = 8 bits)
+-+-+-+-+-+
& & & & & & & &
+-+-+-+-+-+
|0 0 1 1 1 1 1 1| Port Set Mask
+-+-+-+-+-+
| | | | | | |
V V V V V V
+-+-+-+-+-+
|x x 1 0 1 1 1 1 x x x x x x x x| Port Set = 12032-12287, 28416-28671,
+-+-+-+-+-+
|0                                |16
        44800-45055, 61184-61439
```
Advantages

- Stateless CGN
  - No logging
  - Robust, scalable, etc.
  - Allows asymmetric routing (careful with fragments)
- Minimal modifications to CPE
  - A vanilla Linux home router can do this today.
- Fits into existing infrastructure and operational practices
- Very flexible port set definition
How is this different from...

- SD-NAT44 [draft-penno-softwire-sdnat-01]
  - SD-NAT has per-customer state. SLNAT44 has no state at all.
  - SLNAT44 supports non-contiguous port sets.
  - SLNAT44 has no signaling between CGN and CPE.
  - SD-NAT44 has been dropped from draft -02.
- MAP, 4rd
  - SLNAT44 is IPv4-only, no impact on IPv6.
Next steps

• Is Sunset4 interested in this draft?
• What would be the next steps to progress this draft?