

# IETF Report: IPv4-IPv6 Co-Existence

**Jari Arkko**

Internet Area Director, IETF  
Ericsson Research

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# Topics to Talk About

- IPv4 depletion
- IPv6 deployment
- Recent IETF efforts
- The difficult parts
- Call for feedback

# Implications of the IPv4 Situation

- Leads to a change in the network business
- Painful discussions on how the remaining addresses are allocated
- Address trading is likely to become a reality
- Impact on how network address translators (NAT) are used and placed
  - One public address per subscriber no longer feasible; have to share addresses
- IPv6 deployment becomes even more crucial

# New IPv6 Deployment Tools at the IETF

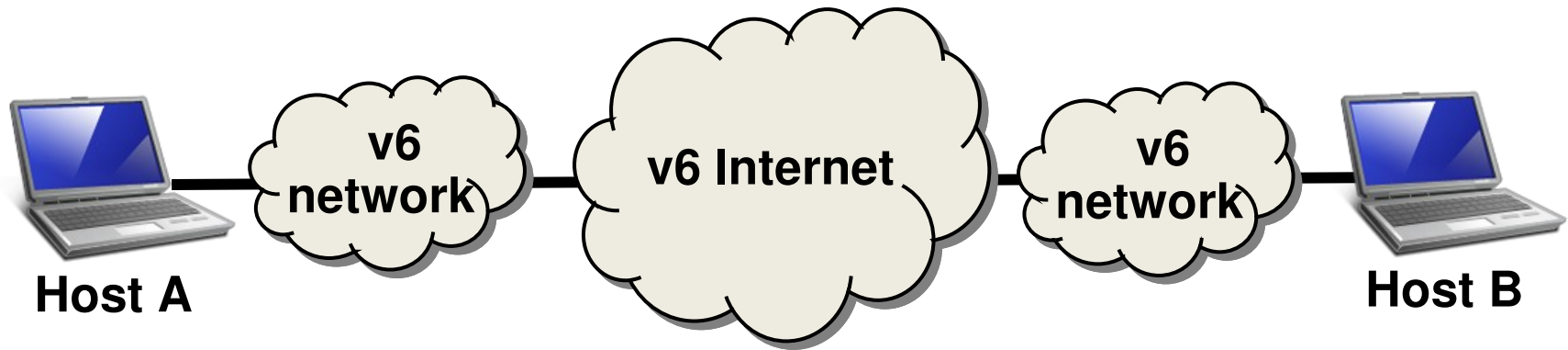
# IPv6 Deployment

- Looking at new needs and additional features (just as with any IETF technology)
- New deployment scenarios identified
  - Unilateral IPv6 deployment
  - IPv4 and address sharing in an IPv6-only access network
- Chartered two new work items in the Internet and Transport areas
- Expecting the RFCs to come out late 2009

# Should We Forget Dual-Stack?

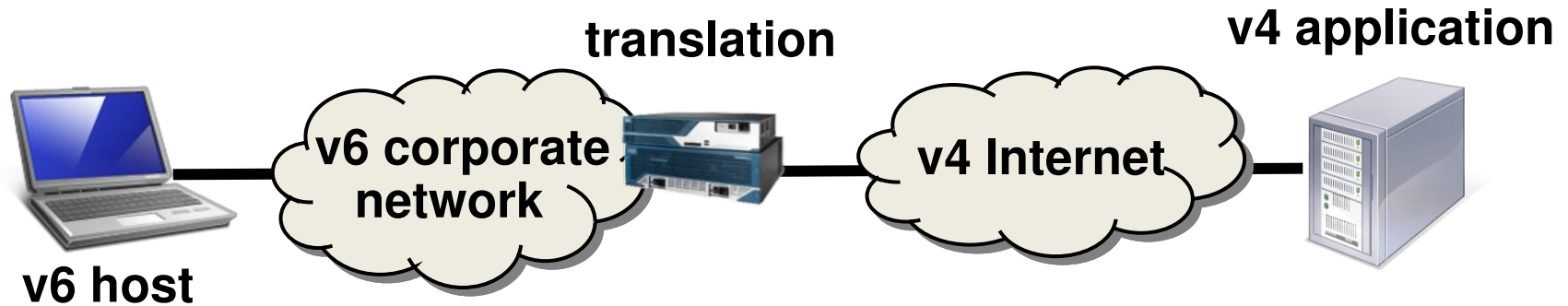
- No! The new tools are for new scenarios; existing tools continue to be valid for other cases
- While you see a lot of new tools being built
- This is NOT an indication that the existing tools should no longer be used – Dual Stack works and is the most well-understood way to deploy IPv6 today
- Other existing tools also continue to be valid, e.g, SOFTWARE mesh solutions

