

The IPv6 Transition Challenges

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Challenges of Converting to Unleaded Fuel

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Leaded Fuel vs. IPv4

Changing to unleaded

- Lead pollution is bad for the environment
- Requires changes in cars
- Requires changes in the infrastructure
 - Gas stations
 - Refineries
 - Supply chain

Changing to IPv6

- NAT pollution is bad for the Internet
- Requires changes in applications
- Requires changes in the infrastructure
 - Internet hosts
 - Internet ISPs
 - DNS, DHCP, etc.

Overview of the talk

- **What is wrong with the IPv4?**
- **Will IPv6 solve my particular problem?**
- **How do I move from IPv4 to IPv6?**
- **How much will it cost?**
- **Common questions about IPv6**
- **I am ready! Where do I start?**

What's wrong with the IPv4?

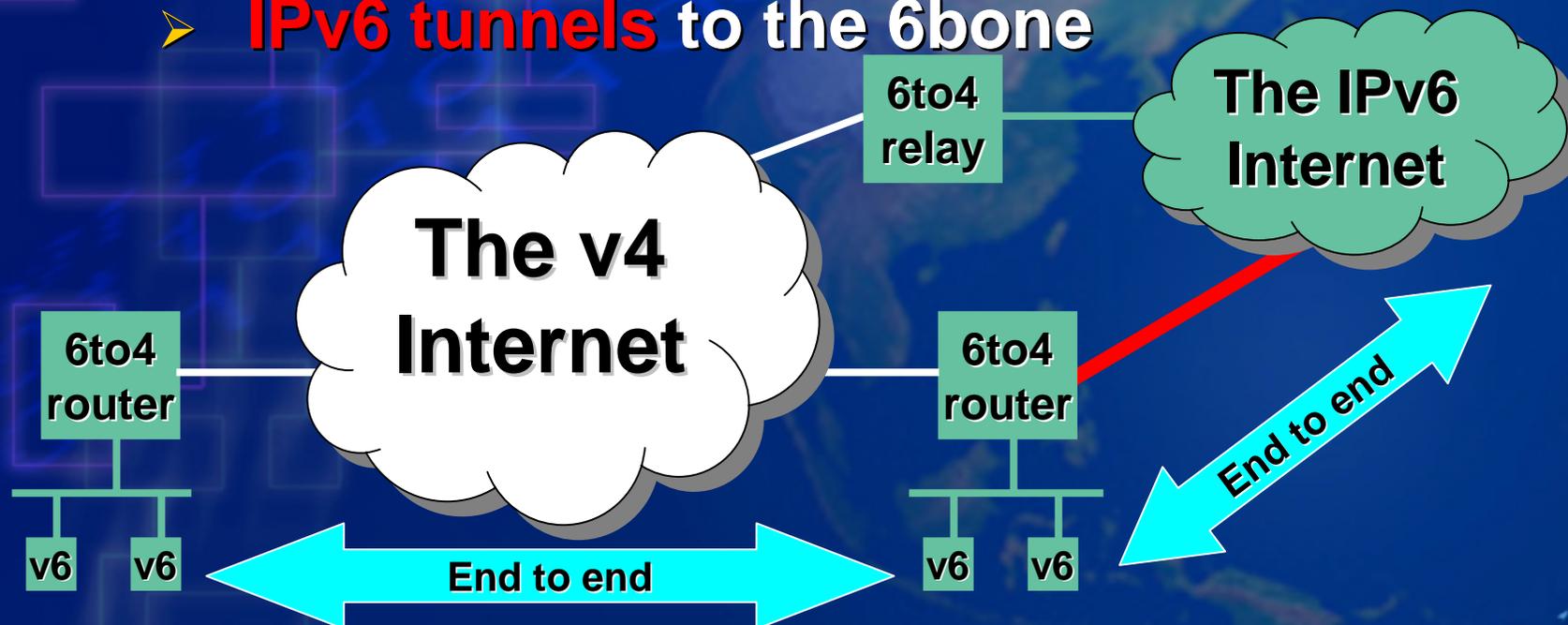
- **Global IP address depletion**
 - The address shortage in Asia, Europe
 - Address allocation rate is accelerating
- **Proliferation of custom NATs**
 - Existing applications stop working
 - Security is weak
 - Limits innovation: Mobile IP, VoIP, QoS
 - Complicates wireless and mobility

Will IPv6 solve everything?

