

Lightweight 4over6 in access network

draft-cui-softwire-b4-translated-ds-lite-04

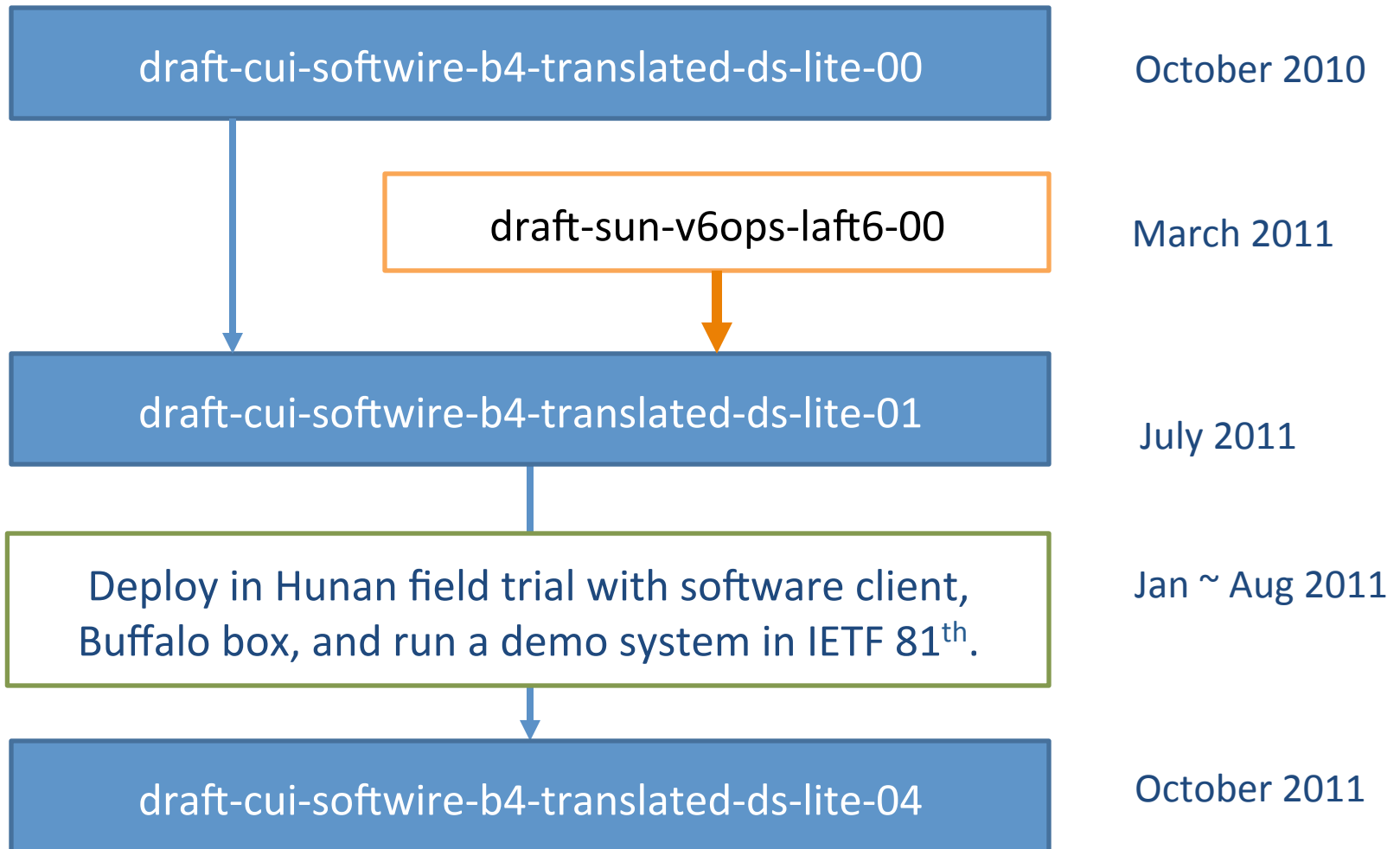
Y. Cui, P. Wu : Tsinghua University

