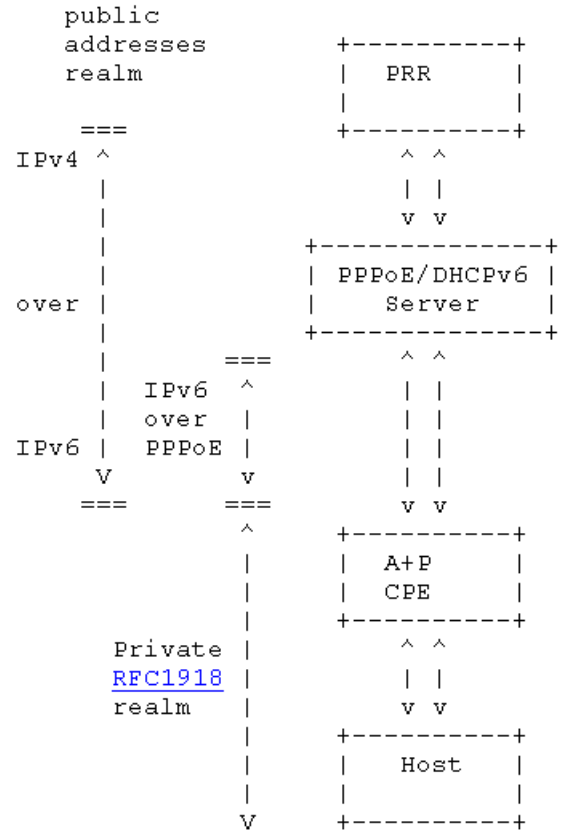
A+P implementations

X.Deng
M. Boucadair T.Zheng
L.Wang
France Telecom

X.Huang Q.Zhao
Yan.Ma
BUPT

Implementation Overview

- Network Topology

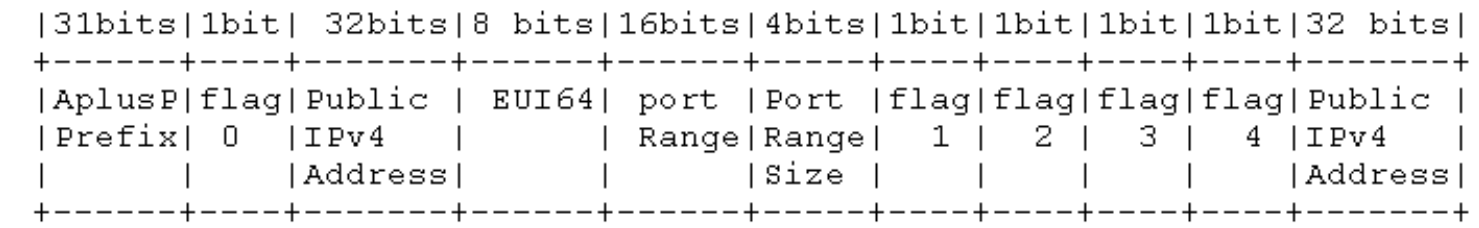


- CPE Parameters

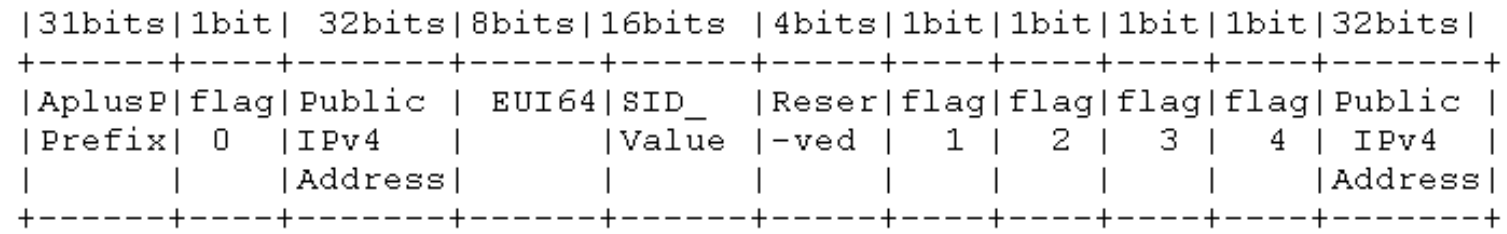
Model	CPU Speed (MHz)	Flash (MB)	RAM (MB)	Wireless NIC	Wireless Standard	Wired Ports
Linksys WRT54GS	200	8	32	Broadcom (integrated)	11g	5

Two flavor of implementations

- Port Range A+P



- Scattered Port Sets A+P



Scattered ports provisioning

- What's the benefits of provisioning scattered ports?
  - For incoming ports
  - Scattered ports allocation is more likely to satisfy the random incoming port requests from applications
    - such as eMule, uTorrent,sharez, using UPnP 1.0

- A solution
  - to distribute bulks of non-continuous ports among subscribers,
  - also takes port randomization into account

How to provision scattered ports?

