

From IPv4 only
To v4/v6 Dual Stack
- IETF IAB Technical Plenary -

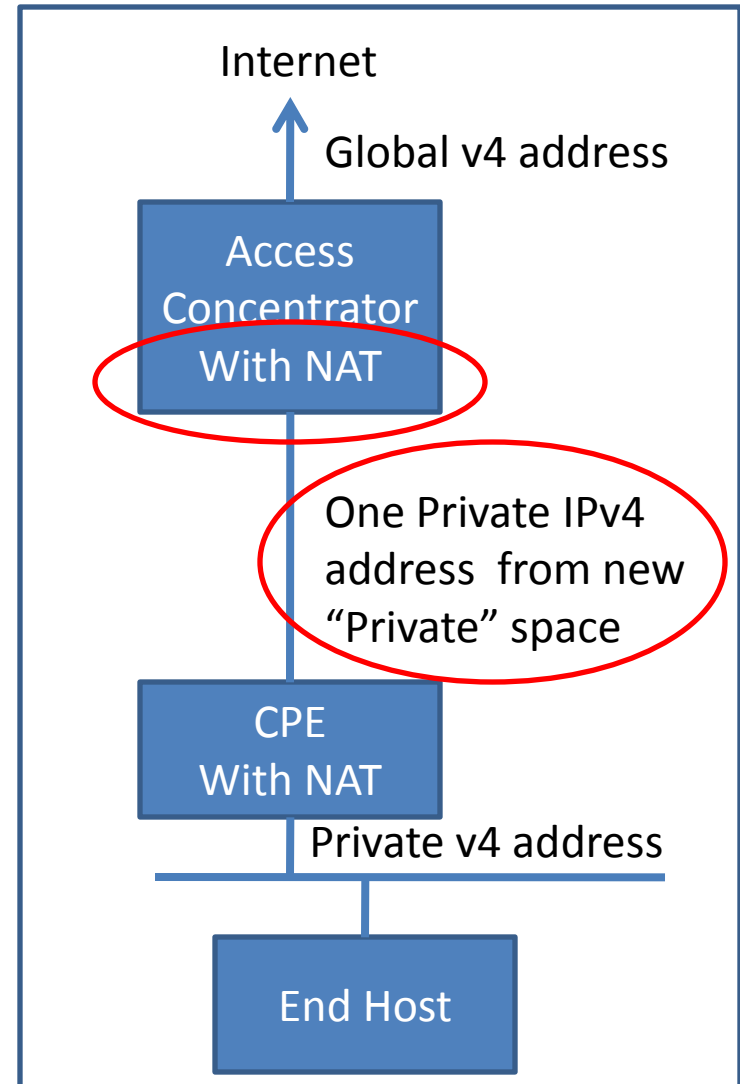
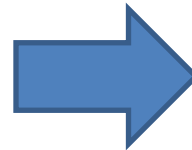
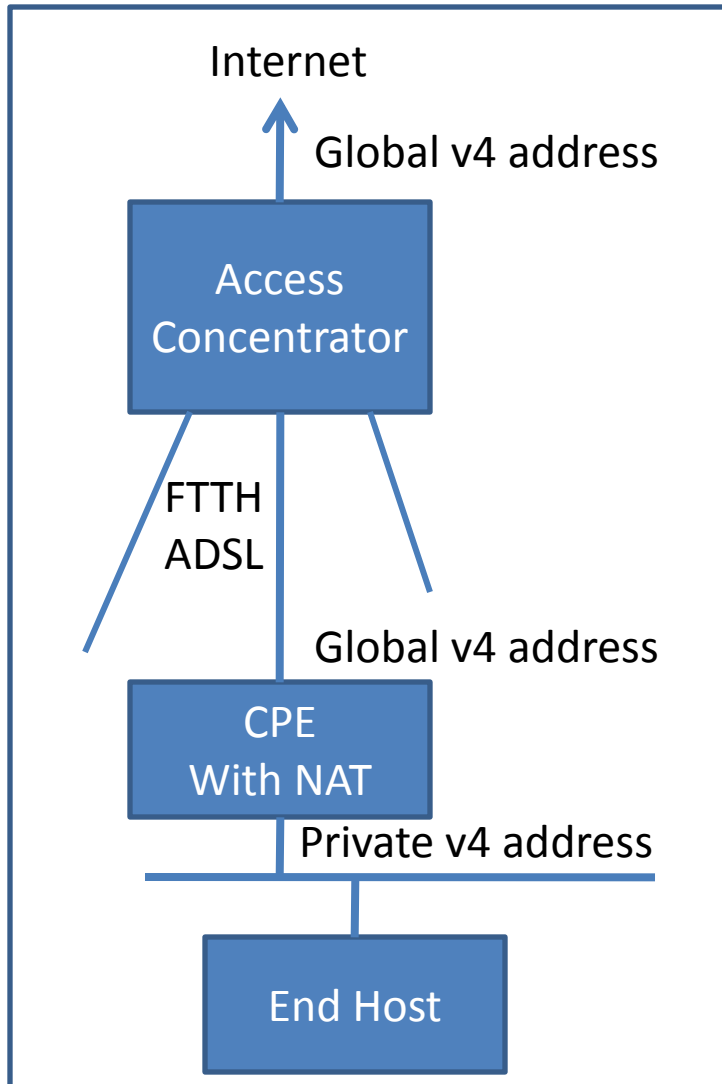
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- You can find the extended version of this presentation at
 - <http://www.nttv6.jp/~miyakawa/IETF72/>

