



This session is: Deploying IPv6 in a Microsoft Enterprise Network

Level: 100/200

Abstract: The presentation is focused on the basic deployment items that system and network administrators need to pay attention to for Enterprises networks that are primarily Microsoft focused.

Topics covered include default IPv6 behavior of different Windows OS's, when transition technologies are enabled, what Microsoft products will use IPv6 and deployment guide modifications for Exchange, DirectAccess, Forefront UAG and TMG.

In addition, if time allows, some design challenges around DHCP and DNS and how Windows 7 will behave vs Apple OSX or Linux implementations.





WE ANSWER THE CALL

Rocky Mountain IPv6 Task Force



Deploying IPv6 in a Microsoft Enterprise Network

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Rocky Mountain 2011 IPv6 Summit



Contact

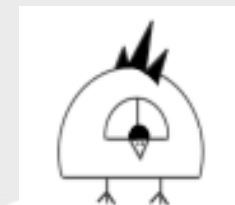
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Real Quick: What is NOT covered

Justifying or creating a business case

Creating a DETAILED deployment plan

The arguments for why to do IPv6 (really?)

Every weird corner case you can come up with to stump me





What we are going to cover:

- Checklists
- Microsoft products with IPv6 support
- Understanding OS behavior with IPv6
- Overview of transition technologies
- Design challenges
- Long-term considerations
- Reference links
- Afterthoughts

**What everyone
really wants to
ask is.....**

**Can I get the
quick outlined
solution please?**





The Snapshot

1. Acquire Provider Independent IPv6 space
2. Do native IPv6 peering or use a tunnel service
3. Get external firewall and external routing working
4. Trial public IPv6 with external DNS and Mail
5. Evaluate transition services as needed

