A+P Lite

How to Keep CGNs from Breaking the Internet

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Problem Statement

Broadband (cable/DSL) and wireless (GSM/3G) providers will not have enough IPv4 space to give a unique IPv4 address to each CPE or terminal so that every consumer has usable IPv4 connectivity.

CGN Breaks the Net

- This cause problems for the carrier, but also for the whole internet, as these captive customers can not use new protocols
- NAT in middle of net has all of the problems of a smart core, the Telco model
- Double NAT == Double Trouble

It's Not NAT44444 It's NATNATNATNAT

This Does Not Have to Happen

Keep the Power of Choice in the Hands of the Users!

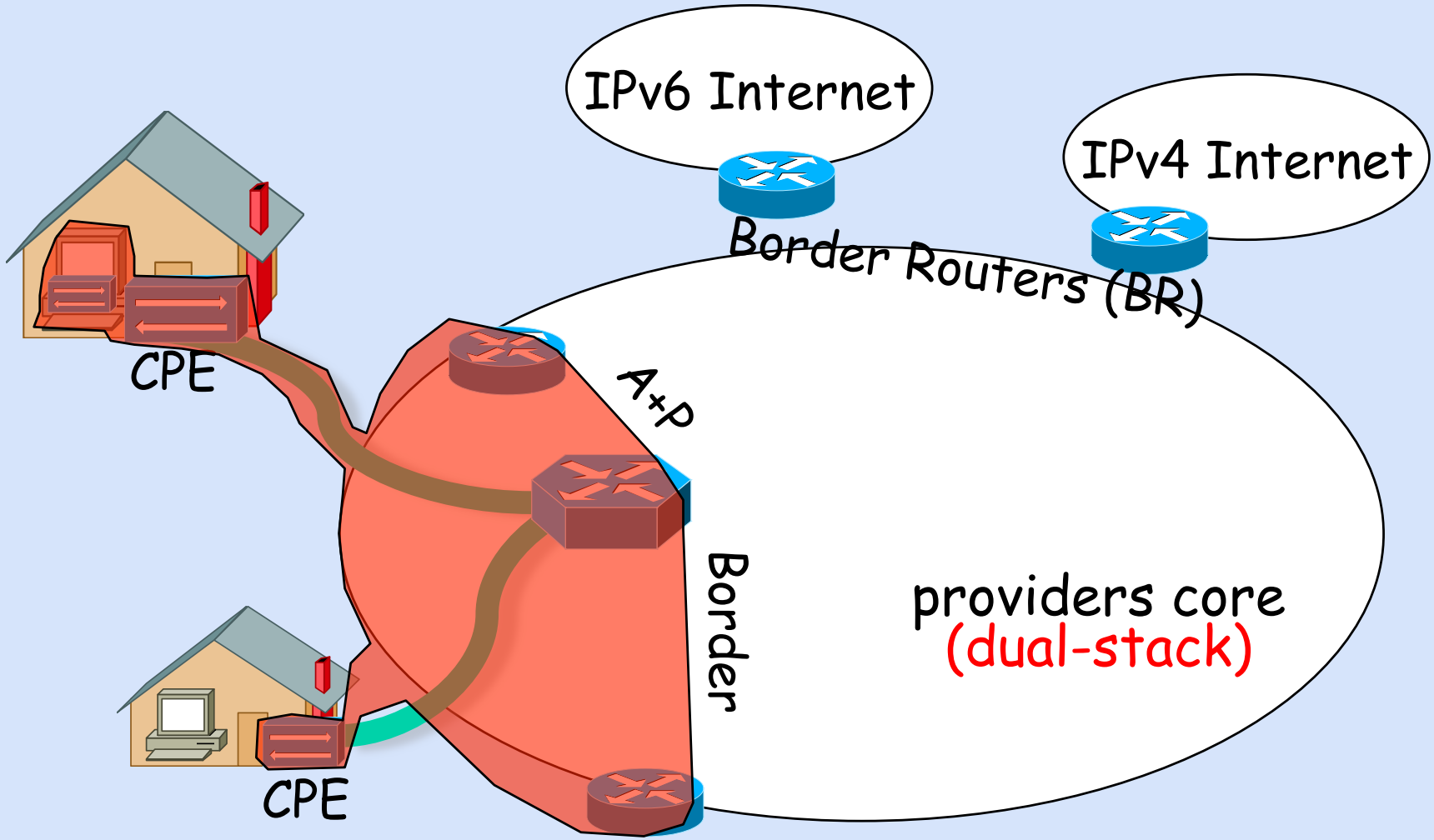
Allow the NAT to be "flexible"

