

# CGN NAT Bypass

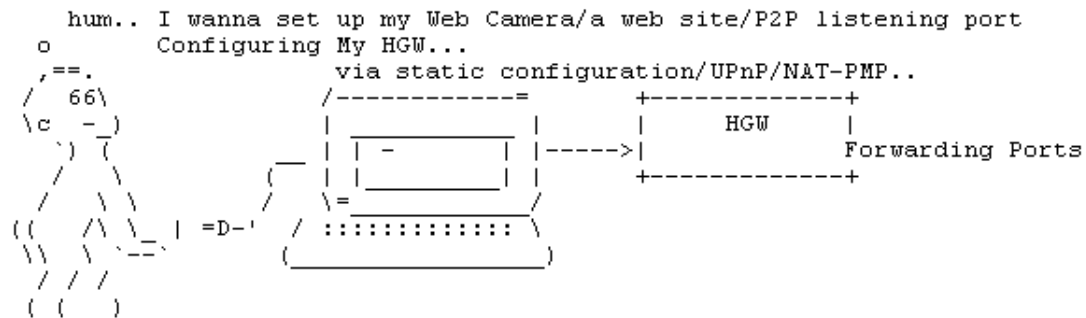
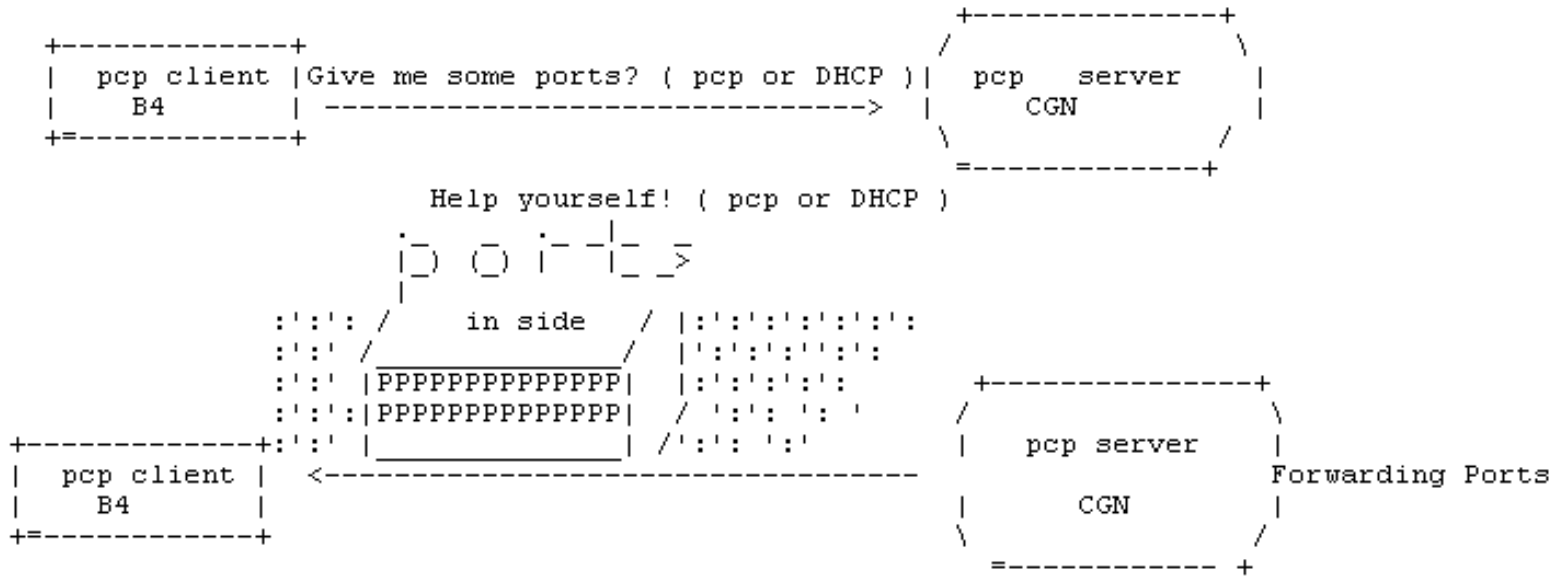
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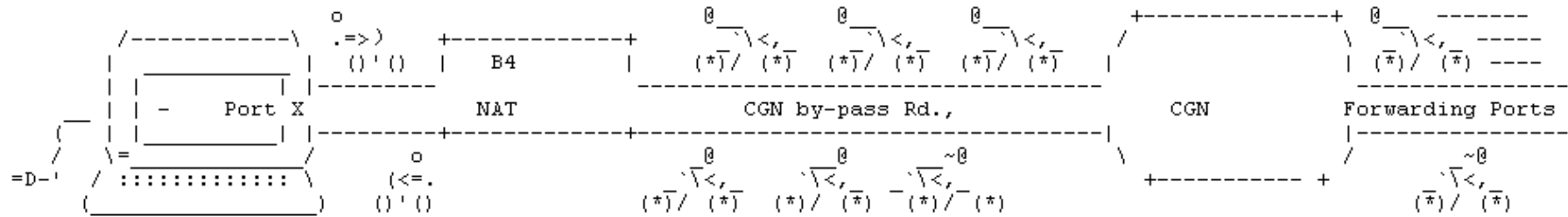
T. Tsou Huawei Technologies (USA)