# Understanding the IPv6 Deployment Challenges



- Individual adoption is possible, but multiple stakeholders are needed for actual use
  - Application, host, local network, and Internet
- No universal implementation support – appliances, firewalls, etc.

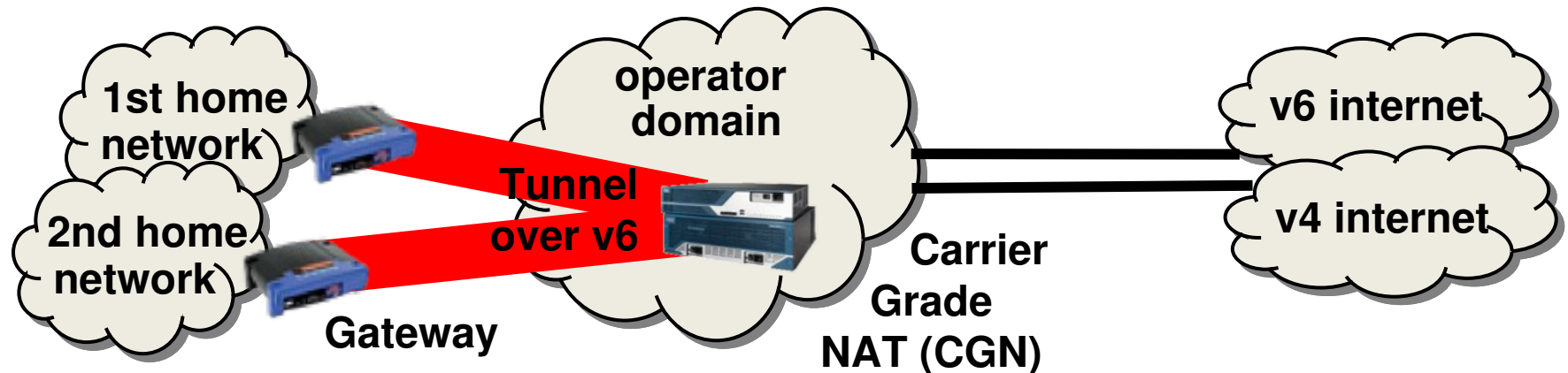
# New: Unilateral Deployment



- Translation through a general purpose IP protocol translator or an application proxy
- Enables unilateral deployment
- Some networks use a deprecated tool NAT-PT, leading to a number of problems
- Improved specifications to come out



