

NAT-PT: A Transition Mechanism for IPv6

➡ Agenda

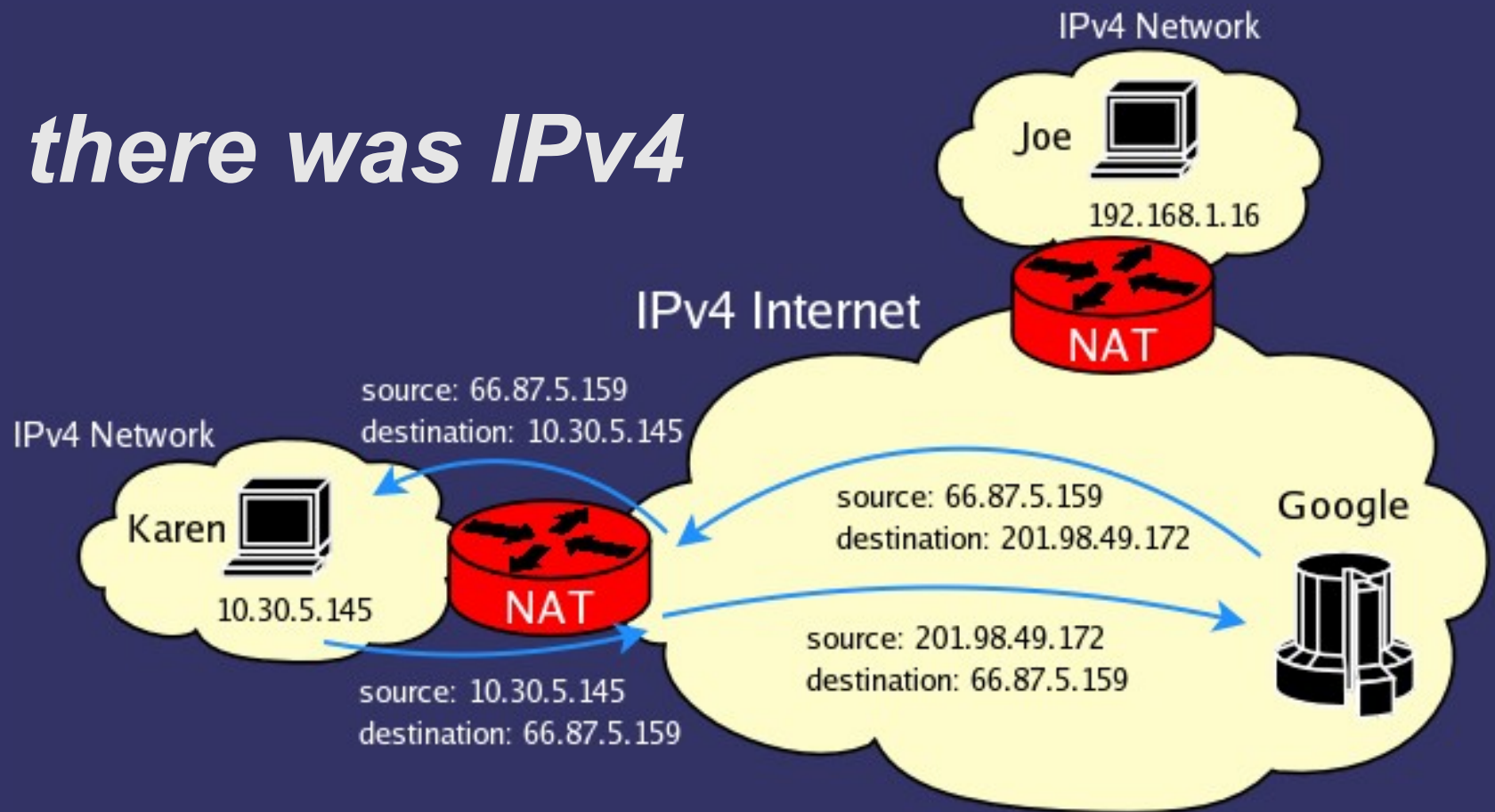
- IPv4, NAT, CIDR
- Consumer Trends
- Unleashing the Internet
- Adapting IPv6 Today
- Q&A

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Once there was IPv4



⇒ Network Address Translation (NAT)

- Main workaround for global address depletion
- Breaks end-to-end model
- NAT aware applications or application aware NAT
- Need for third party registration servers to find peers