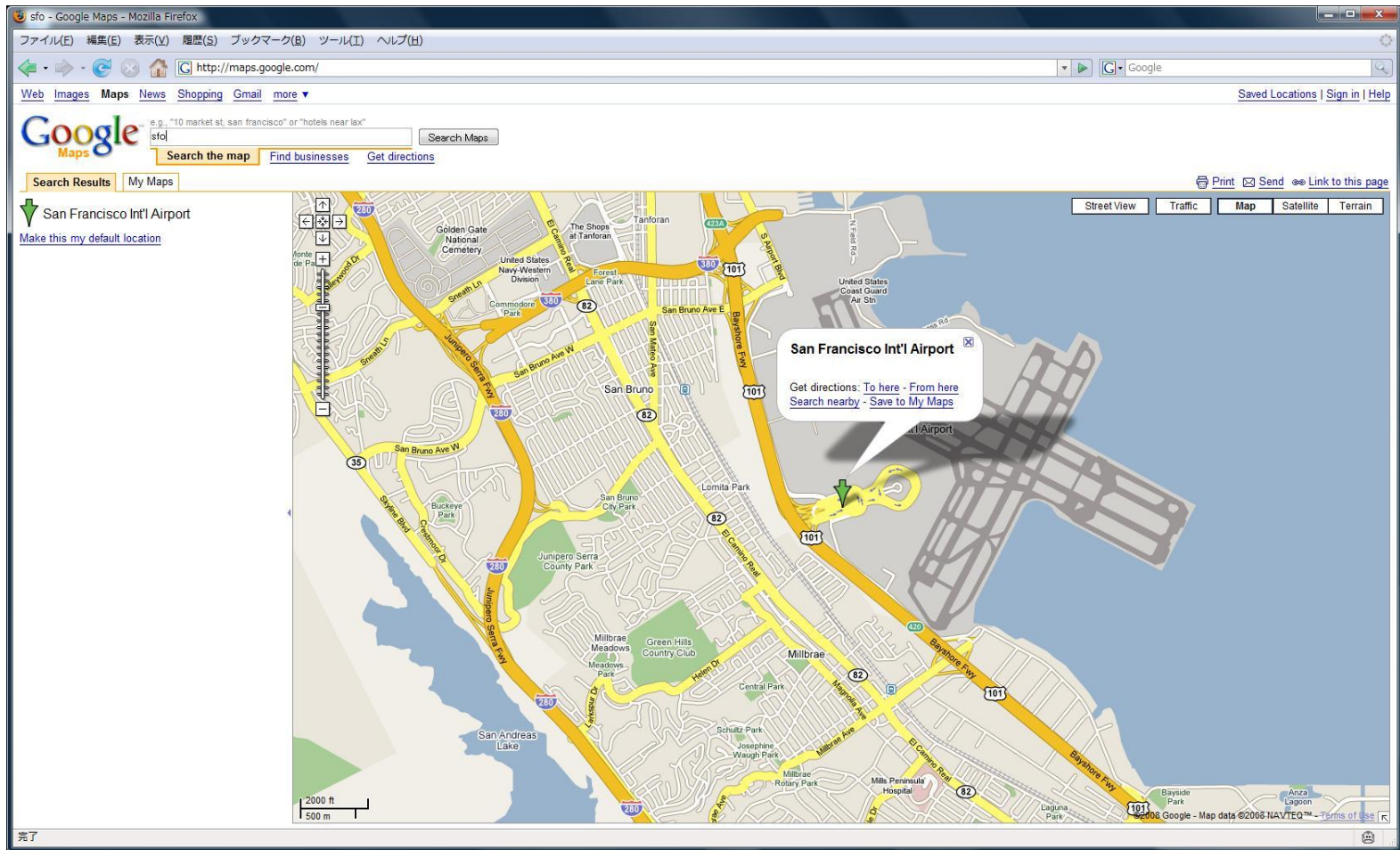
Most conservative access model changes - introducing “Carrier-Grade NAT” -



It looks v6 is not needed ?

- Please do not feel safe. CGN (and any other carrier-grade NAT scheme) has serious restrictions.
- IPv6 is needed !
- Each customer can have only some “limited” numbers of sessions simultaneously.
 - How many ? Let say... 50 ? 30 ? Because “port number” is just 2bytes which means 64K
 - For example, if 2000 customer shares same Global IPv4 address (please note that this is just for example), only 25 or 30 so sessions can be used by each customer at the worst case.
- Which means that:

Max 30 Connections



Max 20 Connections

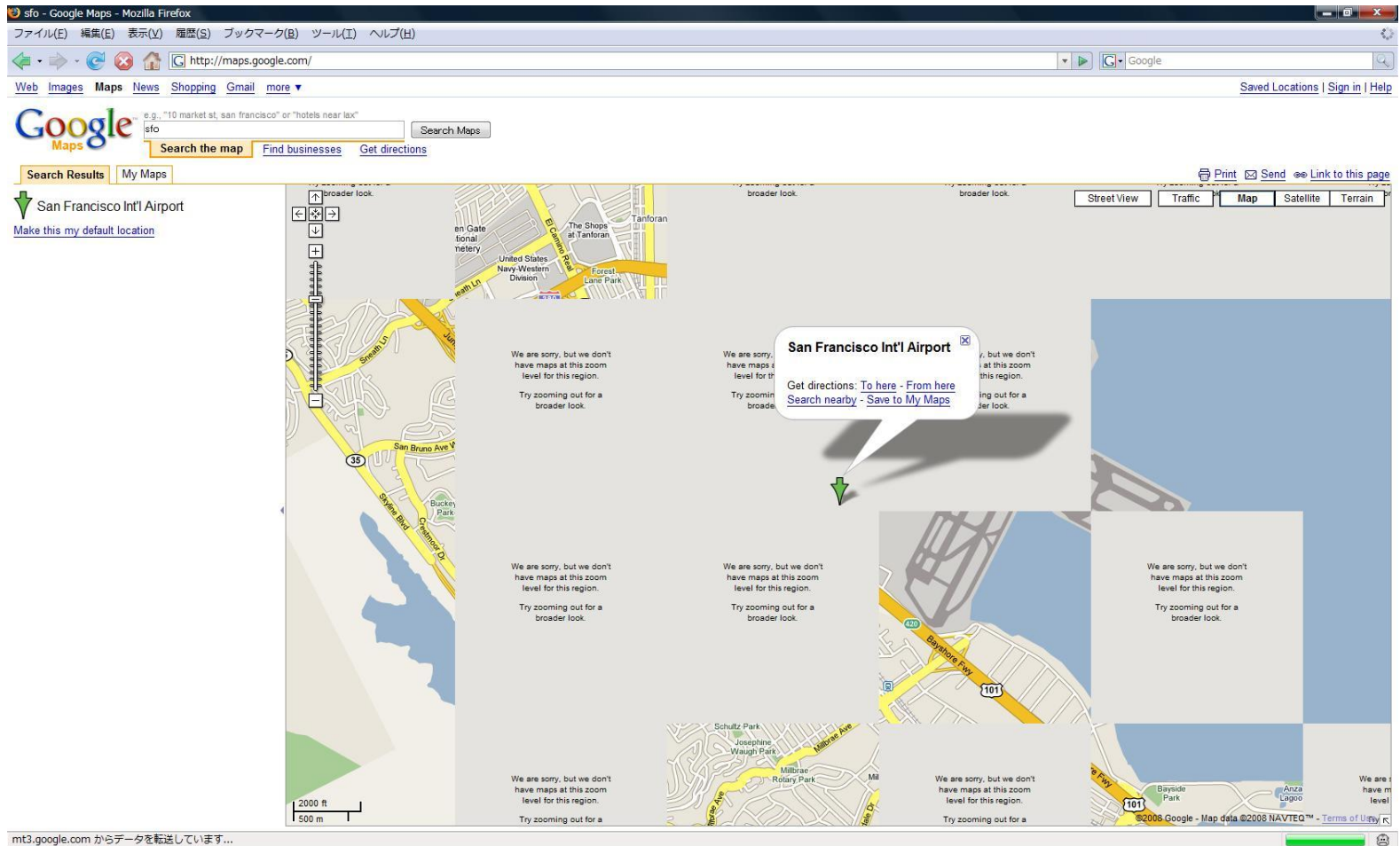
The screenshot shows a Google Maps interface in a Mozilla Firefox browser window. The address bar contains `http://maps.google.com/`. The search bar has the text "sfo" and a search button. Below the search bar, there are tabs for "Search Results" and "My Maps". A green arrow points to "San Francisco Int'l Airport" with the subtext "Make this my default location".