Q. Sun, C. Xie : China Telecom

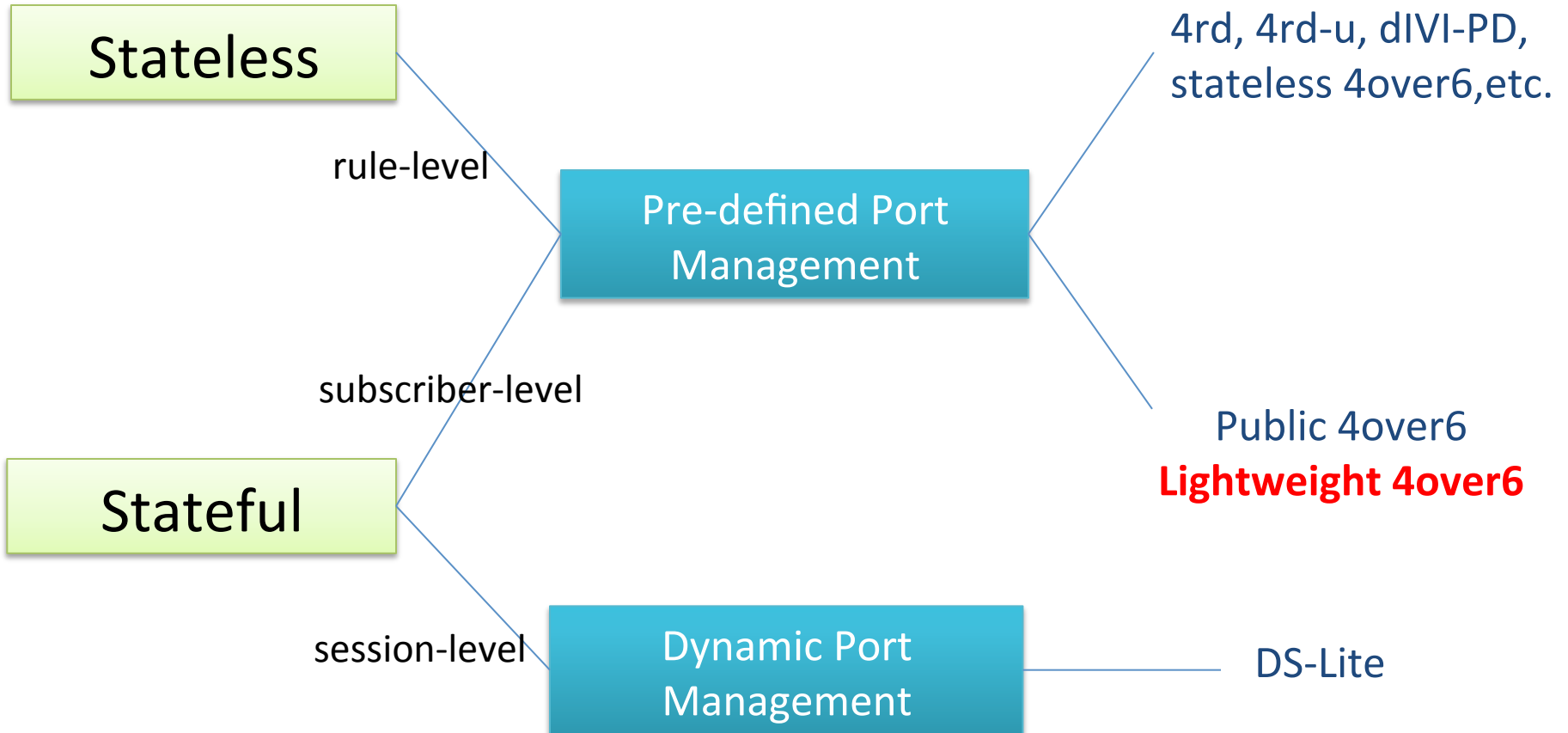
Y. Lee: Comcast

C. Zhou and T. Tsou: Huawei Technologies

History of “lightweight 4over6”