⇒ Other problems with IPv4

- Not tamper-proof, no encryption at network level, no mobility



Consumer Trends - Devices

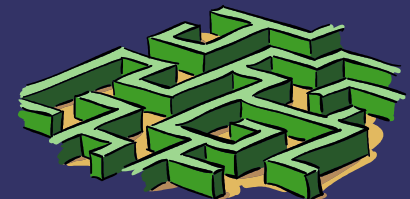
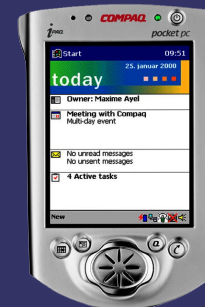
➔ Consumer devices

- Broadband users
- PDAs, Smartphones, Webpads
- Home appliances
- Mobile computers



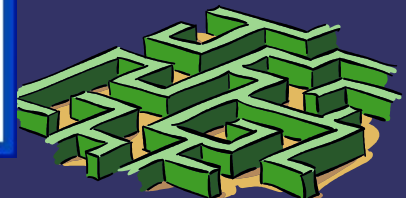
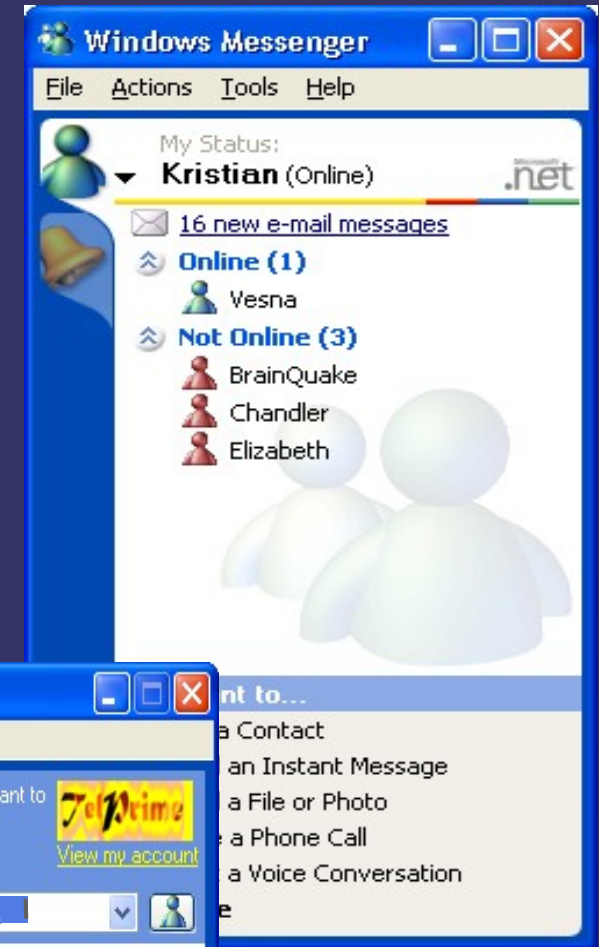
➔ Consequences

- With dial-up, 25 users => 1 IP address
- Now, 1 user => 1 IP address
- Devices are always-on, always connected
=> always attacked
- Switching between wireless networks must be transparent to the user
- Peer-to-peer connectivity is key
- Network “plug and play”
- Security that goes beyond network edge firewalls