- Only two parameters
- Subscribers ID pattern

1st	2nd	3rd	4th	5th	6th	7th	8th
0	s	0	0	s	0	s	0
9th	**10th**	**11th**	**12th**	**13th**	**14th**	**15th**	**16th**
s	0	s	0	0	0	0	0

- Subscribers ID value

1st	2nd	3rd	4th	5th	6th	7th	8th
1	**0**	1	1	**0**	1	**0**	1
9th	**10th**	**11th**	**12th**	**13th**	**14th**	**15th**	**16th**
0	1	**1**	1	1	1	1	1

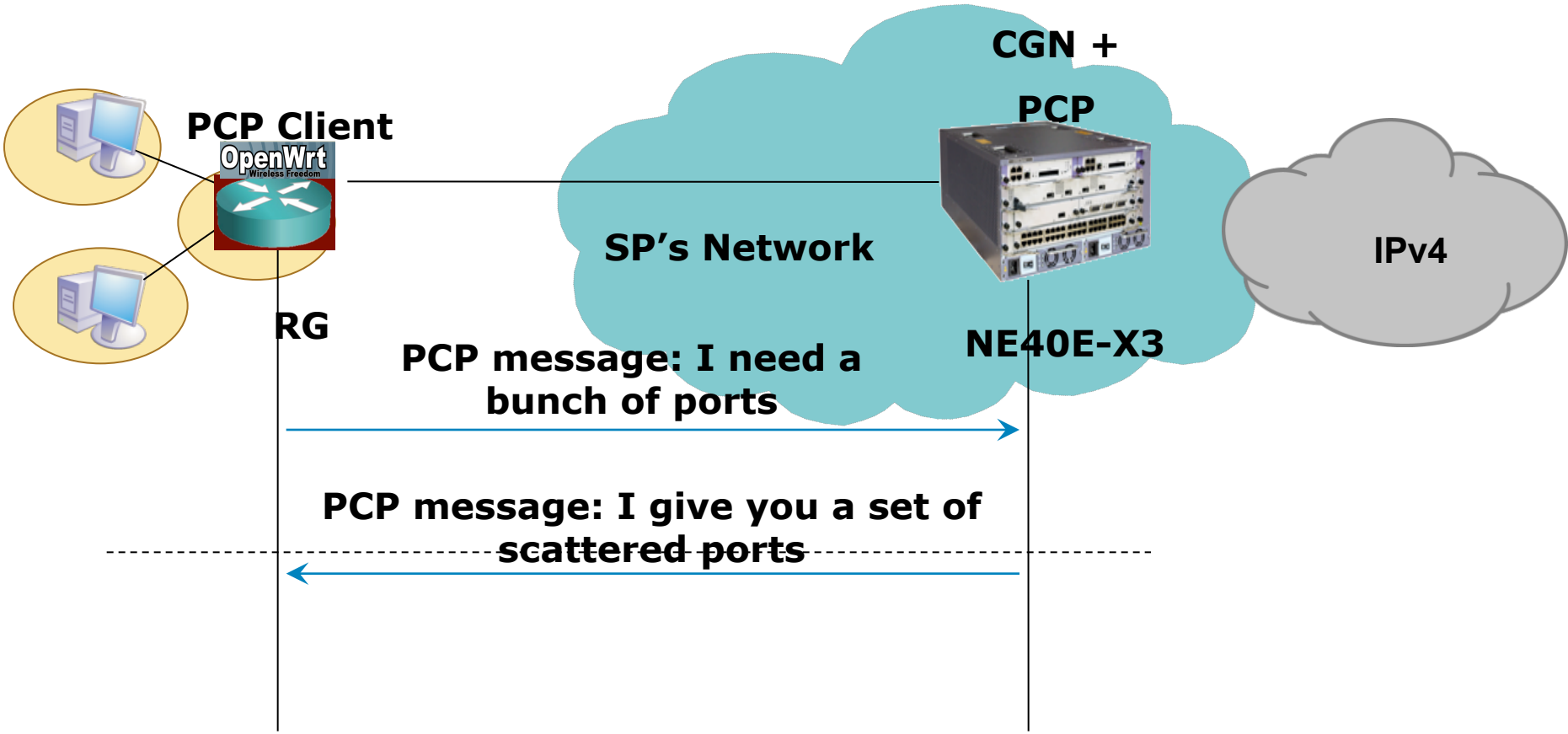
Random ephemeral port selection for Scattered Port Sets NAT

- Subscribers ID pattern
- Subscribers ID value

Only one line code needs to be changed!

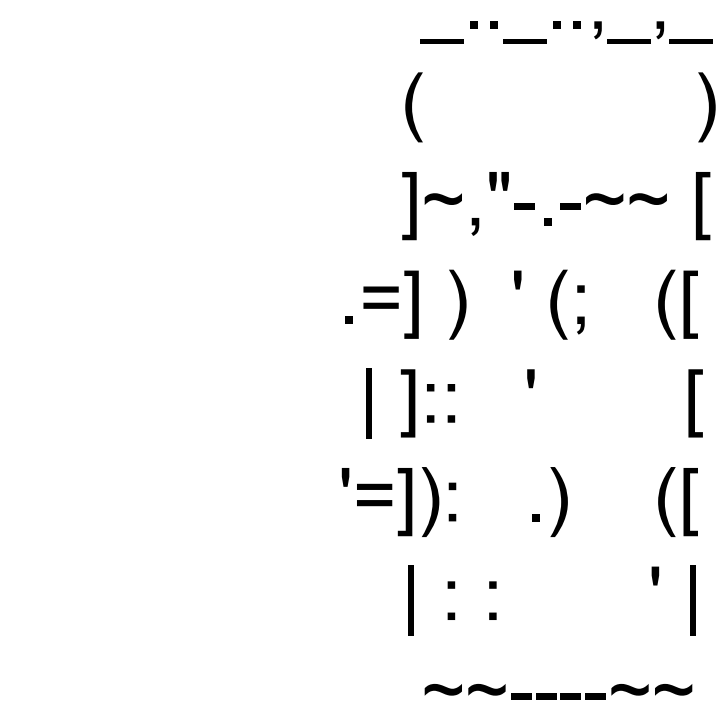
```
do{
    restricted_next_ephemeral = (random()|subscriber_ID_pattern)
                                & subscriber_ID_value;
    if(five-tuple is unique)
    return restricted_next_ephemeral;
}
```

An Implementation of Scattered Port Sets (A demo in DS-Lite case)



Location: **2000D**

Check out website for this demo: http://130.129.48.23:35328/



Thoughts?