Technical Matrix



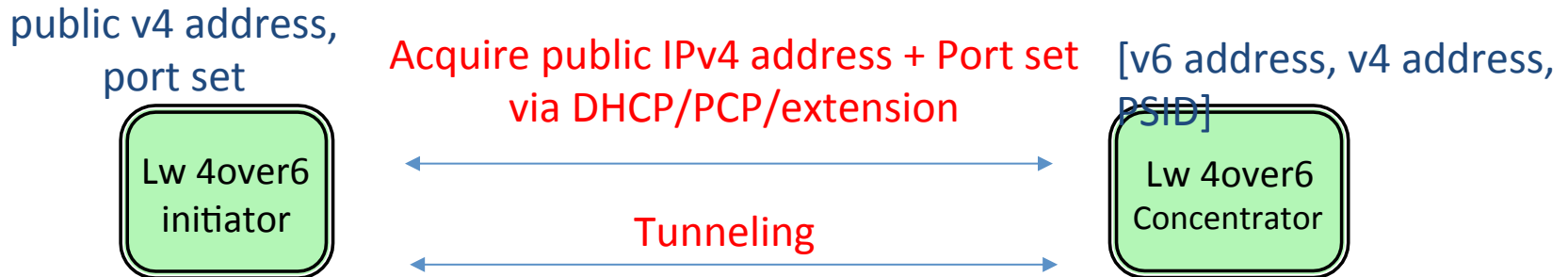
Motivation

- A simple extension for DS-Lite without NAT, and address sharing mode for public 4over6
- Good scalability in centralized deployment
- Easy for traffic logging
- No extra request on address/prefix planning
- On-demand IPv4 address/port set provision
- Flexible port management