# New: Address Sharing & IPv6-Only Access Networks



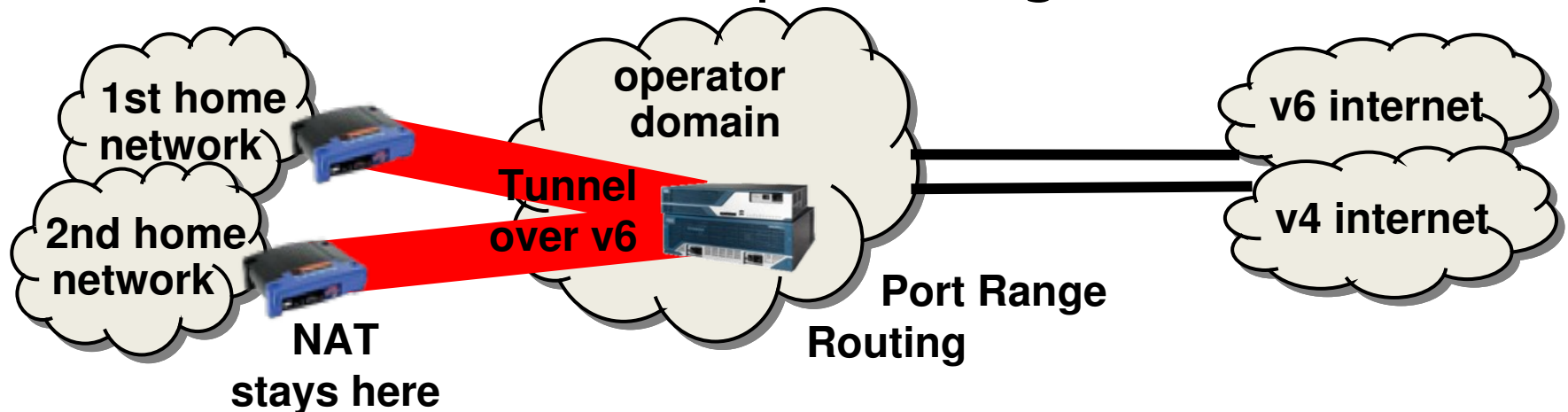
- Problem: less than 1 address per subscriber
- Problem: operator domain larger than net10
- SOFTWARE WG working on a solution
- Employs an IPv6 only network, but uses tunneling to provide IPv4 service
- NAT in the operator domain (address sharing)

# The Difficult Parts 1 - Tunnels

- We know how to do tunnels and NATs
- But still some things to work on
  - Tunnel endpoint discovery via DHCP
  - Load balancing/liveness detection

# The Difficult Parts 2 - Tunnels

- Can we reduce the effects of Carrier Grade NATs (CGNs)?
  - Move NAT closer to the user!
  - Each user gets a "fraction" of an address, i.e., a port range or a set
  - Provider routes on port ranges



# The Difficult Parts 3 - Translation

- DNSSEC – mostly solvable if the validating resolver and mapping is in the local DNS server or in the host
- The choice of the prefix that represents IPv4 space in IPv6 space
  - Standardized vs. normal prefix
  - Affects routing tables, load balancing, ...
- Compatibility with address selection rules
  - We should avoid using a translator if a direct IPv6 path exists

# The Difficult Parts 3 - Translation

- Should the same rules be followed as in NAT44s (endpoint independence etc)?
- Ongoing discussion about the priorities – what specifications will come out first
  - IPv6-only network to Internet
  - IPv4 Internet to IPv6-only network
  - IPv4-only network to IPv6 Internet
  - ...

# A Small Sidetrack

- The possibility of an IPv6-to-IPv6 translation device has also come up
  - Can be done very badly by copying what IPv4 NATs do
  - Or more wisely, eliminating 80% of the disadvantages
- Not clear yet if this is
  - A) a better way to do a bad thing,
  - B) solution to BGP scaling & world hunger,
  - C) or a blasphemy

# Next Steps

- Discussions ongoing in
  - BEHAVE WG (IPv4-IPv6 translation)  
<http://tools.ietf.org/wg/behave>
  - SOFTWARE WGs (tunneling + NAT)  
<http://tools.ietf.org/wg/software>
  - SHARA BOF (port range routing)  
<http://www.ietf.org/mailman/listinfo/nat66>
  - 6AI BOF (IPv6-IPv6 NAT)  
<http://www.ietf.org/mailman/listinfo/shara>
- IETF-74 in San Francisco, March 22-27
- Please provide feedback