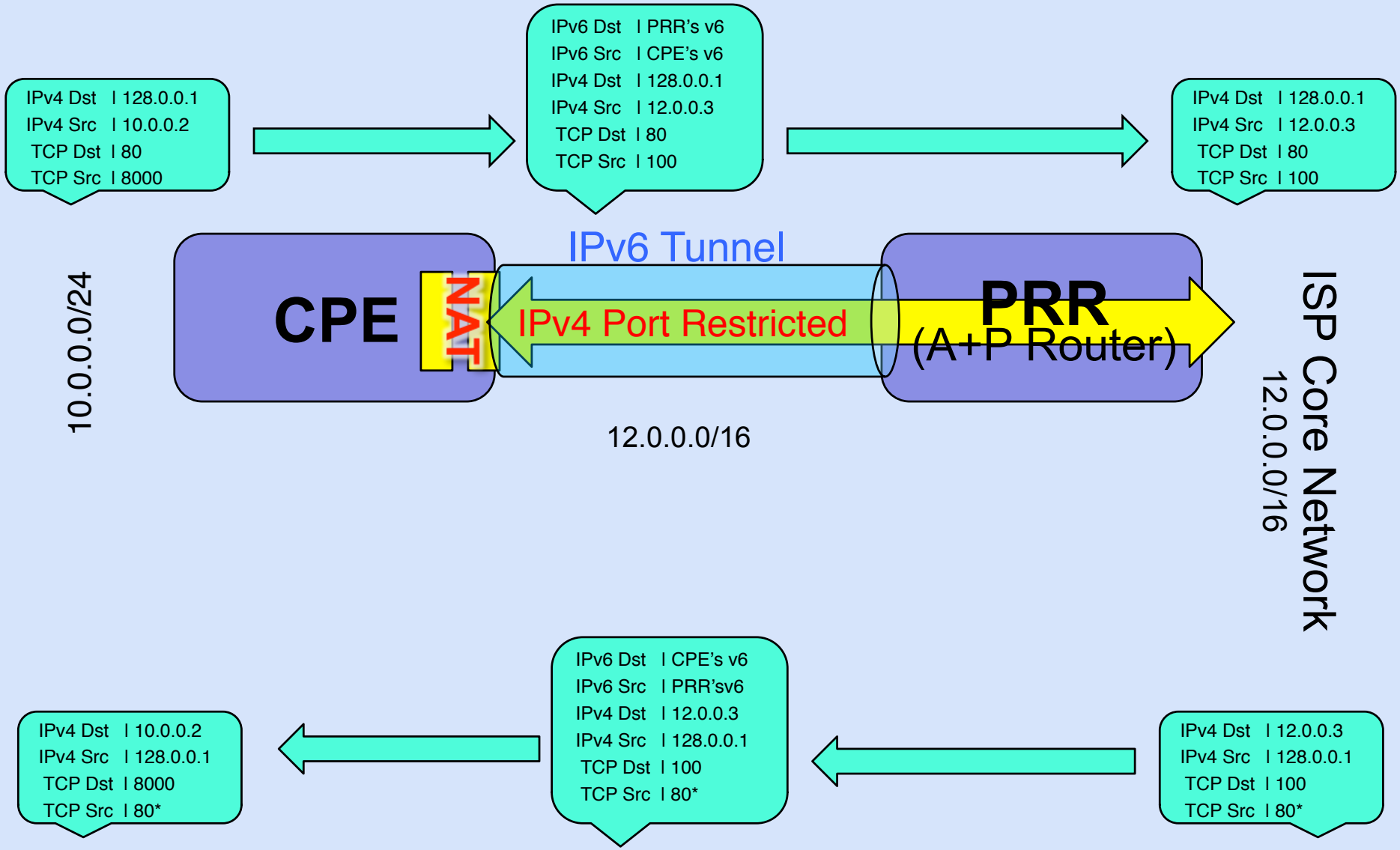
A+P in One Slide

- Goal: mechanism required that **customer can control their "fate".**

- "Steal" bits from Ports and use it for addressing. Same as LSN.
- But do it **at the User CPE**!
- Thus, extend end-to-end connectivity (at least for some ports) to end-user!