The map displays a route from the city center to the airport, highlighted in yellow. A speech bubble over the airport icon contains the text: "San Francisco Int'l Airport", "Get directions: To here - From here", "Search nearby - Save to My Maps".

At the bottom left of the map, a scale bar shows 2000 ft and 500 m. At the bottom right, there is a copyright notice: "©2008 Google - Map data ©2008 NAVTEQ™ - Terms of Use".

At the very bottom left of the browser window, the Japanese characters "完了" (Kwanryou) are visible, indicating the end of the presentation.

Max 15 Connections



Max 10 Connections

The screenshot shows a Mozilla Firefox browser window displaying Google Maps. The address bar contains `http://maps.google.com/`. The search bar has the text "sfo" and a "Search Maps" button. Below the search bar, there are tabs for "Search Results" and "My Maps". A search result for "San Francisco Int'l Airport" is shown with a green arrow icon and a link to "Make this my default location". The map itself is centered on San Francisco, showing major roads like Highway 280 and Highway 82. A callout box for "San Francisco Int'l Airport" is visible, containing the text "Get directions: To here - From here" and "Search nearby - Save to My Maps". The map interface includes a navigation pane on the left with zoom controls and a map type selector on the right with options for "Street View", "Traffic", "Map", "Satellite", and "Terrain". A scale bar at the bottom left indicates 2000 feet and 500 meters. The bottom of the browser window shows the text "javascript:void(0)".

Max 5 Connections



So, We DO NEED IPv6

Examples of # of concurrent sessions

Webpage	# of sessions
No operation	5~10
Yahoo top page	10~20
Google image search	30~60
Nico Nico Douga	50~80
OCN photo friend	170~200+
iTunes	230~270
iGoogle	80~100
Rakuten	50~60
Amazon	90
HMV	100
YouTube	90

In real world

- According to our observations, about 500 sessions are average numbers of concurrent sessions per users.
- To be more realistic, only 8 users per 1 single global IPv4 address is a good ratio to use CGN

Carrier-Grade NAT

- Scalability
 - >10K users (or contracts)
 - 100s of TCP sessions per user (or contract)
- Maximum Transparency is desired
 - Like “ideal” SOHO Router, there should be no barrier for application
 - So call “Full-CONE” + “Hairpinning” is ideal
 - Different from NAT for Enterprise
 - draft-nishitani-cgn-00.txt
 - Will be presented at SOFTWARE and BEHAVE WG.
- High Availability