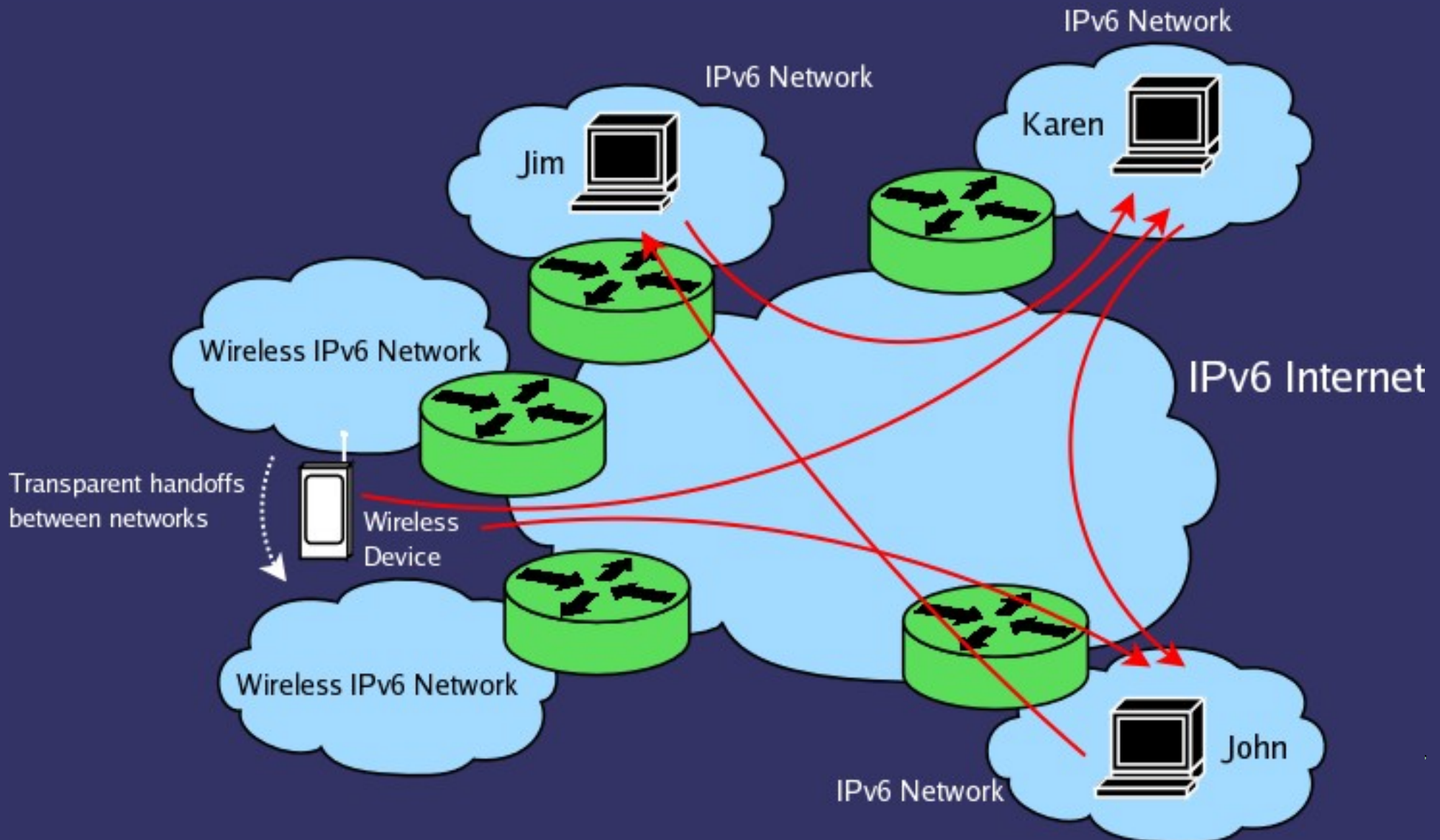
Consumer Trends - Applications

- ➔ Most promising applications today are peer-to-peer
 - Peer-to-peer needs end-to-end connectivity
 - NATs block p2p growth
- ➔ Networked consumer electronics and gaming devices are emerging
- ➔ Applications that need always-on, anywhere connectivity
 - Voice
 - Video
 - Collaboration (IM, file sharing, etc.)
- ➔ Consequences
 - We need to be able to address every point on the network