A+P Subsystem

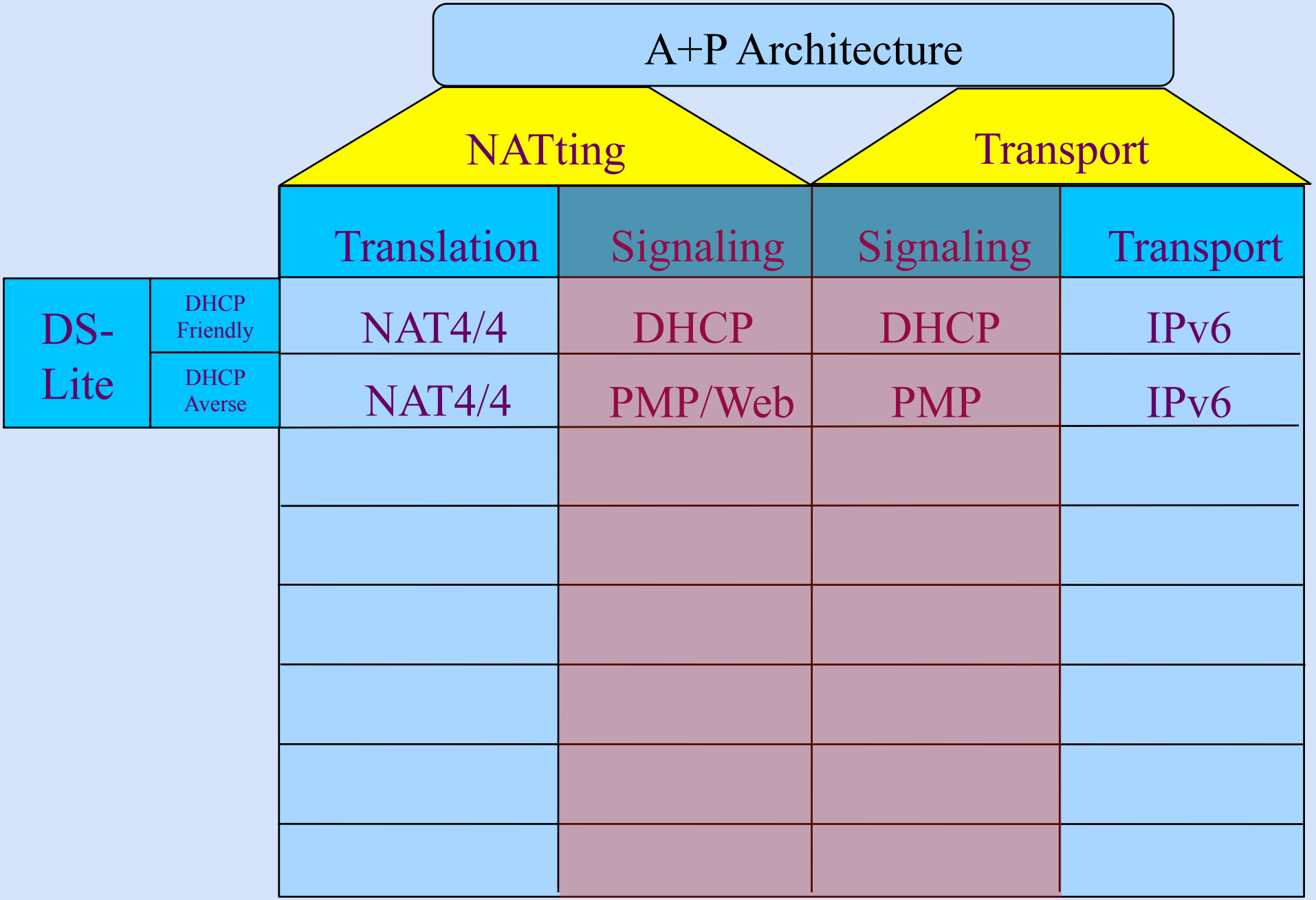