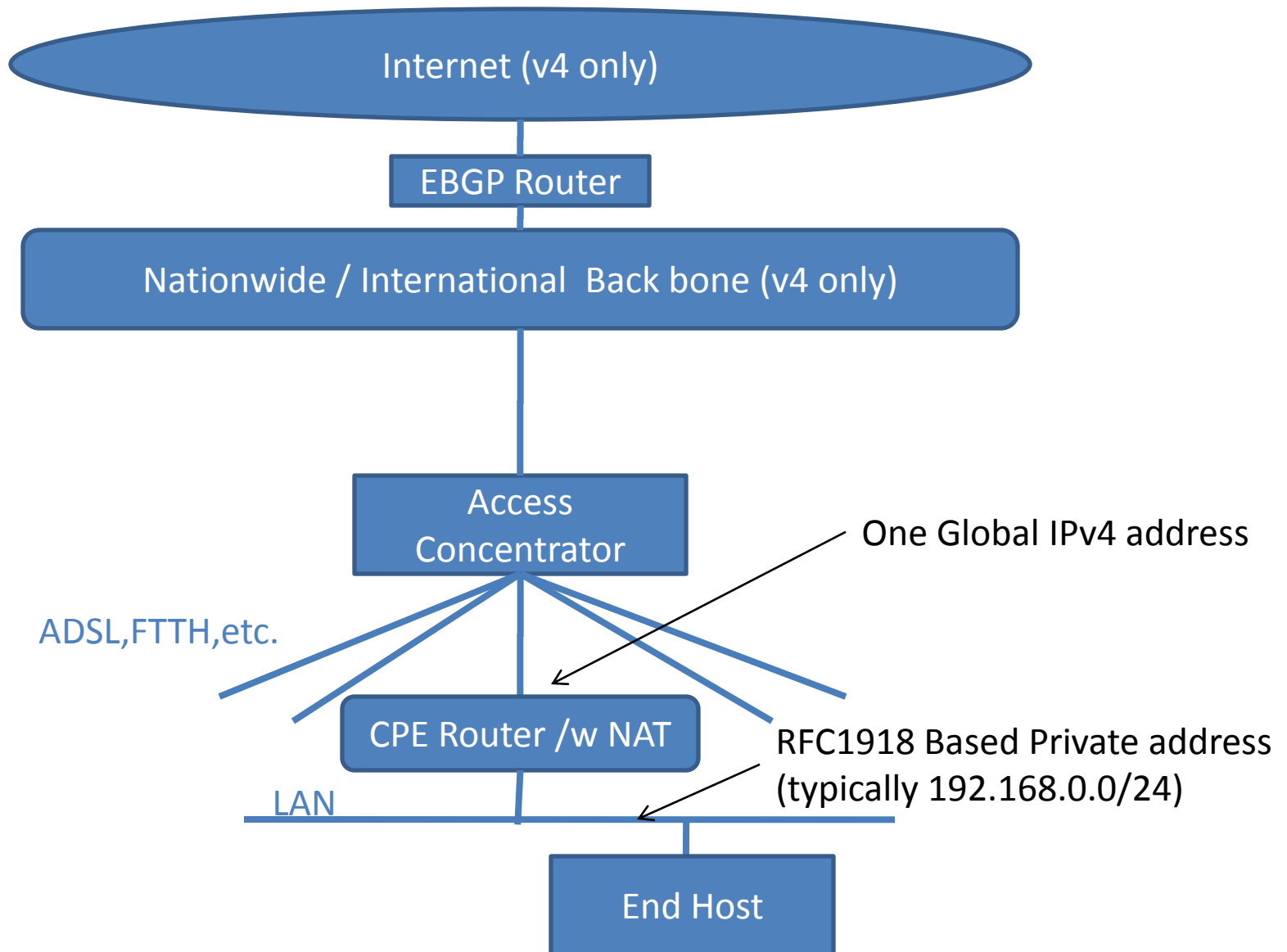
Transition Scenario

- One possible transition scenario from v4 only to dual stack to v4/v6 will be showed
- I think this is the most conservative and step-by-step

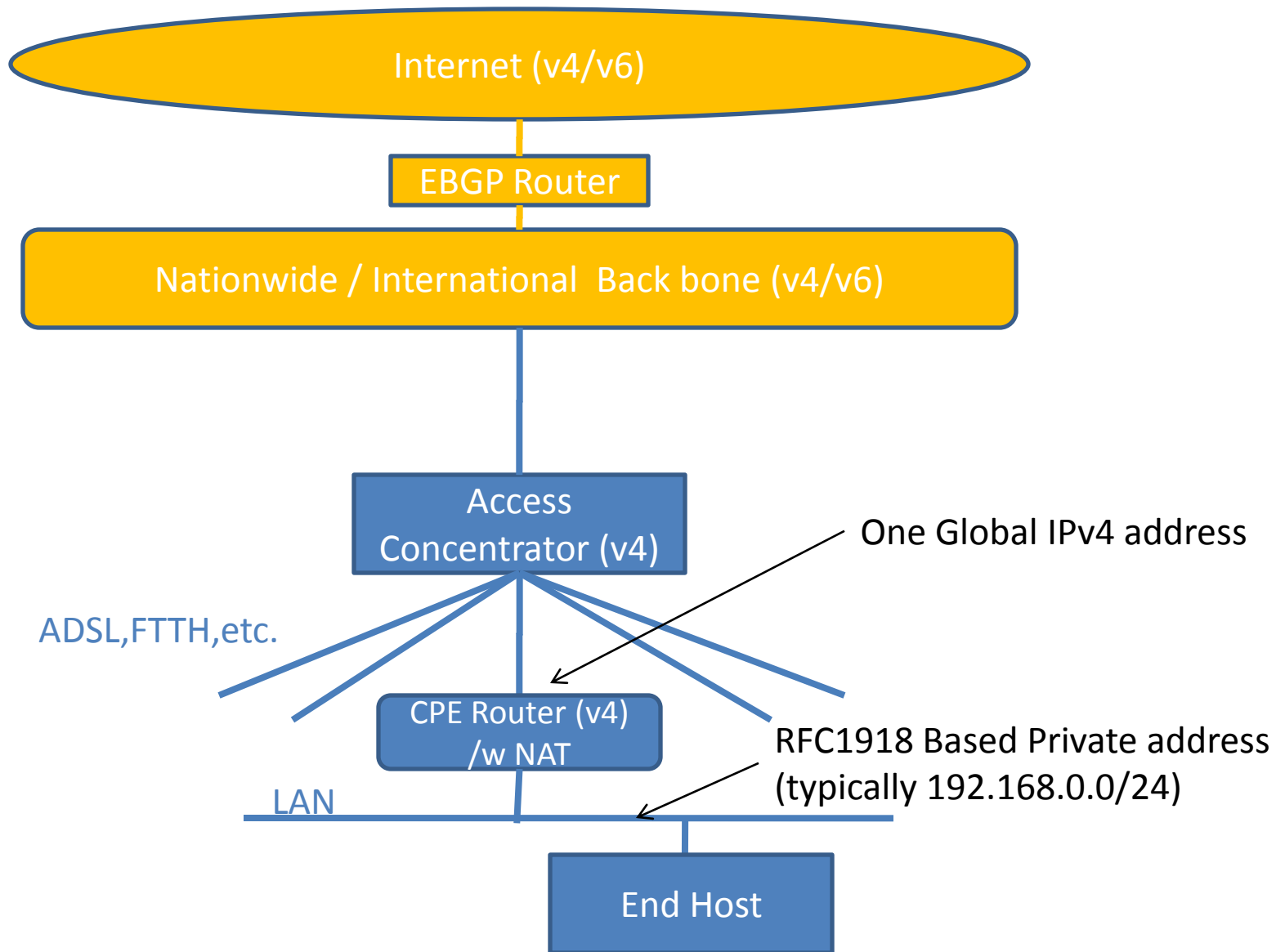
Simple concept

- Customer can be converted one by one
- Customer do not need to purchase any hardware until some stage of conversion
 - Especially he/she uses XP, Vista, Leopard, Linux or BSD
- IPv6 will be main stream eventually
- IPv4 will be for backward compatibility