IPv6: Unleashing the Internet

Multi-party video conference example



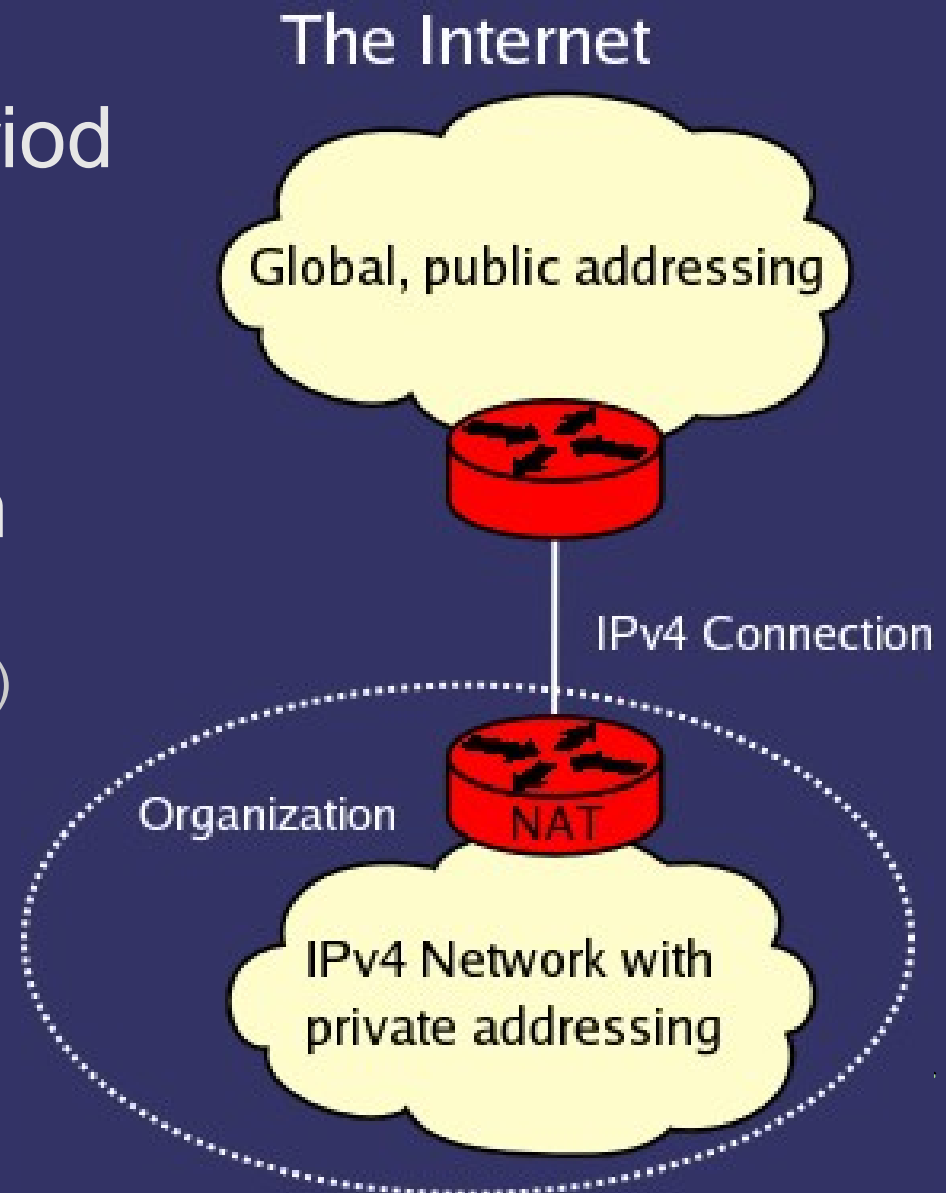
Transition Scenario

⇒ IPv6 has been designed with a long transition period in mind

- No “D-Day” for deployment
- Coexistence of IPv4 and IPv6

⇒ IPv6 has many transition mechanisms

- Tunneling (static, automatic, brokers)
- DSTM
- 6to4
- ISATAP
- Torpedo
- Dual-stack
- NAT-PT