- No big impact on CPE when NAT44 has already widely supported

What is Lightweight 4over6 ?

- Lightweight 4over6 is an IPv4-over-IPv6 **hub and spoke mechanism**, which supports **address sharing** to deal with IPv4 address exhaustion, and places the IPv4 **NAT on the initiator side**.

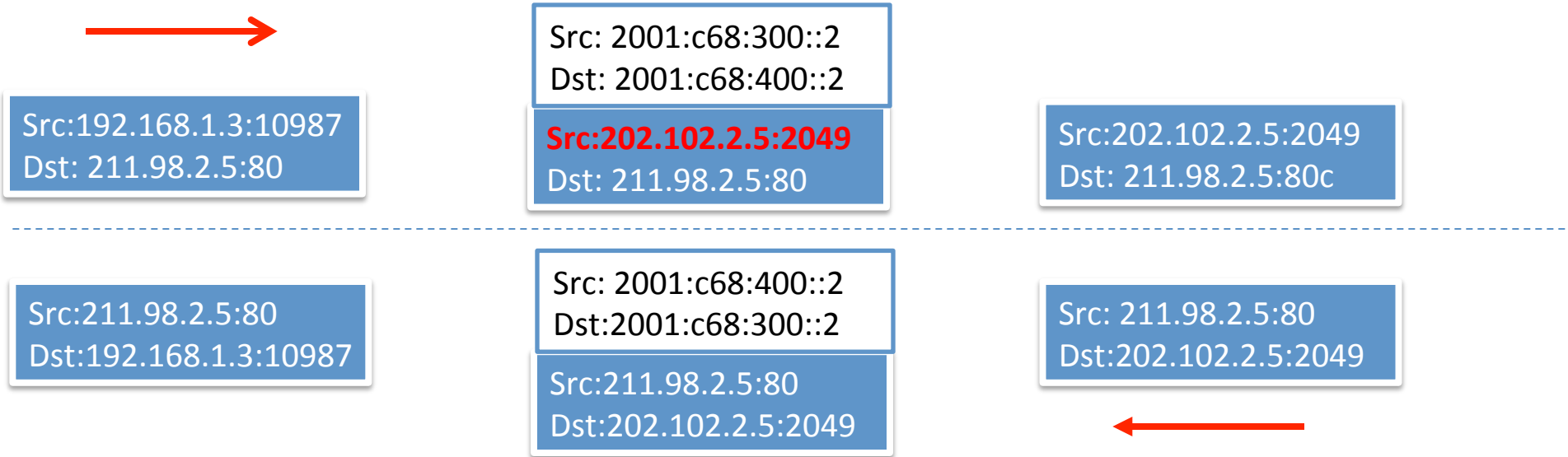
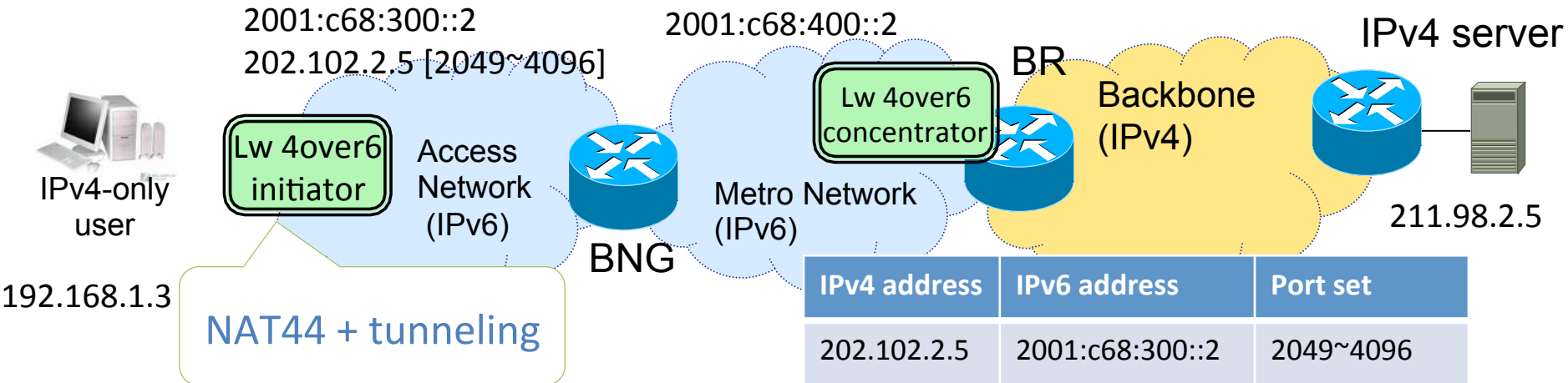
Components