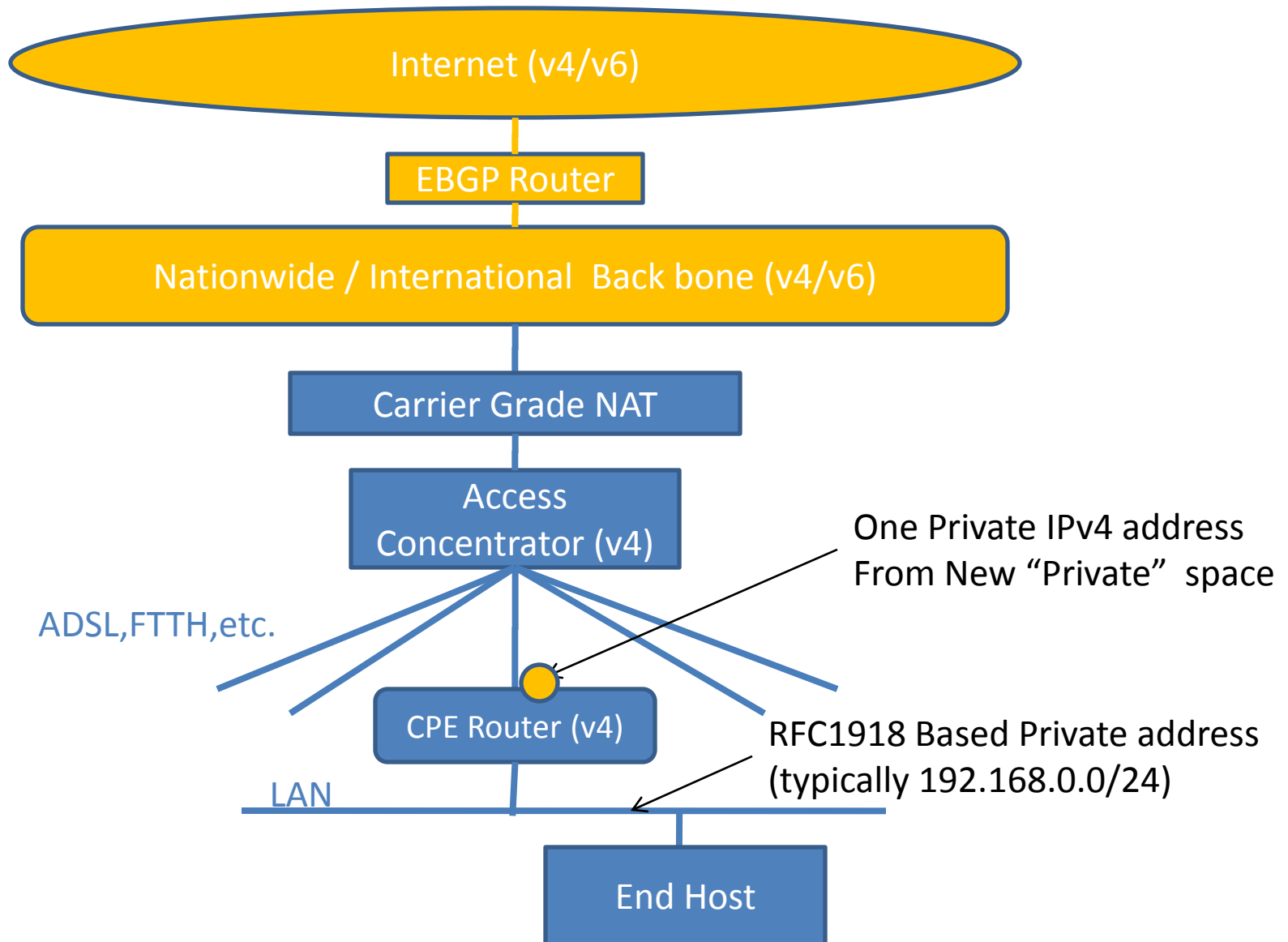
At the beginning: Global v4 only service



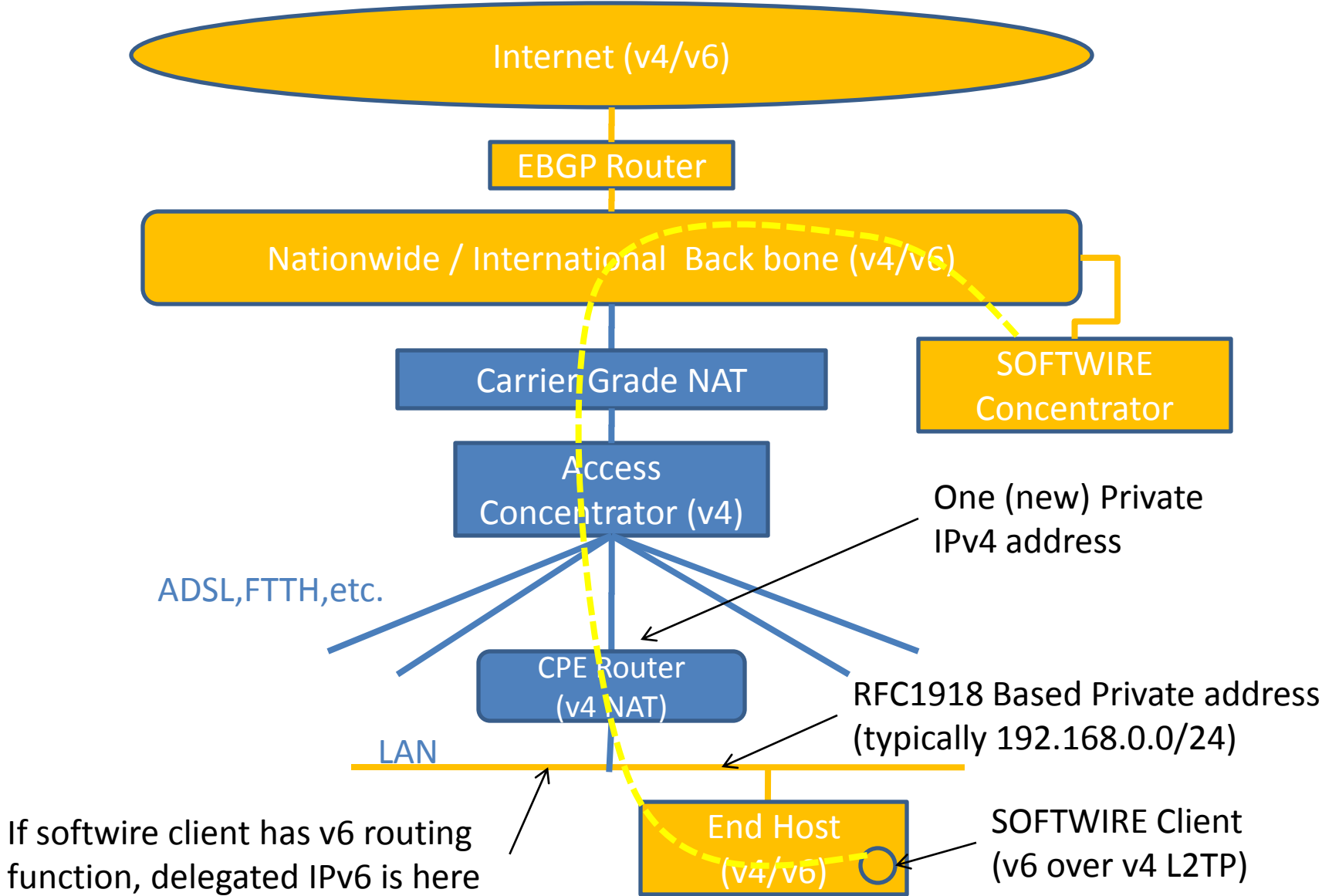
Dual Stack backbone (it's easy)