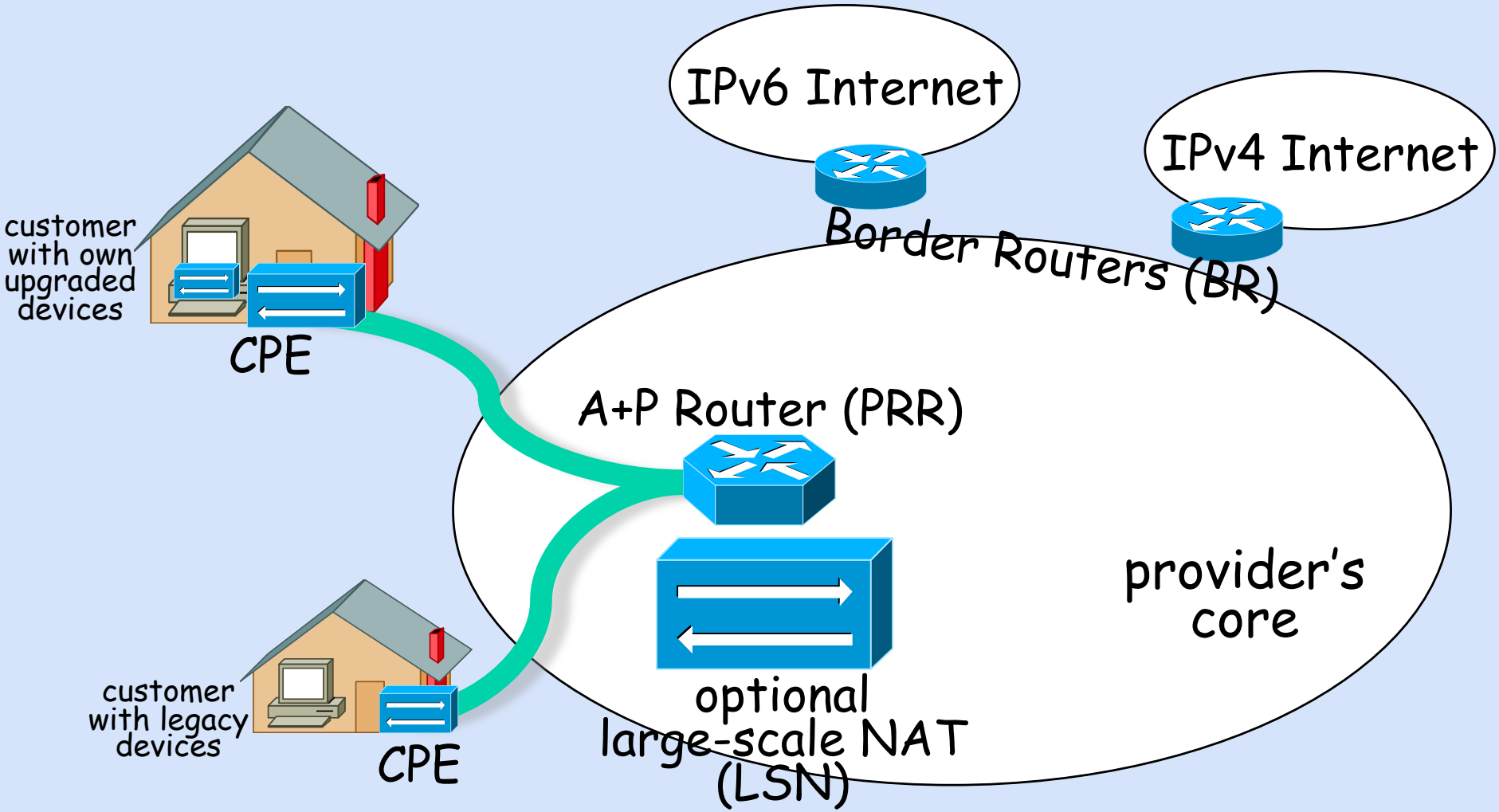
80* - web sites usually port shift the replies