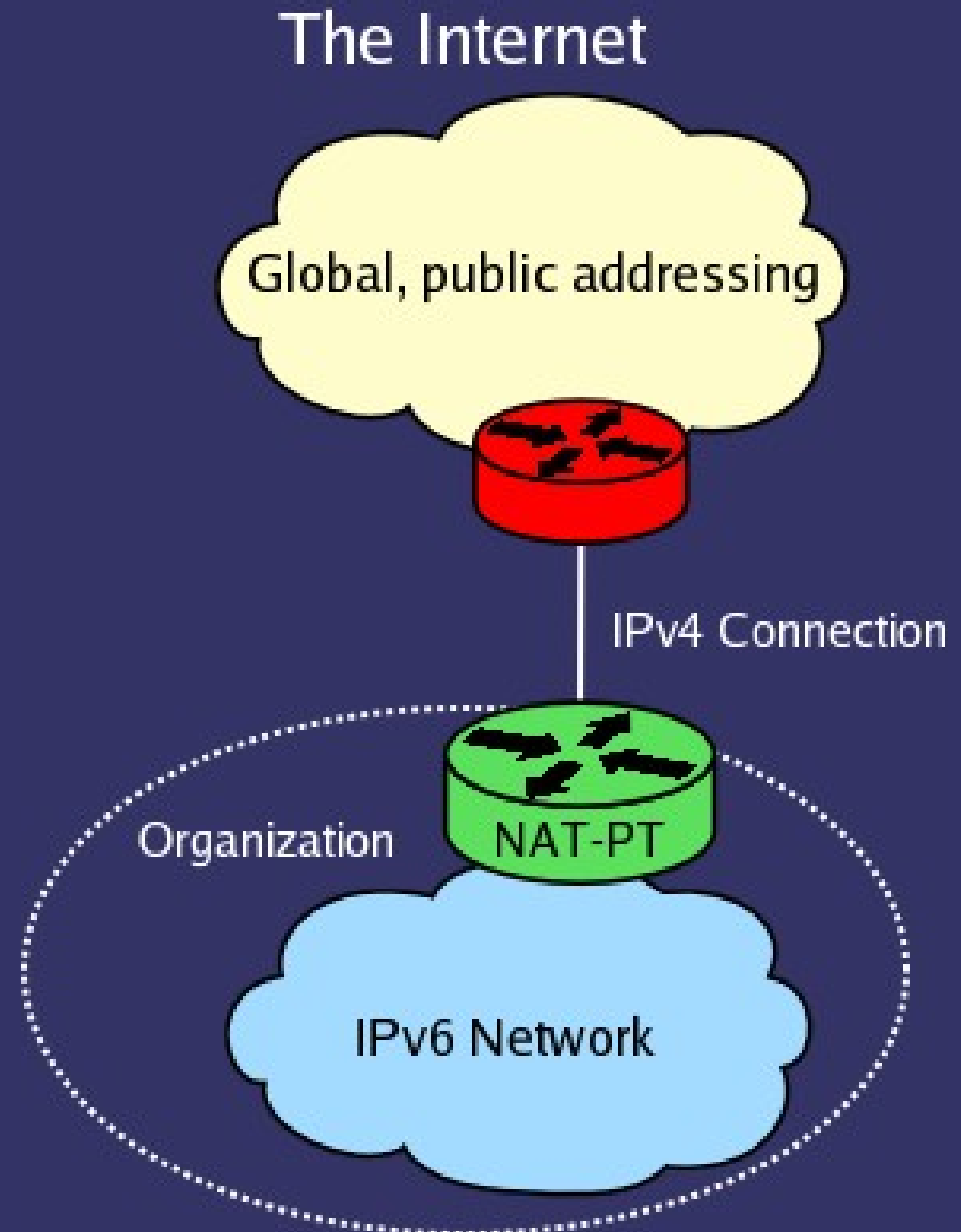
Using NAT-PT

➔ Enables transparent communication between IPv6 and IPv4 hosts

- Still a NAT with all its evils
- IPv6 to IPv6 now possible!
- Communication is transparent to hosts
- Public DMZs can still be accessed using IPv4 through static or dynamic inbound mappings