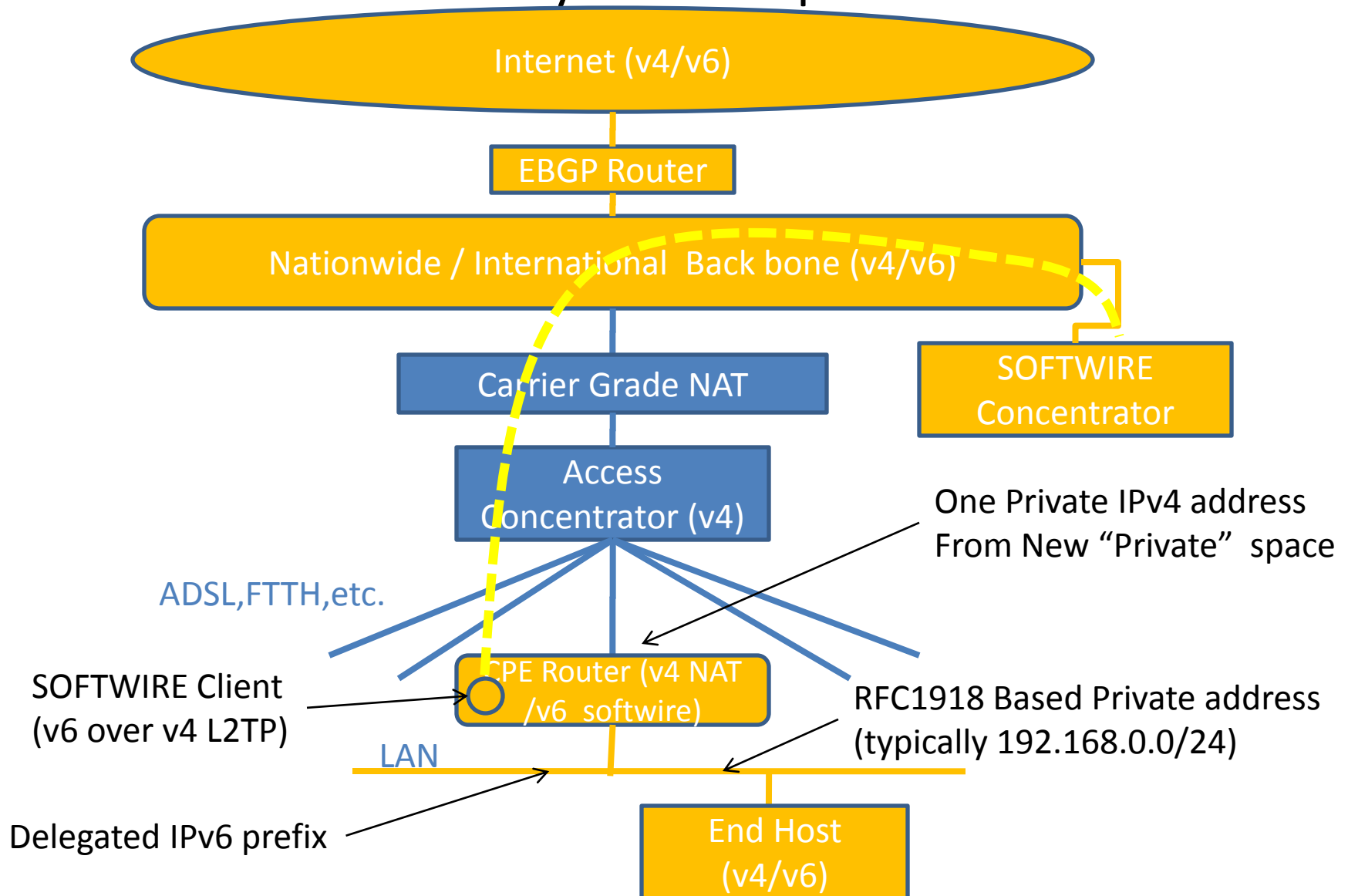
Introducing CGN



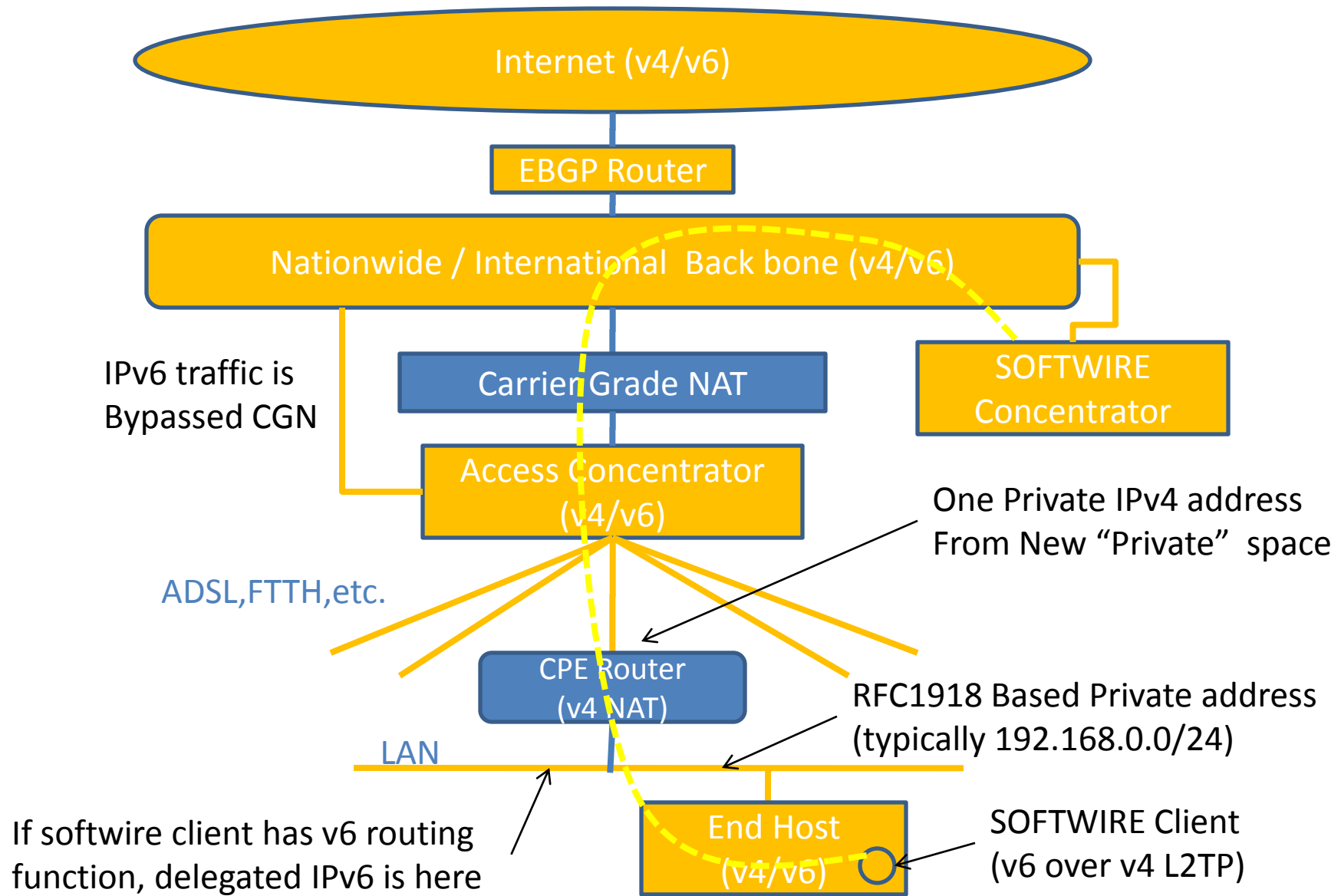
Introducing Softwire (v6 over v4 L2TP)