- **IPv6 will:**
 - Restore end-to-end Internet model
 - Provide more addresses
 - Combat routing table explosion
 - Improve mobility experience
- **IPv6 will not:**
 - Magically make everything secure
 - Make all applications run 100 times faster
 - Prevent earthquakes and hurricanes

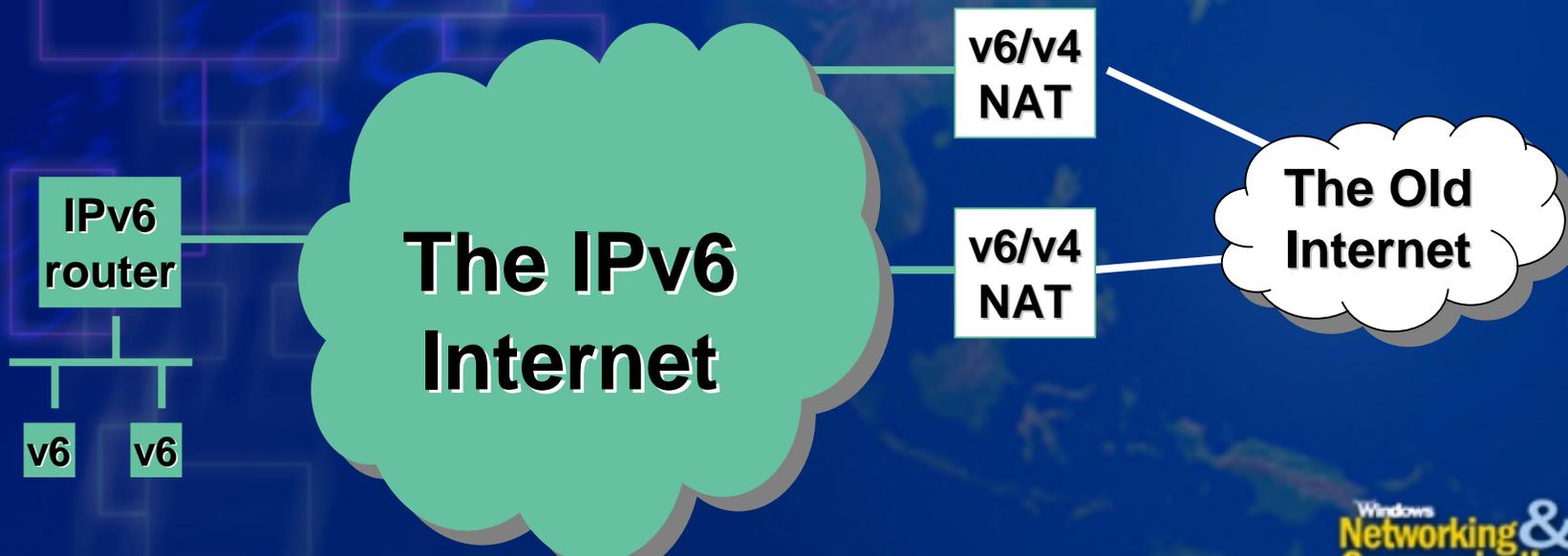
Transition to the IPv6

- Starting at the Internet edge
 - 6to4 allows IPv6 to connect over Internet
An IPv4 address expands to 64K networks
 - **IPv6 tunnels** to the 6bone



Transition to the IPv6 (cont.)

- **Displacing IPv4 for core connectivity**
 - High speed native IPv6 routing
 - Native IPv6 multicast / QoS / other services
 - NAT-type technology to reach IPv4 hosts



How much will it cost?

- **Edge transition**
 - OS, developer and application support
 - DNS and basic routing infrastructure
 - IPv6 in consumer devices
 - Protocol standards work (DNS, etc)
- **Core Internet replacement**
 - IPv6 hardware availability and upgrades
 - Solid IPv6 routing infrastructure
 - More standards work (BGP, etc)

Common Q&A

- **Will IPv6 have effect on privacy?**
 - **MAC-derived addresses may allow tracking users; IETF draft on anonymous addresses is intended to fix this problem**
- **When will IPv4 go away completely?**
 - **Compare with IPX, X.25, etc.
There will be situations where technology of the '80s and '90s will meet the needs**

Common Q&A (cont.)

- **Will the IPv6-only devices be able to talk to the old devices?**
 - **With the help of NAT-type gateways. Some advanced IPv6 features will not translate.**
- **Will all the applications have to change?**
 - **Only those directly using IPv4 (sockets)**
 - **Many apps will not have to change: RPC/DCOM, WinInet, DirectPlay8**

Common Q&A (cont.)

- **Do I need to maintain two versions of my app, one for IPv4 and one for IPv6?**
 - **No. It's not difficult to write a "universal" application that will support both protocols**
- **Will universal apps run on older OS?**
 - **Yes. IPv6 SDK uses dynamic linking magic to let universal applications run on Windows 95/98 and Windows NT 4.0**

I am ready! Where do I start?

- Learn more about IPv6: www.ipv6.org
- Developers
 - Obtain the IPv6 SDK, read porting guide
 - Think multihoming when writing code
- ISPs
 - Short term: set up 6to4 relay servers
 - Long term: provide native IPv6 service

Where do you want to go
today?

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