➔ Converting Today

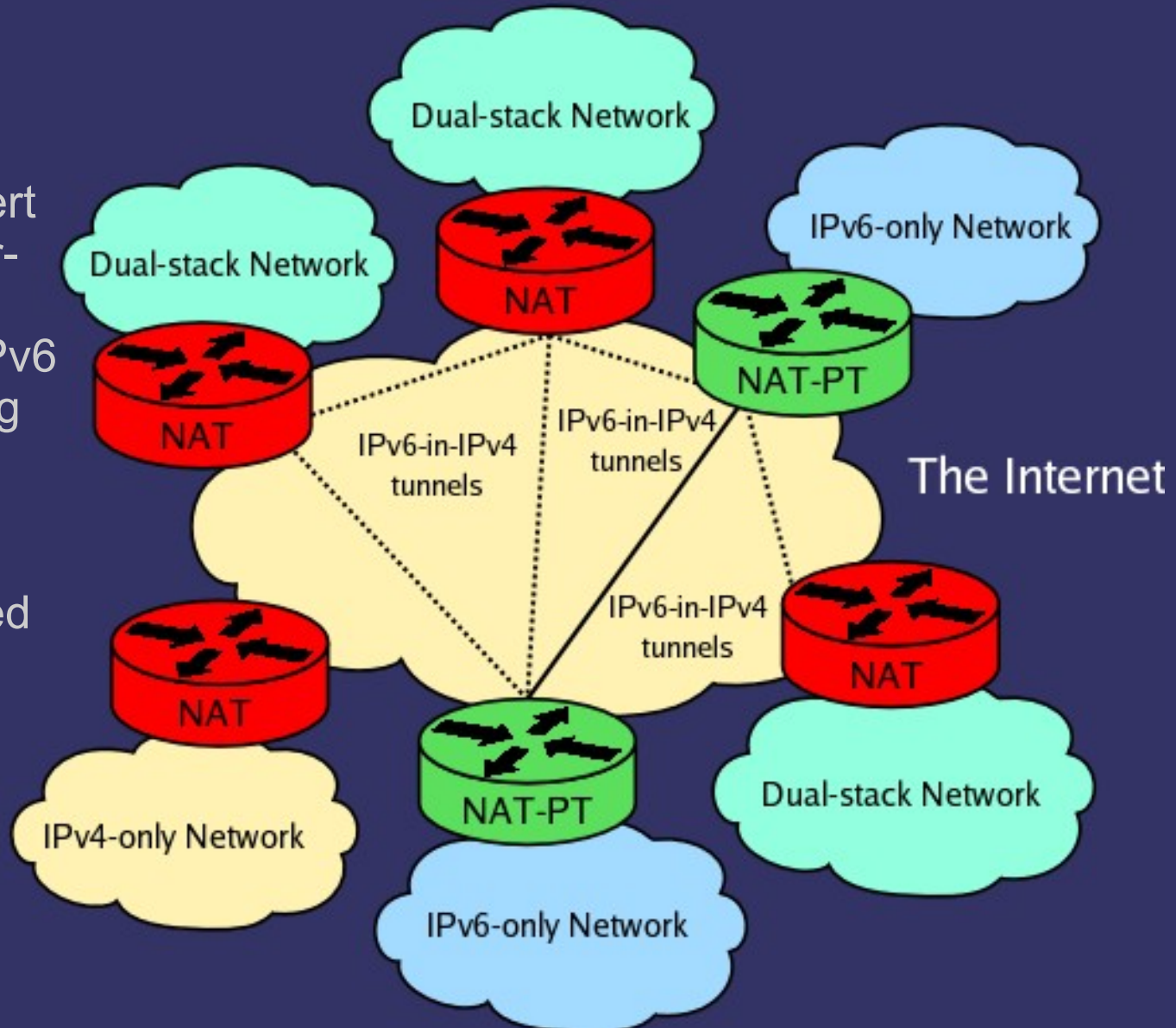
- Deploy IPv6 internally
- Deploy NAT-PT
- Use tunneling/native IPv6 to connect to other IPv6 networks