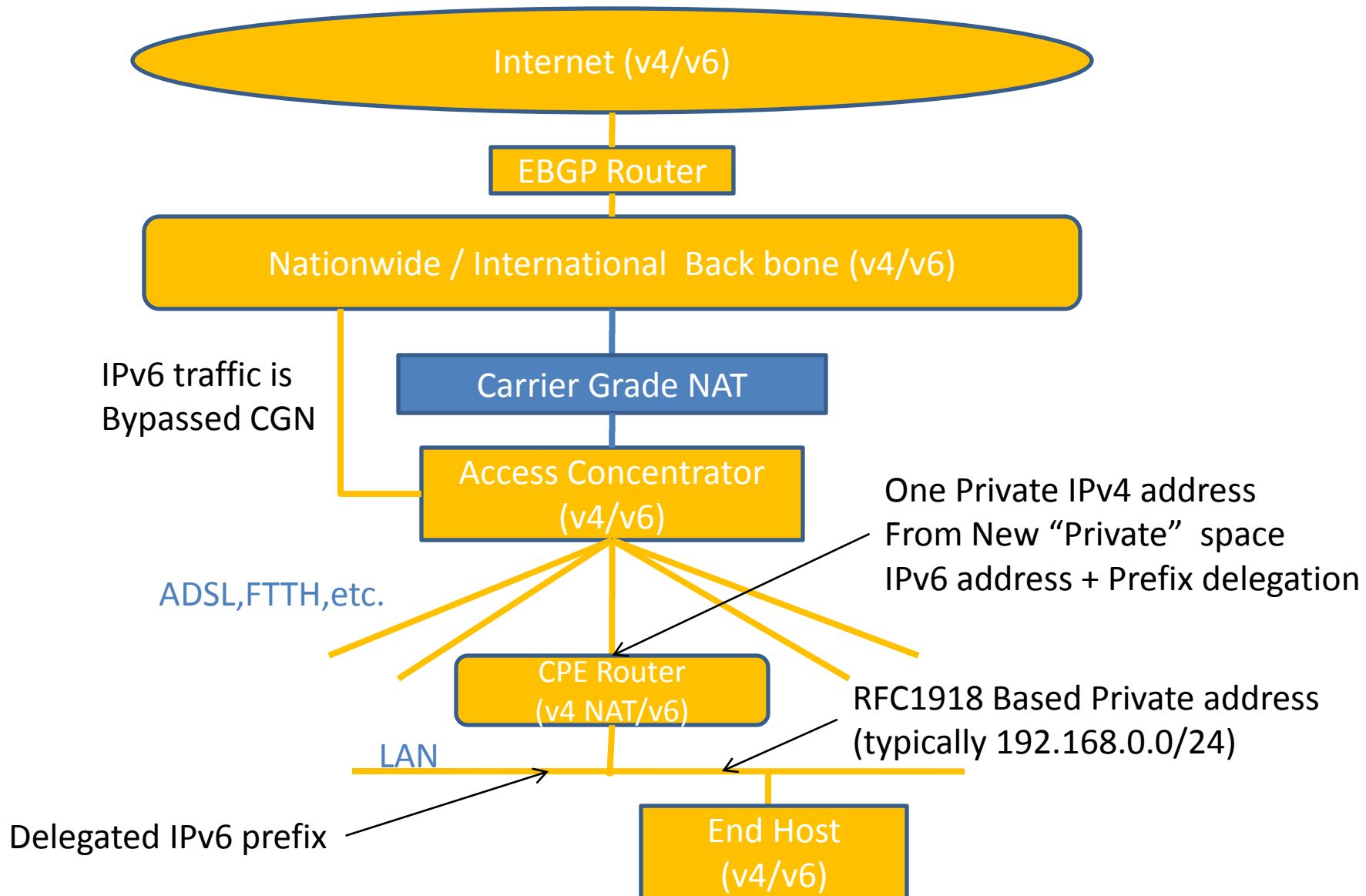
Softwire termination on CPE router looks tricky but in-expensive