Separable Functions

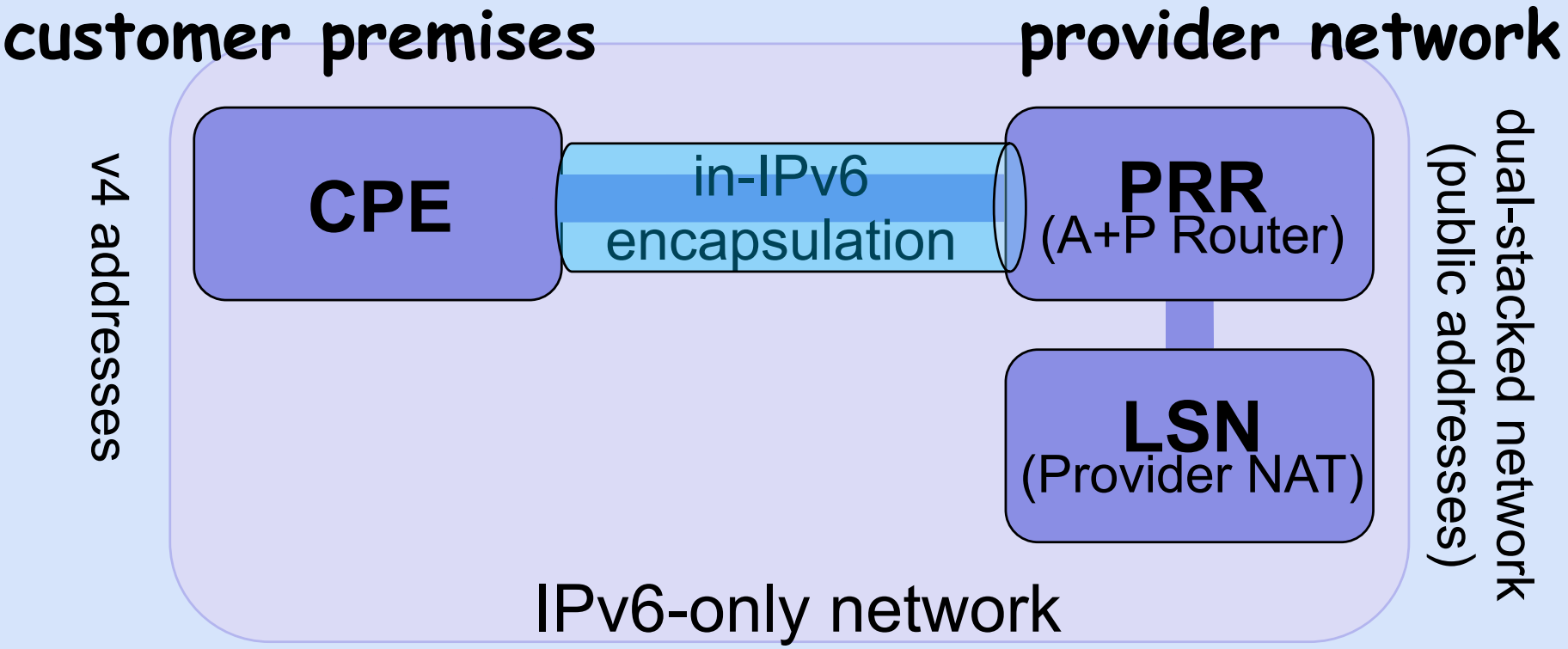
- **Encaps / Decaps**
  - "Softwire" (transport pkts from/to CPE)
  - End-user has control over some *untranslated* ports end-to-end
- **NAT**
  - Inevitable to connect legacy devices
  - But: flexible of where NATing is done