IPv4/IPv6 Coexistence, Phase 1

➡ More users on IPv6 means

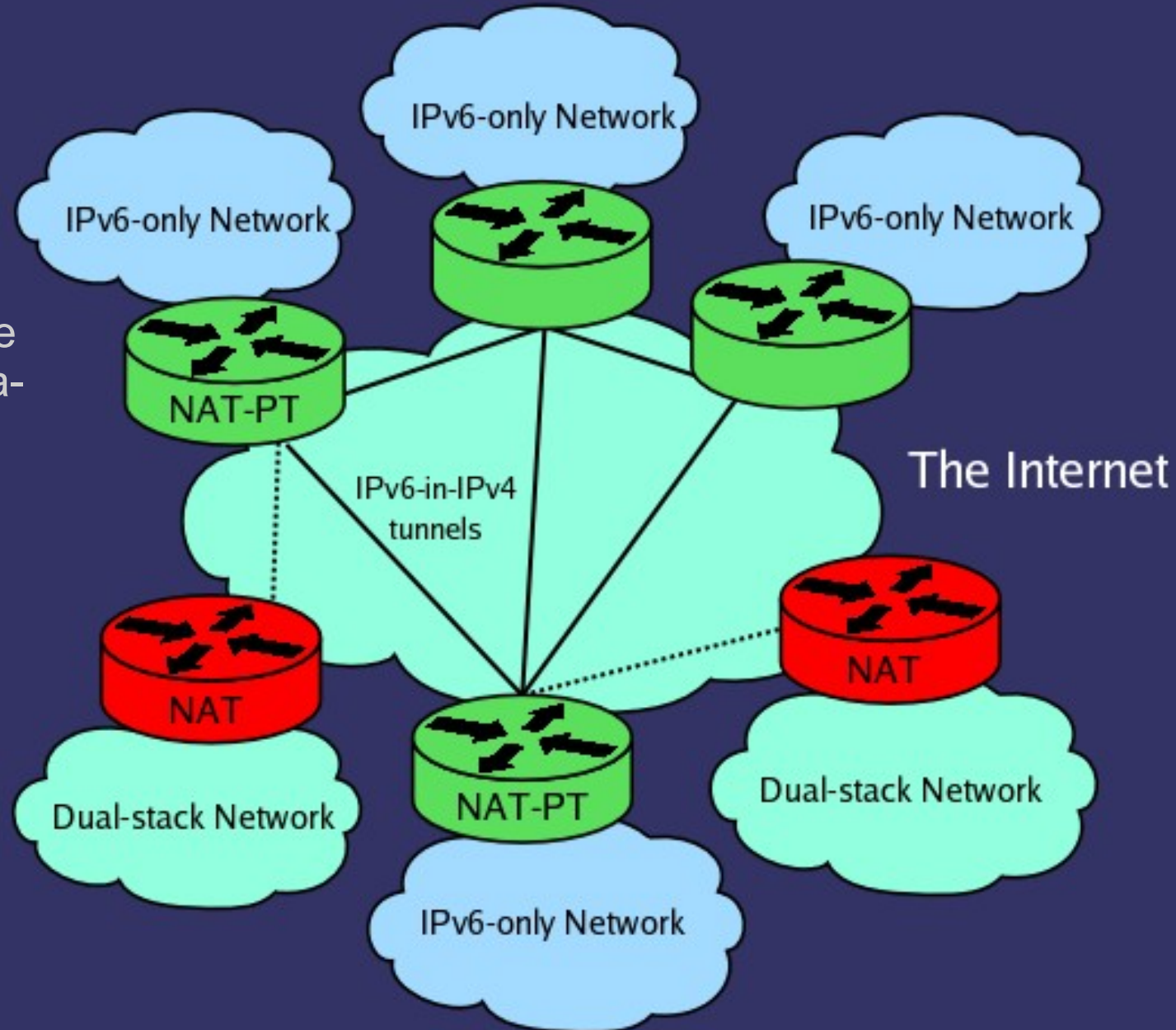
- More demand to convert
- More IPv6-enabled services
- More ISPs providing IPv6
- More applications using IPv6
- Better vendor support
- More scalable Internet
- Tunnels will be replaced with native links