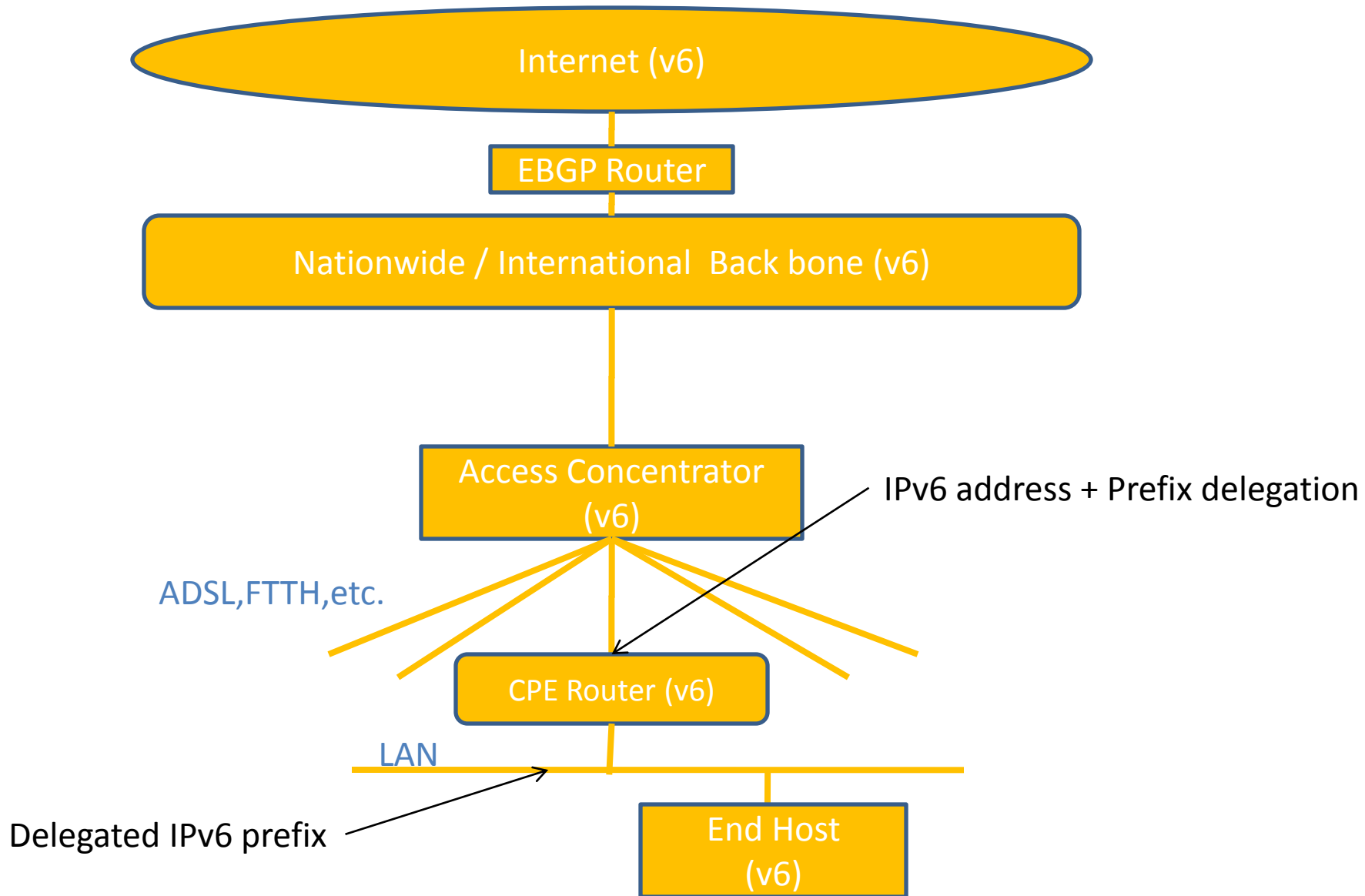
Native IPv6 service but CPE router is not ready



Replace CPE router to IPv6 compatible



Pure v6 world



We will do

- Actually, NTT group already has commercialized walled garden IPv6 service for VoIP, IPTV and so on for 5+ millions of customers
- We are now constructing a beta testing ISP facility for complete dual stack with CGN environment in a data center in down town Tokyo
- Our new service with CGN is planned to start by year 2010 Spring
- We are really happy if we could help ISPs especially in Asia Pacific area (but not limited to) that will be facing same problems

Enterprises

- We already have some requests from ASPs, usual enterprises, governmental organizations and schools for IPv6 deployment support especially for their out side system like web and E-mails first
- Eventually, their internal system will follow

These are important things to be considered

- We think that we still need
 - Simple security scheme for IPv6 should be nailed down
 - draft-ietf-v6ops-cpe-simple-security-02
 - New “private” address space allocation for carrier / provider access network behind CGN
 - draft-shirasaki-isp-shared-addr-00.txt
 - And some more...
- Also we need implementations
 - IPv6 DNS deployment should be more popular
 - MPLS support
 - Firewall
 - Load Balancer