

Microsoft IT

# Testing the waters with IPv6-only

Marcus Keane  
Network Architect  
Microsoft

# Agenda

- A very brief history of our IPv6
- Our current status
- What currently motivates us
- Our current plans
- Ongoing planning
- Issues along the way

# Evolution of our IPv6

- 1999 Microsoft Research looking at IPv6
  - Limited Microsoft IT involvement
- Acquired ARIN IPv6 /32 prefix 2001:4898::/32
  - Also connected to 6bone – using 3ffe::/16
- 2005-2006 Microsoft IT started working with IPv6
  - Restricted deployment to aid development
- 2006-2012 IPv6 collaboration across groups
  - World IPv6 Day
  - World IPv6 Launch
  - Mostly grassroots work
- Today routing IPv6 across all three regions

# Current status of IPv6

- Operating systems IPv6 capable
  - Most managed systems o/s  $\geq$  Win8.1
- Transition technologies
  - ISATAP deprecated in favour of dual-stack
- Security and monitoring
  - Firewalls IPv6-enabled
  - Other security components(DLP, IDS, etc.) IPv6-aware
  - Netflow v9 enabled on routers
- On-premise DCs IPv6 enabled
- Internet Access
  - Peering with AS8075 and Level3
  - Advertising /48s out of regional /32s
  - Enabling IPv6 internet to labs on request

# Current status of IPv6 - continued

- **Corporate network**
  - 100% of WAN and Backbone is v6 enabled; IS-IS backbone (OSPFv2/v3 campus)
  - 63% of managed hosts are v6 enabled
  - Approximately 50% of corporate access network is native enabled
  - 6,800 internal v6 routes, 20,000 internal v4 routes
- **Example DNS AAAA to A record comparison**
  - This includes teredo...

## **Europe**

A – 73.660

AAAA – 73.339

## **Redmond**

A – 841.487

AAAA – 596.130

# What motivates us now

- MSIT has no more public IPv4 space
- We have no more RFC1918 space
  - Guest wireless network
  - Corporate network expansion
- We have overlapping RFC1918 space
  - Azure and online properties
  - Acquisitions – Nokia
- This is getting complicated. And expensive

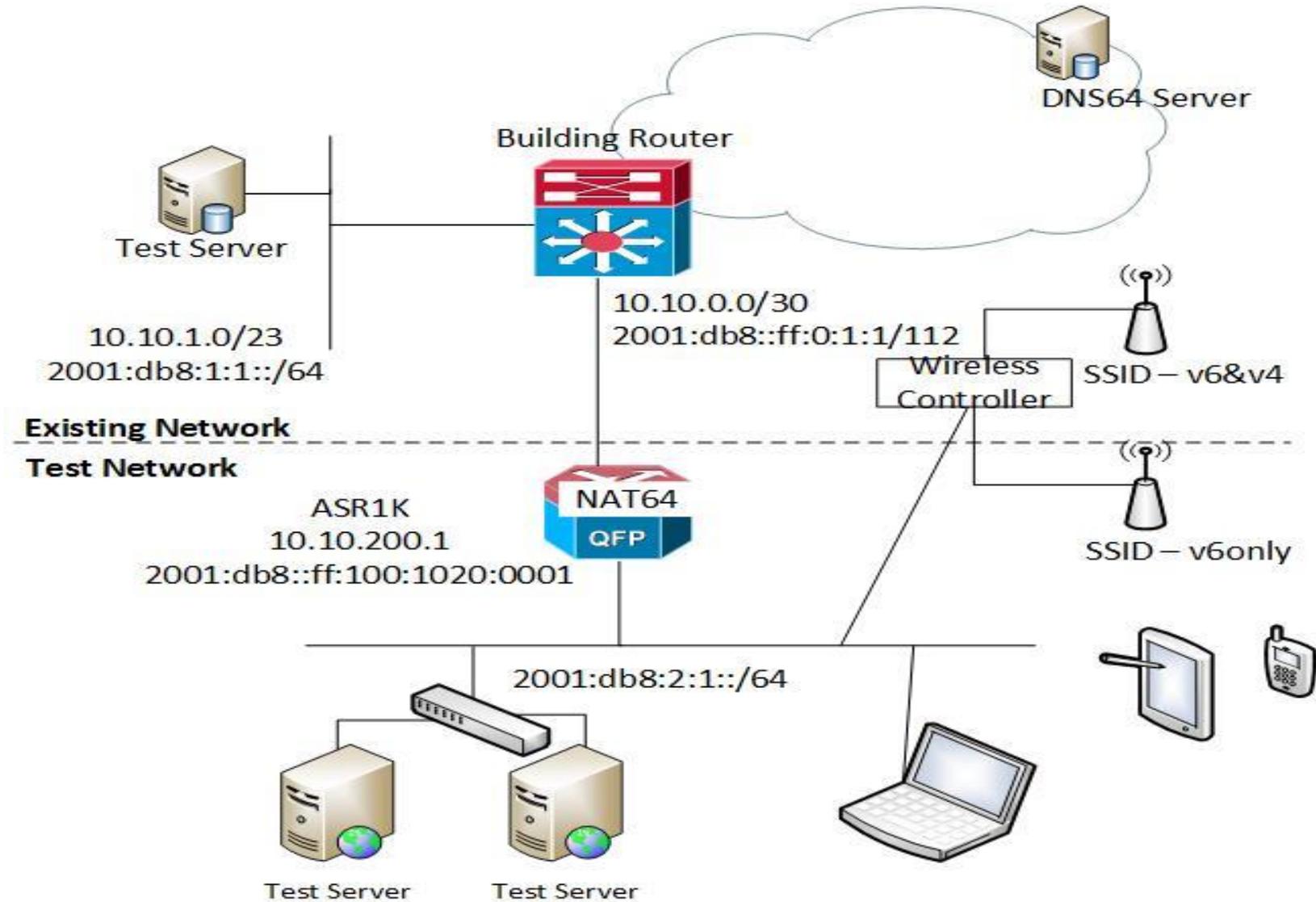
# Current plans

- Pilot IPv6-only on corporate network
  - There is an existing small pilot in Redmond, USA
  - Works for most applications
  - Still working on some issues – DHCPv6 related
- Pilot IPv6-only on wireless guest network
  - This works well for iOS/Windows Phone
- Both using:
  - DNS64
  - NAT64
- Still some issues: Client DNS resolver configuration

# Current plans- continued

- Deploy IPv6 to remaining access edge networks
  - This is being automated
- Convert DC apps
  - Most DC apps are still using an IPv4 VIP
  - Convert to IPv6 with evolution of application
- Deploy Global NAT64/DNS64
- Start Removing IPv4 from access edge networks
  - Some networks will have to remain Dual-Stack(IoT/NoT)

# IPv6-only pilot topology



# Ongoing planning(and discussion)

- DHCPv6 stateful or SLAAC or both?
- MPLS for IPv6 – segment routing?
- IPv6 Multicast

# Issues experienced

- Transition technologies
  - ISATAP
  - Extremely hard to control traffic
  - Doesn't play nicely with MPLS
- Jump in LAN control traffic
  - Neighbour discovery
  - LLMNR
- FIB on routers
  - Host routes – adjacencies in Cisco-speak
  - TCAM carving on older platforms
- Hardware support for IPv6 – fast/slow forwarding path
- Operational issues – training needed

# Thank You

# Questions?

The foregoing represents Microsoft's approach to moving to IPv6. It is for informational purposes only.