IPv4/IPv6 Coexistence, Phase 2

➡ Phase 2

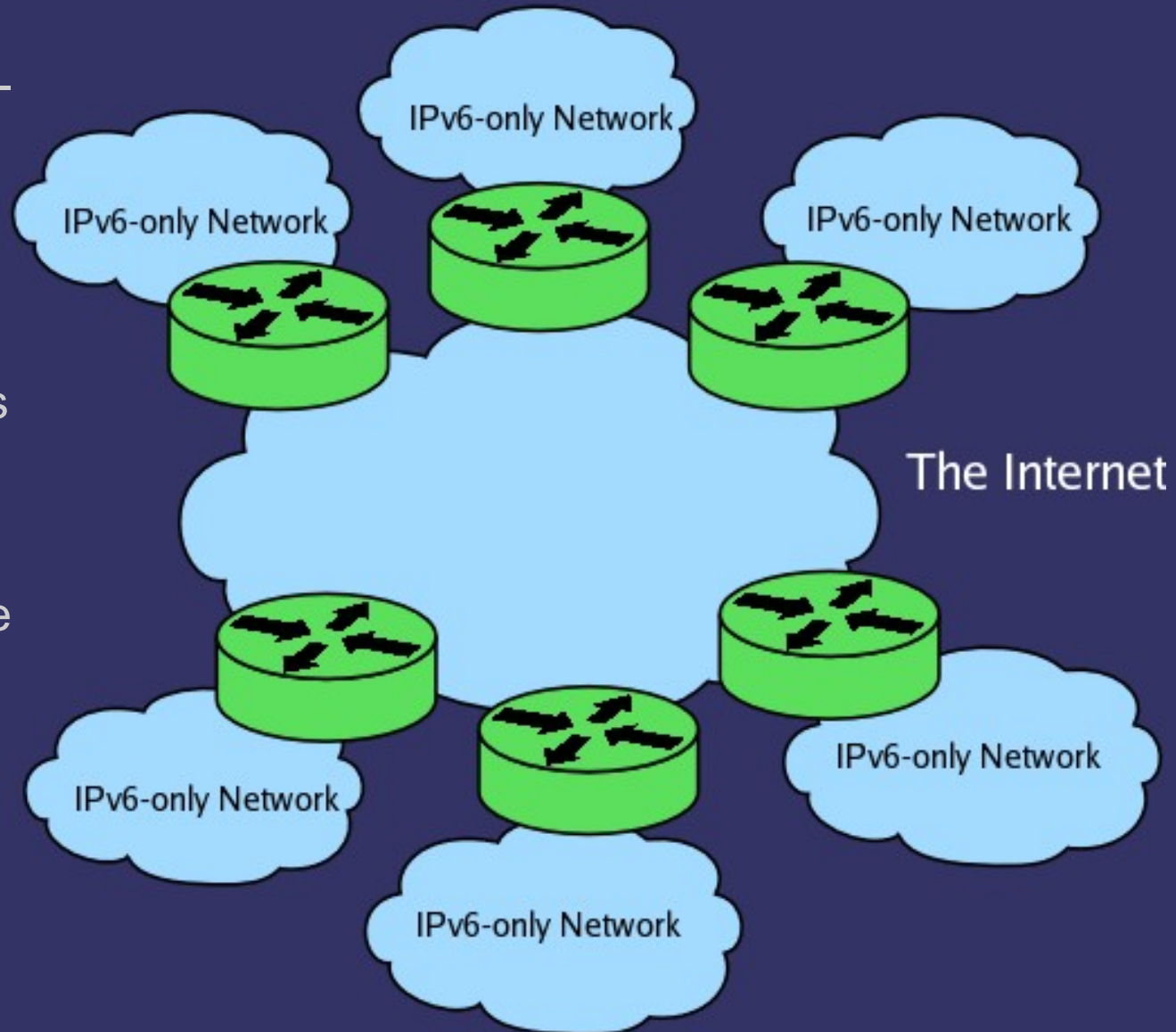
- Most networks are IPv6-only or dual stacked
- Some users still have IPv4 because of legacy applications
- Some organizations stop providing interoperability with IPv4 and drop their NAT-PTs



IPv4/IPv6 Coexistence, Phase 3

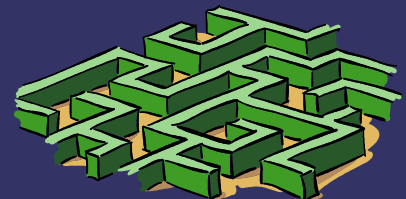
➔ Phase 3

- The Internet core is IPv6-only
- IPv4 use is marginal, IPv4-in-IPv6 tunnels
- NAT and NAT-PT disappear
- Peer-to-peer applications are dominant
- All traffic is encrypted
- Mobile users enjoy transparent access to the network
- Networks are “plug and play” enabled
- Every point of the network is addressable and globally routable



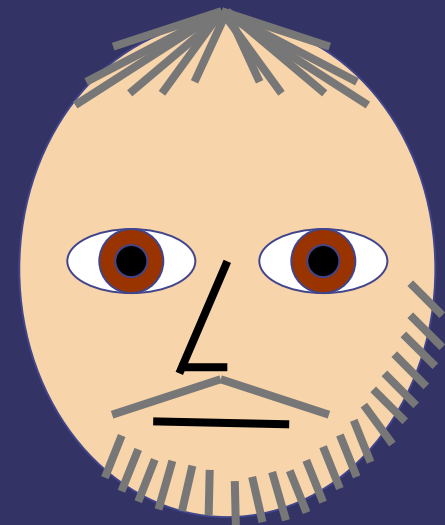
Summary

- ⇒ Gain experience with IPv6 now
- ⇒ Demand IPv6 support for all new network hardware and software
- ⇒ NAT-PT enables stateful, application transparent translation between IPv4/IPv6
- ⇒ NAT-PT replaces NAT
- ⇒ The transition to IPv6 is possible today
- ⇒ Linux is ready for IPv6-only today
- ⇒ Microsoft Vista (Longhorn) will enable IPv6-only Windows networks



Questions?

"The difference between theory and practice is even larger in practice than in theory [...]"



Thank you for listening

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NAT-PT available at:
<http://tomicki.net/naptd.php>