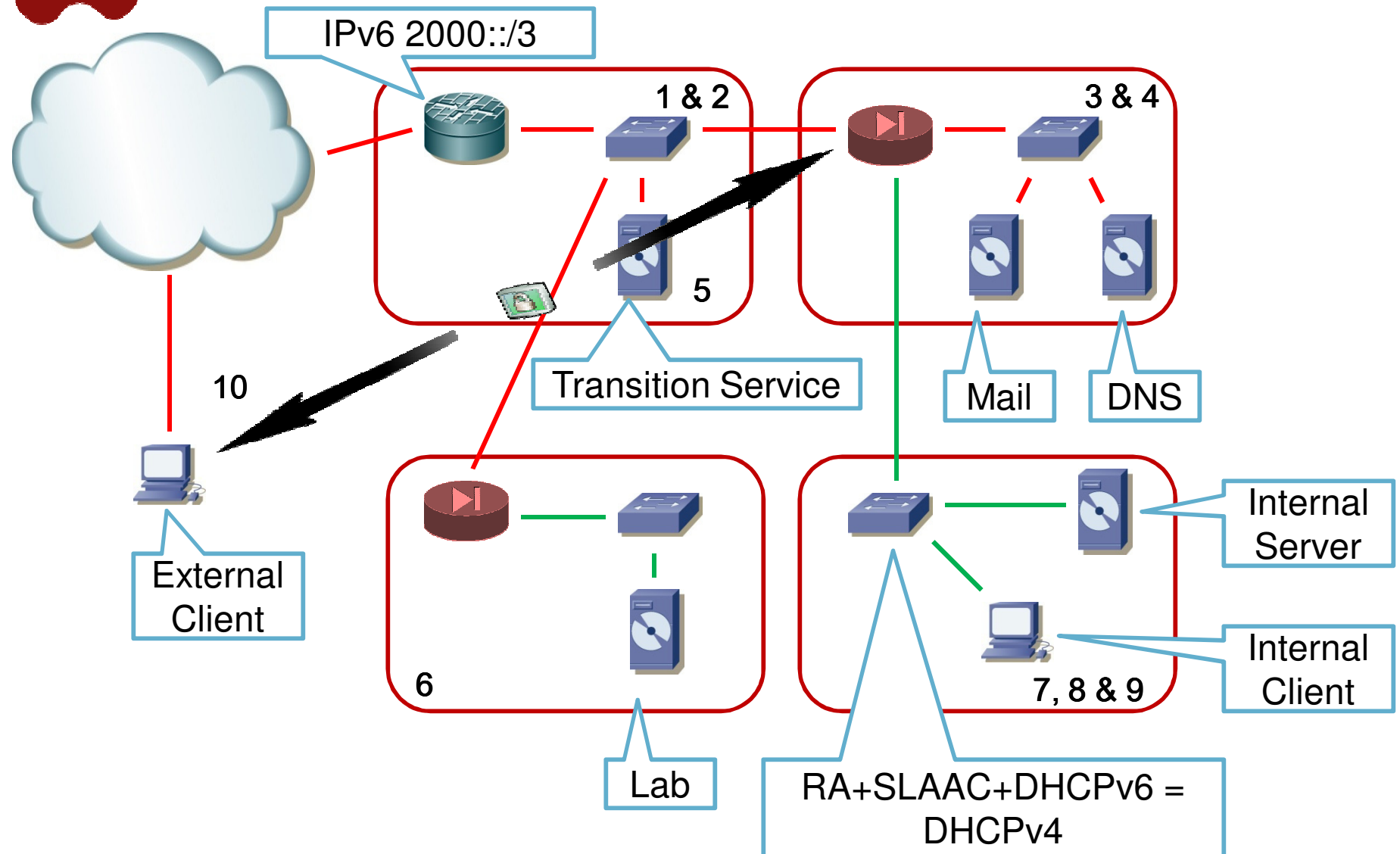


The Snapshot

6. Test your applications in a lab
7. Get internal IPv6 routing, DNS & DHCP working
8. Dual stack your servers
9. Provide dual stack to your workstation vlans
10. Deploy VPN dual stacked



The Snapshot Diagram



**Can you put this
in some
checklists?**





Pre-Deployment Checklist

Do an audit of your environment to get:

- OS Support of IPv6
- Network Equipment Support of IPv6
- Service Provider Support of IPv6
- Hosting Provider Support of IPv6
- 3rd Party Partner / Vendor / App Support of IPv6

From all that you can do the next steps:

- Design and Planning
- Deployment / Transition Timeline



Pre-Design & Planning Checklist

Once you know where you are put a design and plan together, it should cover items like:

- Resources required (people mainly)
- Training requirements (of those people)
- Network equipment replacement or upgrades
- Coordinating with your service and/or hosting provider
- Determining which 3rd Party Partner / Vendor / App support of IPv6 you require – if any
- Budget estimates (people and equipment)

Design Motto



Credit: Lauren Hogg

**Go Native
where you can**

**Tunnel where
you must**





Design Checklist

Design:

- Be specific in what you NEED to be IPv6 and what you WANT to be IPv6 – not everything has to run it
- Move from the edge back to the core if you can leverage transition technologies, dual stack where you can and tunnel where you must
- Pick forgiving applications to move and test first
- Use the same SLA's you have built for IPv4 for IPv6
- Test 3rd Party Partner / Vendor / App Support of IPv6 – it often (at least now) isn't accurate



Planning Checklist

Planning:

- Build a team (network, systems, app, dev, db, finance and those pesky security folks too) – give them resources
- If at all possible, fit the move to IPv6 into your regular change and upgrade process – avoid making it an out of band upgrade or “one off”
- Training often needs to happen BEFORE design and deployment
- Knowledge transfer is key – bring back the lunch and learns to pass along the IPv6 knowledge



Deployment Checklist

Deployment:

- Reference deployment guides (Cisco, Microsoft, etc.) – a lot of smart people did a lot of work for you
- Make sure to test both IPv6 and IPv4 behavior after a change has been made
- Test your monitoring tools on the lab first (seems obvious – lots of heartache here)
- Test IPv6, then dual stack behavior to see if there is a difference
- Don't remove IPv4 (for now) unless there is a specific need

**Can an IPv6
deployment fit in
my regular
upgrade cycle?**

**That is how you
SHOULD deploy
IPv6!**



What Microsoft Products work with IPv6?

There are two tiers...





Microsoft Products with IPv6 Support

- Windows Server 2008R2, 2008, 2003*

- Windows 7, Vista, XP*

- Exchange 2007 & 2010

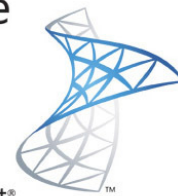
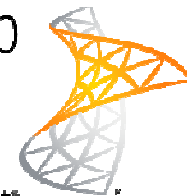
- DirectAccess

- Forefront UAG/TMG *

- SharePoint

- SQL Server 2008

- System Center



* - Utilizes IPv6 for specific function but has limitations



Microsoft Products without IPv6 Support

- Microsoft Lync
- Microsoft OCS
- Xbox 360



**Is there OS
behavior I should
look out for?**

Of course!





Understanding OS Behavior with IPv6

- IPv4 & IPv6 – Dual Stack behavior
 - If both IPv4 and IPv6 addressing are available the majority of OS's will utilize IPv6 first
 - The typically combination is DNS queries happening across IPv4 to resolve a name to IP and getting a AAAA record then use IPv6 to access it
 - Potential for network brokenness if the IPv6 network does NOT route properly (no route, improperly routed, blocked, etc.)



