Lightweight 4over6 in access network
draft-cui-softwire-b4-translated-ds-lite-01

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Background

- Dual-stack lite adopts CGN to deal with the incoming IPv4 exhaustion problem, which maintains per-session mappings on AFTR.

- The huge amount of sessions from the users would cause extra load, hardware cost, and performance issues in AFTR.

- In order to reduce the amount of address mappings on the concentrator, it is reasonable to move the translation from the concentrator to initiators.

What is Lightweight 4over6?

- IPv4-over-IPv6 hub and spoke mechanism
- The tunnel concentrator supports address sharing to deal with IPv4 address exhaustion.
- Session translation is moved to the initiator side.

Broadband Deployment scenarios
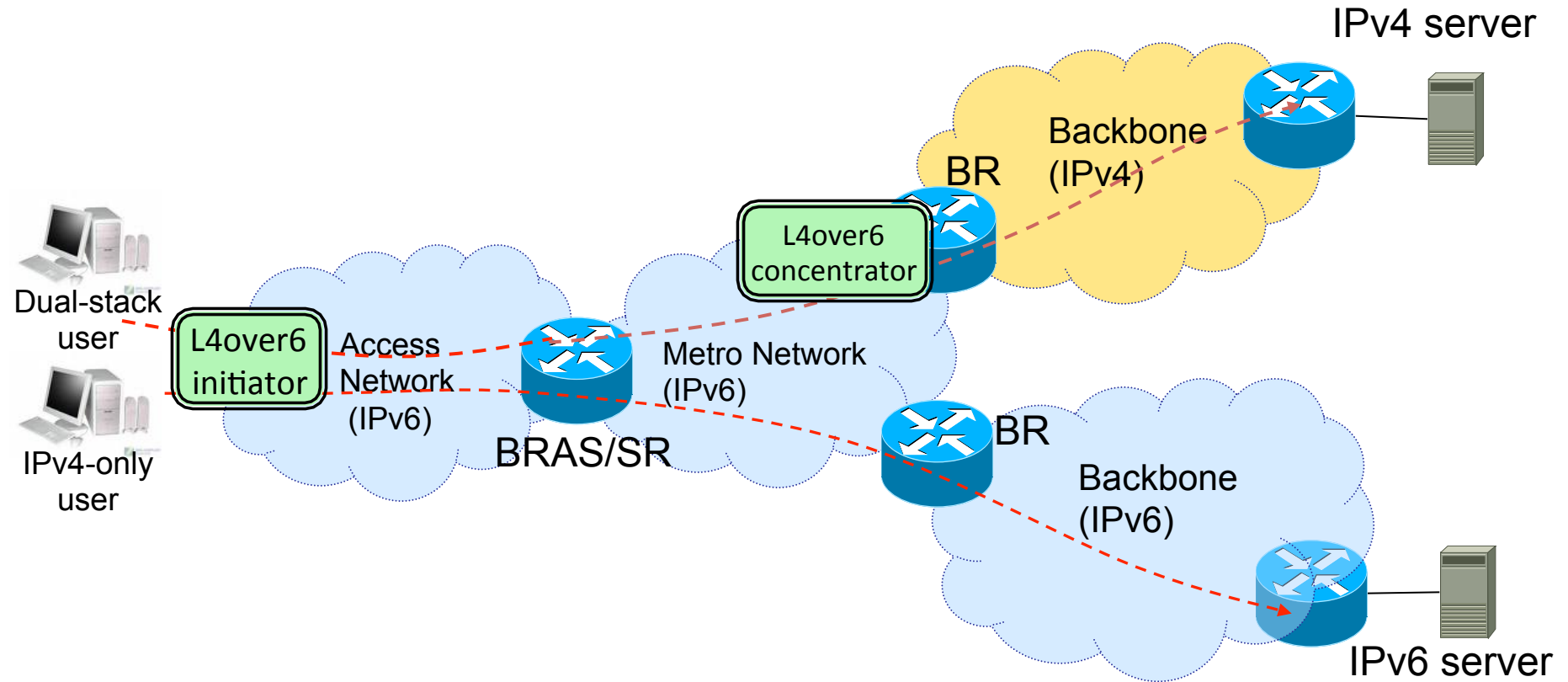
Port Restricted IPv4 Address Allocation

- In order to reduce the time of port allocation time, it is better to allocate IPv4 address with a port range, which is known as "restricted address".
  - Extending DHCP to support address allocation with port range embedded.
  - Extending PCP to support port range control. See [I-D.tsou-pcp-natcoord] for details
  - It can be co-located in concentrator.

Initiator Behavior

- For IPv4 packet sent out with private source address,
  - Performs NAT44 function and translates the source address into public.
  - Encapsulate the packet with concentrator's IPv6 address as destination IPv6 address, and forward it to the concentrator.
- For IPv4-in-IPv6 packet received from the concentrator,
  - De-capsulates the IPv6 packet to get the IPv4 packet with public destination IPv4 address.
  - Performs NAT44 function and translates the destination address into private.

Concentrator Behavior

- The concentrator supports either an extended DHCPv4 server, or an extended PCP server, to allocate port restricted addresses.

- When receiving an IPv4-in-IPv6 packet from an initiator, the concentrator de-capsulates it and forwards it to IPv4 Internet.

- For IPv4 packets received from the Internet, it encapsulates this packet with the destination initiator's IPv6 address , and forwards it to the correct initiator.

Mechanism Analysis

- *Lightweight*:
  - **State-management**: It decreases the state scale on concentrator from per-session level down to per-user level
  - **Addressing**: No specific IPv6 address format is required
  - **Routing**: No extra impact on existing routing infrastructure
  - **Logging**: Reduces logging information can be achieved
  - **State Synchronization**: Relatively more stable state with for HA support.
  - **Little impact on existing infrastructure**: it can support rapid deployment in operational network.
- The costs for achieving all these benefits are extra signaling behavior and per-user states rather than becoming purely stateless.

Trial result

- We have deployed a prototype in Hunan province.

Test Result	Experiment Result
Application test	It can support web, email, IM (QQ, msn, gtalk, etc), ftp, telnet, SSH, video, Video Camera, P2P, online game, voip, and so on.
Operating System test	It can support Win7 and XP.
Access network test	PPPoE, LAN, WLAN, etc
Performance test	The performance test for concentrator is carried out on a normal PC. It can still support more than one hundred million concurrent sessions. Due to limitation of the PC hardware, the overall throughput is about 300Mbps bidirectional.

- Comments and contributions are welcome
  - http://tools.ietf.org/html/draft-cui-softwire-b4-translated-ds-lite-01

Q&A