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Getting over the hump:
Strategies for IPv4/IPv6 co-existence

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The need – what matters?

- Connections, not IPs
  - $\{IP_s, port_s, IP_d, port_d\}$
  - Unfortunately IPs have to be from the same "family", so for each connection to or from IPv4 we need a corresponding IPv4 address

- $Need_{IPv4} = f \left\{ \dfrac{Size(IPv4_{only})}{Size(Internet)}, growth\_rate) \right\}$

- The "Internet" is different for different clients and different players

Possibilities for growth

- All of them require sharing addresses
  - Unless reserves are sufficient
    - 6-3 months - not
  - Long-term need for IPv4
  - Different flavors of NAPT

- The best include IPv6 deployment
  - Support continued IPv6 growth alongside IPv4
  - Shifting the balance gradually to IPv6
    - DS-Lite
    - NAT64

Not all roses

- IPv4 sharing
  - NAT breaks applications
  - Reputation and reporting IP based
  - Geo-location breaks
  - Everybody can't get port 80
  - ...

- Expertise
  - Do you know STUN, ICE, TURN?
  - Have you tested DS-Lite, NAT64/DNS64?

- Unfortunately this is not as mature as IPv6
  - And we thought IPv6 wasn't mature enough!

Players and their IPv4 needs

- Transit providers

- Enterprise

- Content Providers

- Residential (Broadband) providers
  - SOHO

- Mobile operators

Players and their IPv4 needs - Transit

- Transit providers
  - Need to support IPv6 transport and routing
  - Internal IPv4 requirements are modest
    - Can use IPv6
- Enterprise
- Content Providers
- Residential (Broadband) providers
  - SOHO
- Mobile operators

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Players and their IPv4 needs - Enterprise

- Transit providers

- Enterprise
  - Moderate need
  - Restructuring or buying
  - Simple NAT

- Content Providers

- Residential (Broadband) providers
  - SOHO

- Mobile operators

Players and their IPv4 needs - Content

- Transit providers

- Enterprise

- Content Providers
  - Painful, need a real IP for a lo-o-ong time
    - Virtual hosting will help a little
  - Major IPv6 drivers

- Residential (Broadband) providers
 - SOHO

- Mobile operators

Players and their IPv4 needs - Broadband

- Transit providers

- Enterprise

- Content Providers

- Residential (Broadband) providers
  - One of the most painful
  - Technology upgrade
    - DS-Lite, 6rd, + CGN
    - STUN, ICE, TURN
    - need CPE upgrade
    - SOHO needs control (PCP, etc.)
  - Need is proportional to number of households
- Mobile operators

Players and their IPv4 needs - Mobile

- Transit providers

- Enterprise

- Content Providers

- Residential (Broadband) providers
  - SOHO

- Mobile operators
  - IPv6 only + NAT64
    - Still need to support IPv4 data roaming
  - Needs are higher
    - Proportional to population numbers

Getting over the hump
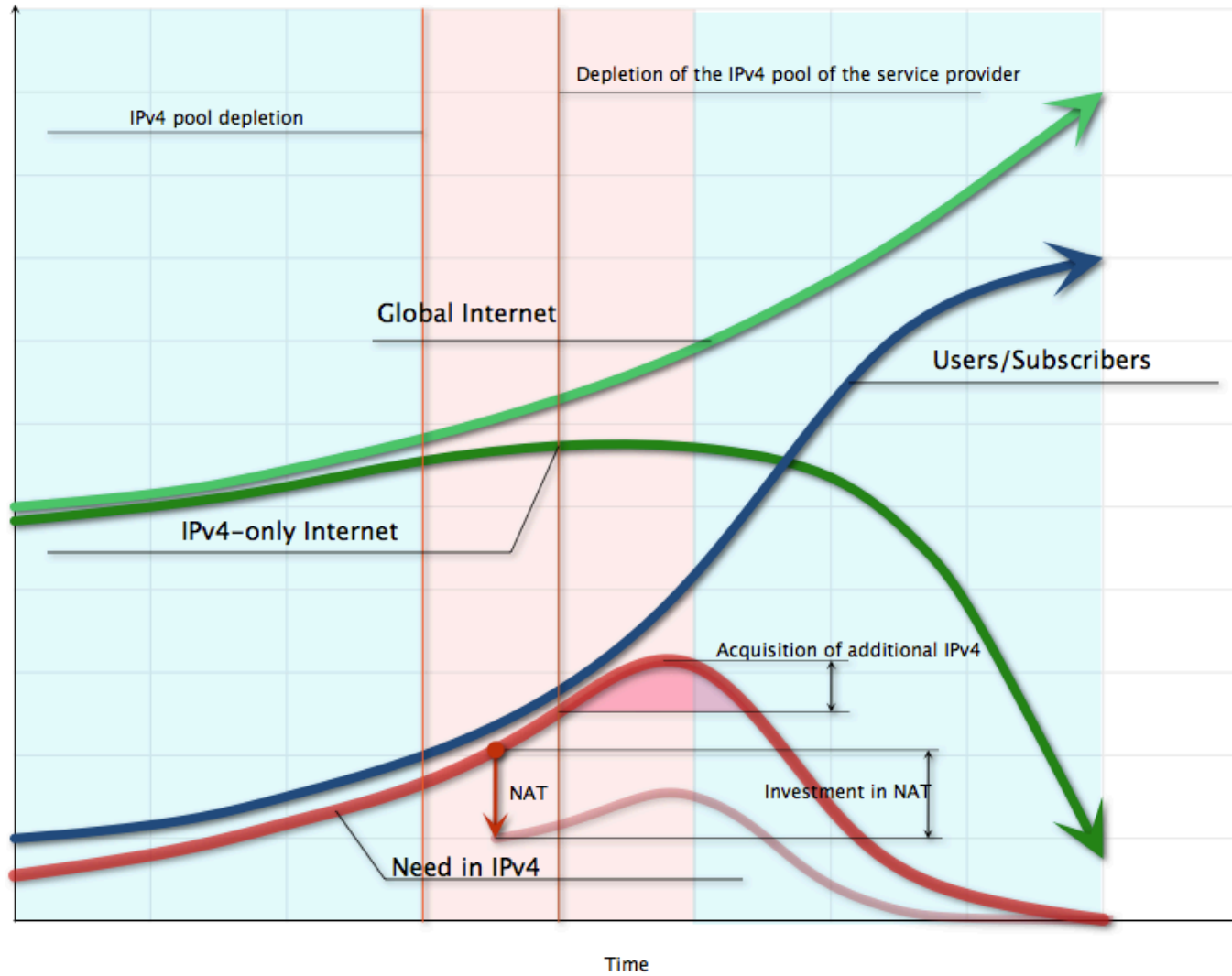
To do, or not to do

- Deploy IPv6
  - The only way to get over the hump
  - Good for the Internet
  - Good for you ~~in the long run~~ (mid-term investment)
  - Start doing the right thing while it's small

- Manage co-existence
  - ensure that the solution will support your growing need for IPv4 (short term investment)
  - otherwise IPv6 won't help you ☹

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