- NAT44 **within restricted port set**
- Tunnel encapsulation/de-encapsulation.
- Subscriber-level binding record
- Tunnel encapsulation/de-encapsulation.
- **No NAT** anymore

Non-continuous port set algorithms (e.g. GMA in the design team) can be introduced to further improve the security.

Lightweight 4over6 Example



Prototype Implementation

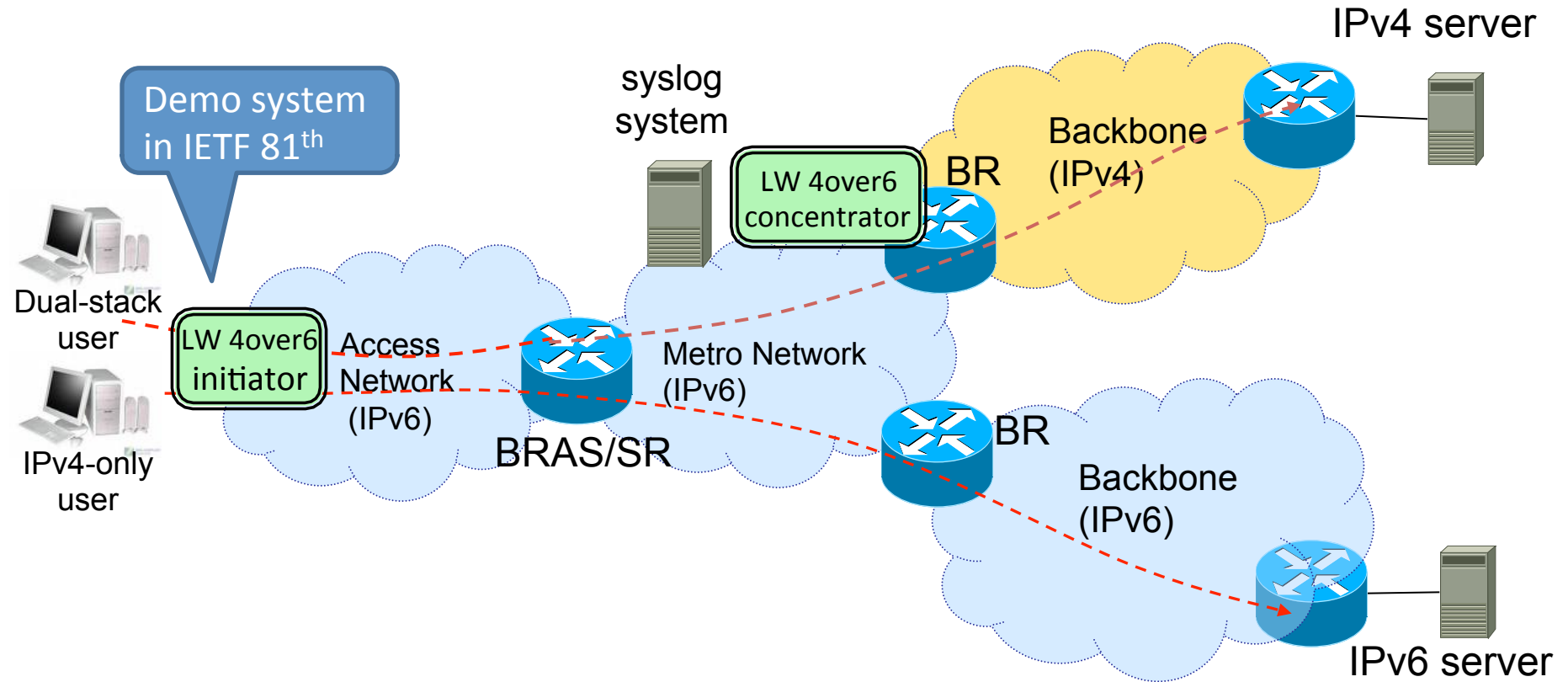


LW 4over6
Initiator



LW 4over6
Concentrator

Our Practice on Commercial Network



- It can be deployed rapidly, with little impact on existing addressing and routing.
- We only need to configure our remaining public IPv4 address pools in concentrator.

Application Test

Application Type	Test Result	Port Number Occupation
Web	ok IE, Firefox, Chrome	normal websites: 10~20 Ajax Flash webs: 30~40
Video	ok, web based or client based	30~40
Instant Message	ok QQ, MSN, gtalk, skype	8~20
P2P	ok utorrent, emule, xunlei	lower speed: 20~600 (per seed) higher speed: 150~300
FTP	need ALG for active mode, flashxp	2
SSH, TELNET	ok	1 for SSH, 3 for telnet
online game	ok for QQ, flash game	20~40

Performance Test

- We have implemented concentrator with B+ tree-based algorithm for subscriber binding.

Subscriber #	100,000	200,000	500,000
Total Tree Height	7	7	8
Lookup Memory Access Number(ave.)	22	23	28
Memory Consumption(ave.)	27.1M	28.2M	32.4M

- Performance test result on a normal PC concentrator:
 - Maximum concurrent subscribers: 500,000
 - Maximum concurrent sessions: 100 million
 - Throughput: 800Mbps

Conclusion

- Lightweight 4over6 is a simple extension for DS-Lite without NAT, and it is an address sharing mode for public 4over6.
- We have verified it in our commercial network.
- It has good scalability, and support a majority of current IPv4 applications.
- It can be deployed rapidly, with little impact on existing addressing and routing.
- It is simple to achieve traffic logging.
- It can be coexistent with DS-Lite easily.

Next Step...

- We have got a lot of online/offline feedback in the WG.
- It is in the milestone of softwire WG charter
 - Jul 2011 Adopt DS-Lite without NAT document as a Working Group document
- *We would like to ask for adoption of WG item*
- Comments and contributions are welcome
 - <http://tools.ietf.org/id/draft-cui-softwire-b4-translated-ds-lite-04.txt>

Thank you 😊

Q&A

NAT offload in Lightweight 4over6