A+P Architecture
NATting
Transport
Translation
Signaling
Signaling
Transport
DS-Lite
DHCP Friendly
NAT4/4
DHCP
DHCP
IPv6
DHCP Averse
NAT4/4
PMP/Web
PMP
IPv6

A+P and DS-Lite

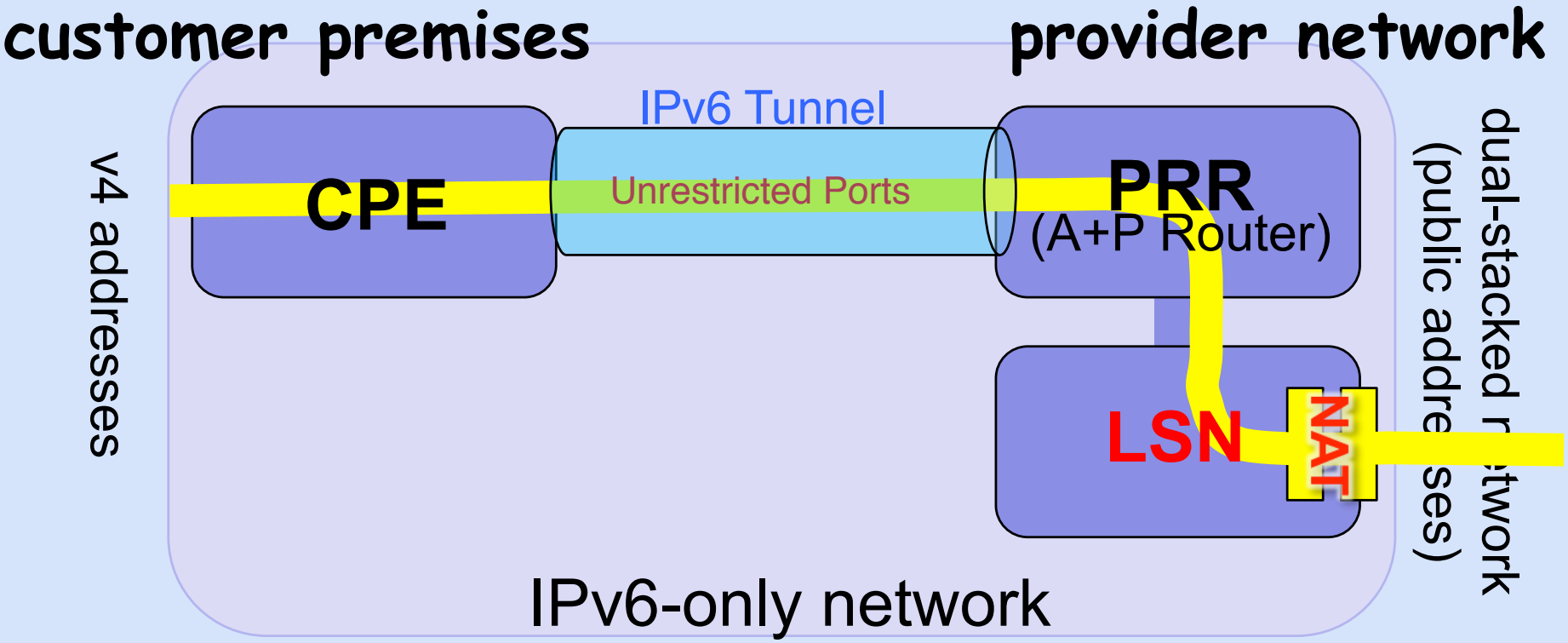


A+P With DS-Lite

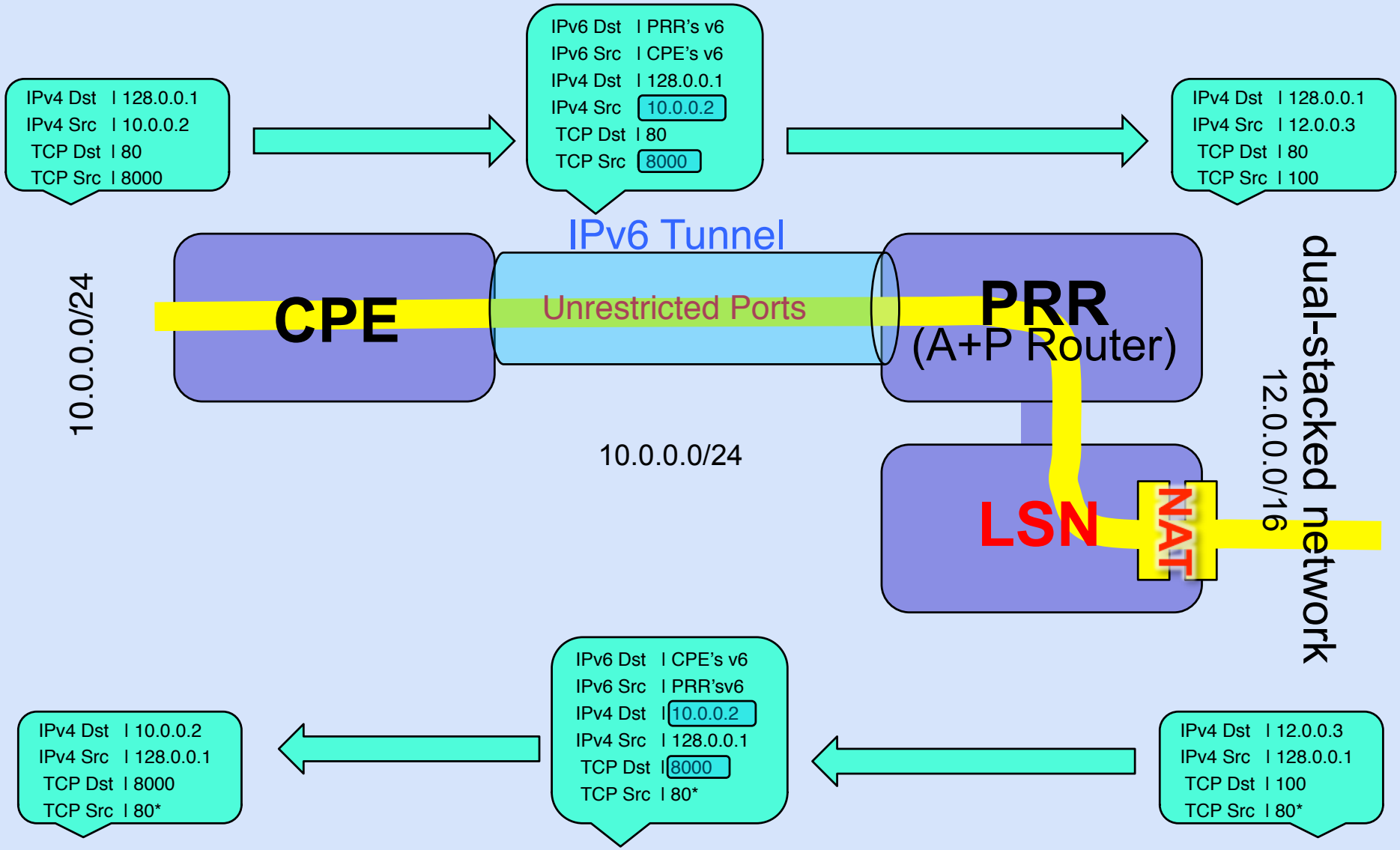


- "A+P pkts" are encapsulated in IPv6
- Could use other encapsulation

DS-Lite NAT at LSN



- Legacy-style DS-Lite, NAT done at LSN
- However, customer could have chosen where NAT is done!



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Same Port-Count Issues as CGN

- Trade-off between port efficiency and signaling
- Measurement studies show port-use per residential customer ~100, peaking at ~700
- We are out of addresses, so we share and this is the consequence. No magic

Status

Large router vendors are currently prototyping this functionality so that we can learn more through actual deployment exercises vs specification by committee

Open Questions

- Signaling mechanisms
- Port restrictions & agility
- Assigned ports and IPv4 address
- Tunnel address of LSN

and your questions…