G. Bajko Nokia

# Core idea



# How it works



- **Outbound Session**
  - B4 behaviors
    - NAT & Encapsulation
  - AFTR behaviors
    - De-capsulation & forward
  
- **Inbound Session**
  - AFTR behaviors
    - Encapsulation & port forwarding
  - B4 behaviors
    - De-capsulation & NAT

# 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 within the restricted port for CPE NAT

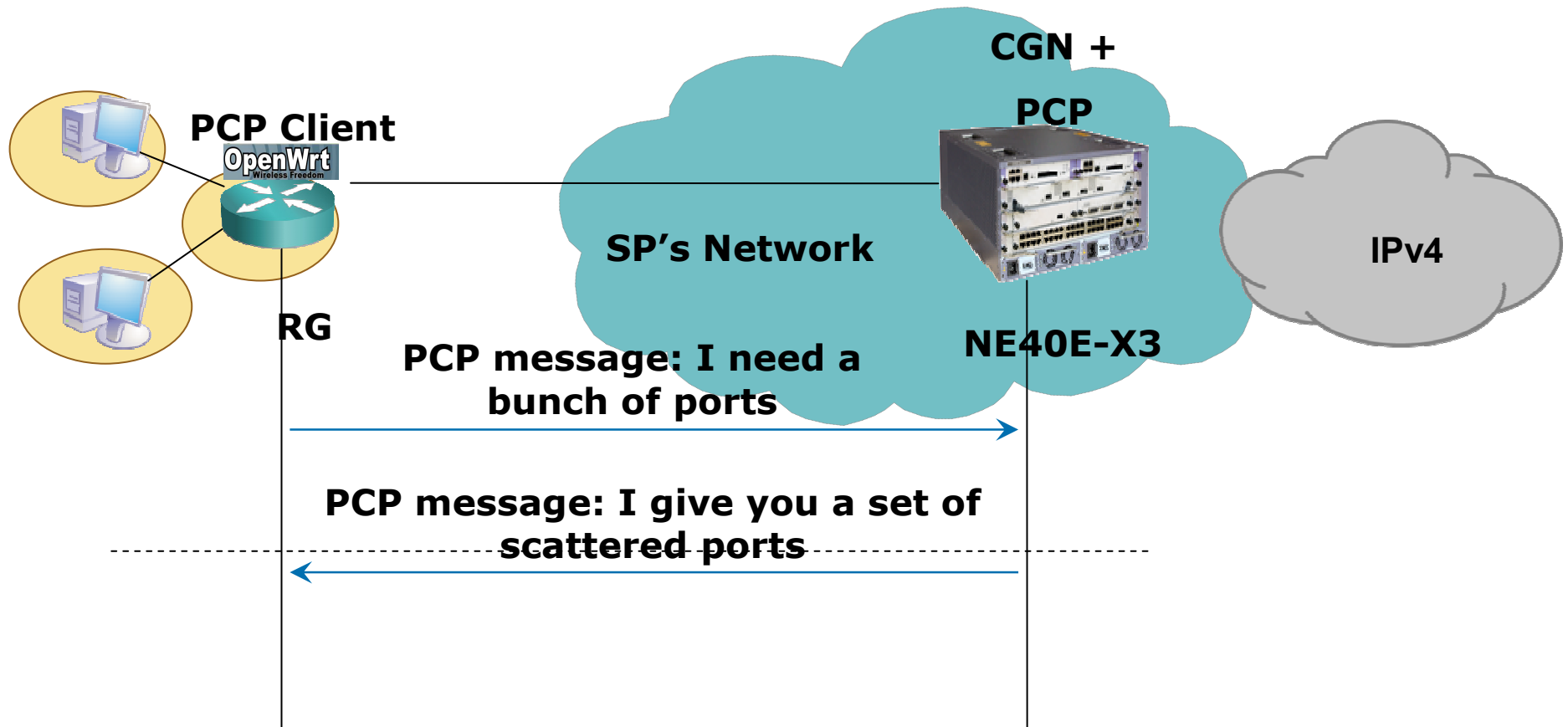
- Subscribers ID pattern
- Subscribers ID value