Understanding OS Behavior with IPv6

- Microsoft has implemented some IPv6 transition services into their OS
- For Microsoft hosts they will do the following:
 - Global or ULA IPv6 address (SLAAC/RA/DHCPv6 obtained) – prefer
 - If the client machine has a public IPv4 address and is non-domain joined the client will do 6to4
 - ISATAP – this has to be explicitly enabled in DNS
 - If none of those work it will fall back to IPv4
 - Teredo – used on non-domain joined clients



Windows behavior to watch out for!

- The deployment guide for Exchange recommends non-domain joined Edge Transport servers
- The deployment guide for DirectAccess (and therefore Forefront UAG server) implies it has to be the default gateway for all IPv6 traffic
- If you want to utilize ISATAP – you have to explicitly remove it from the Global Query Block List in DNS
- Teredo is enabled by default – it might not be ON but an API call can “turn it on”



Windows behavior to watch out for!

- While Forefront UAG implements DA it does NOT support native IPv6 on the external side
- Forefront TMG does NOT support IPv6, there is no published date for support



Other OS behavior to watch out for!

- If you utilize DHCPv6 Windows will behave fine but Linux and OSX might have some issues getting IPv6 DNS resolver information
- OSX Lion beta has implemented DHCPv6 support, prior versions only support RFC6106/5006?
- Linux still seems to be holding out for everyone to adopt RFC6106. In my opinion I find it highly unlikely that Microsoft will be supporting that RFC

**You talk about
6to4, ISATAP and
Teredo...**

**Do I need to
know the
transition
technologies?**





Microsoft IPv6 Transition Technologies

- Microsoft has the following transition technologies implemented in their products, specifically Win7/Vista and Server 2008/r2:
 - **6to4** – tunnel IPv6 traffic over IPv4 without having to build an explicit tunnel, uses public relays
 - **ISATAP** – allow dual stack nodes to tunnel on top of IPv4 utilizing an ISATAP router to forward, doesn't require multicast
 - **Teredo** – same function as 6to4 but works behind IPv4 NAT (able to do NAT traversal)
 - **NAT64/DNS64** – in Forefront UAG – convert IPv6 traffic to IPv4 traffic and intercepts DNS queries to modify them from IPv4 entries to IPv6 entries to match the NAT64 entry

**At this point you
are thinking...**



**Can I nod off
without him
noticing?**



Design Challenges

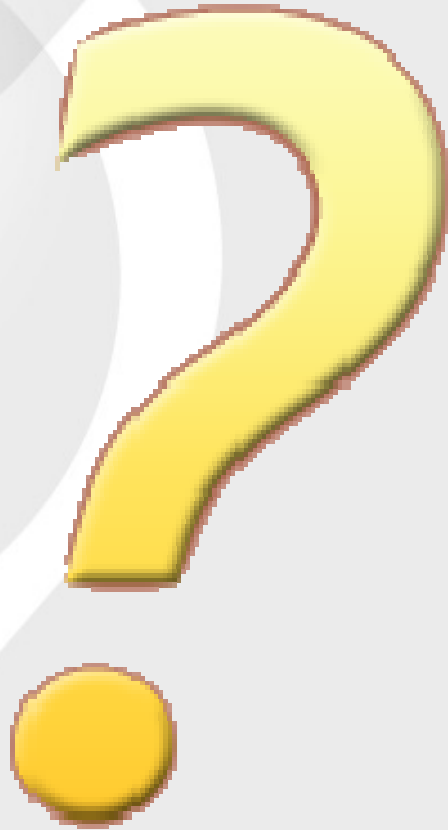
Common design mistakes:

- Assuming you need feature parity – you want functional parity
- Assuming you need your entire network running IPv6
- That your existing security, logging and monitoring products support IPv6

Challenges

- Managing and monitoring transition services
- Microsoft POC/Design docs use ISATAP

Q & A



**My brain hasn't
exploded so...**

Can you recap?



Thank You!



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Long-term Issues

**Can you see a
day when I am
only running
IPv6?**





Reference links

Microsoft links:

Microsoft IPv6 page – <http://www.microsoft.com/ipv6>

IPv6 Source/Dest Address selection process - <http://technet.microsoft.com/en-us/library/bb877985.aspx>

Microsoft Infrastructure Planning and Design Guides - <http://technet.microsoft.com/en-us/library/cc196387.aspx>

Microsoft Exchange: Understanding IPv6 Support in Exchange 2010 - <http://technet.microsoft.com/en-us/library/gg144561.aspx>

Cisco links:

Cisco Validated Design -

http://www.cisco.com/en/US/netsol/ns817/networking_solutions_program_home.html

IPv6 Addressing Plan from RIPE:

RIPE IPv6 Address Planning Guide - http://www.ripe.net/training/material/IPv6-for-LIRs-Training-Course/IPv6_addr_plan4.pdf