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

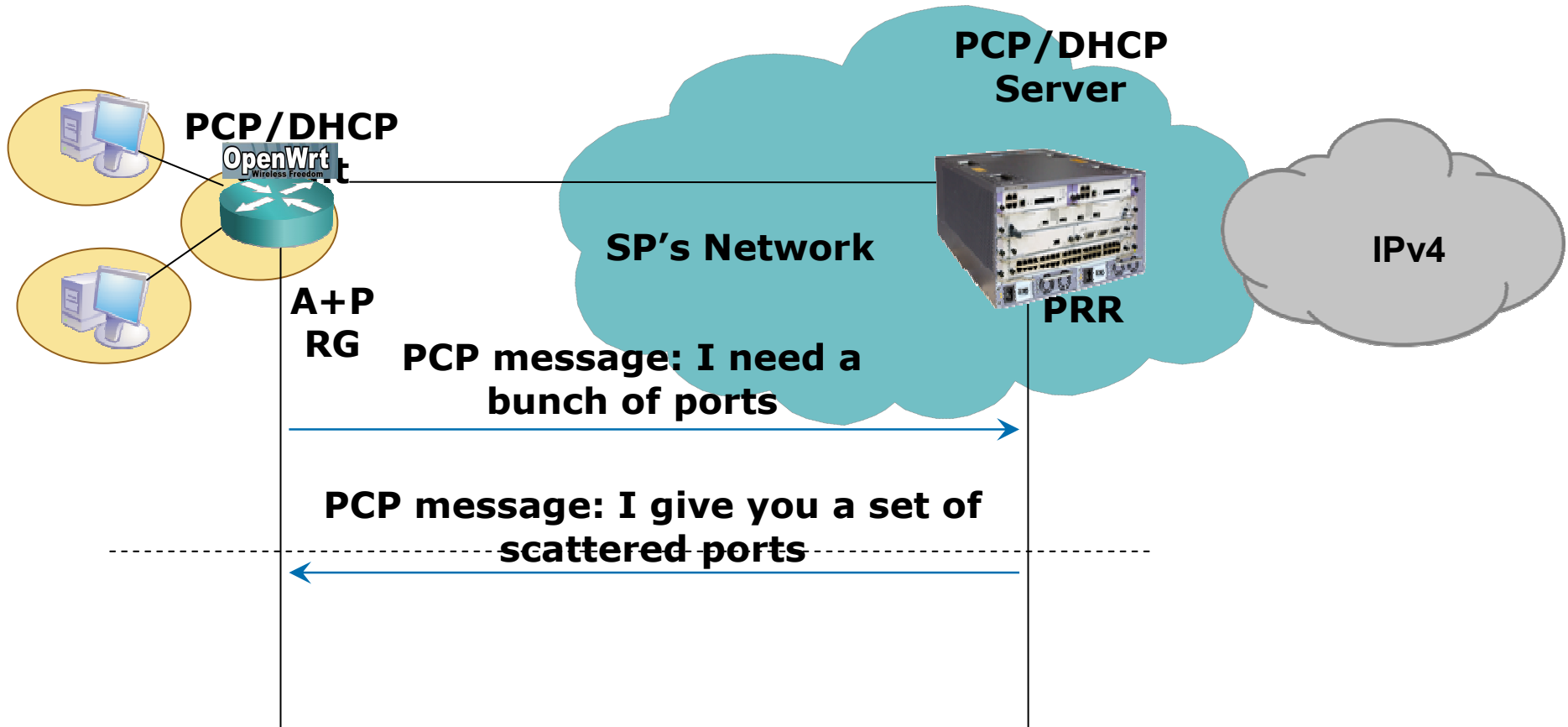
## DS-Lite encapsulation (demonstrated)



Location: 2000D

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

# Alternative implementation A+P encapsulation





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Thoughts?