Configuring Samba 3/4 for IPv6 Operation with Windows Server 2008 and Windows Vista

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Quick Poll

- I asked these questions at SambaXP 2007:

- Who is using IPv6?
- Who is using IPv6 in a production environment?
- Who wants to use IPv6 in Windows networks?

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Quick Comparison IPv4 vs IPv6

	IPv4	IPv6
Address space	Scarce	Huge
End to end connectivity	Broken	Yes
Stateless auto-configuration	No	Yes
IPSec standard	No	Yes
Network renumbering	Difficult	Easy
Peer to peer applications	Difficult	Easy
Protocol independent API	No	Yes
Stack supports IPv6 and IPv4	No	Yes

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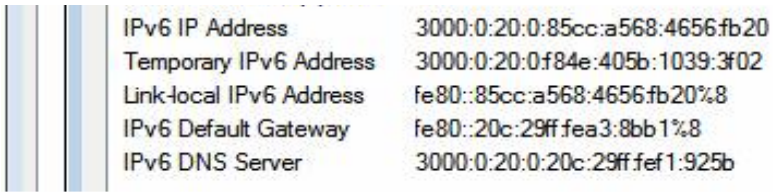
Why is IPv6 Important?

- IPv4 address pools are running out
- Government mandates
  - Japan, Korea, USA
  - DOD
  - US Federal Government
    - OMB Memorandum 05-22, “Transition Planning for Internet Protocol Version 6 (IPv6),” directing all Federal government agencies to transition their network backbones to the next generation of the Internet Protocol Version 6 (IPv6), by June 30, 2008.
- Operating systems support it by default
  - You probably already have IPv6 on your network

Windows and IPv6 Take-Up

- Vista & Windows Server 2008 and IPv6
  - Enabled by default
  - Preferred protocol
  - Configured automatically
  - Fully integrated
  - Works in IPv4 networks
  - Full support in AD
- IPv6 by stealth
- IPv6 by design



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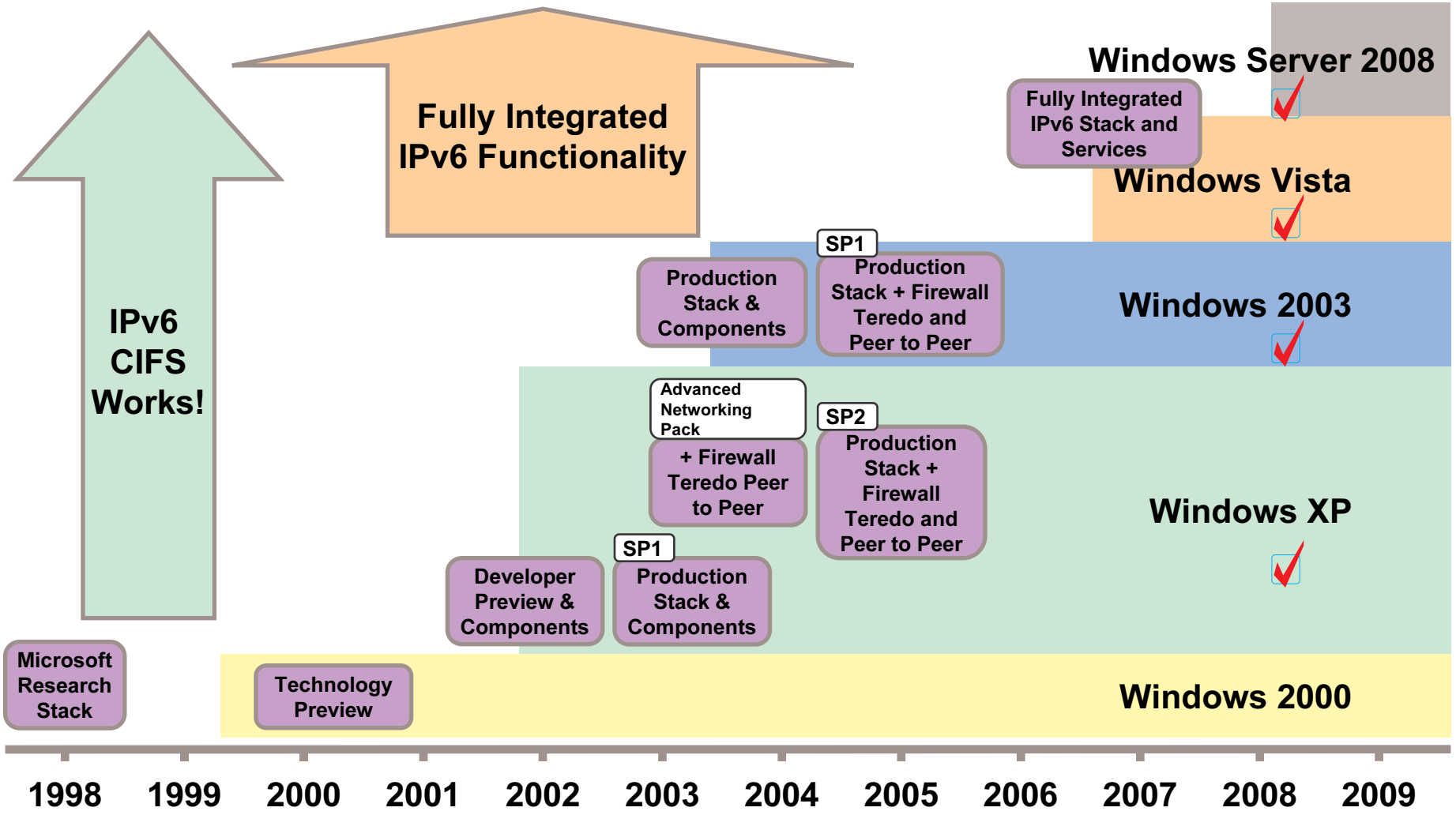
History of Windows and IPv6



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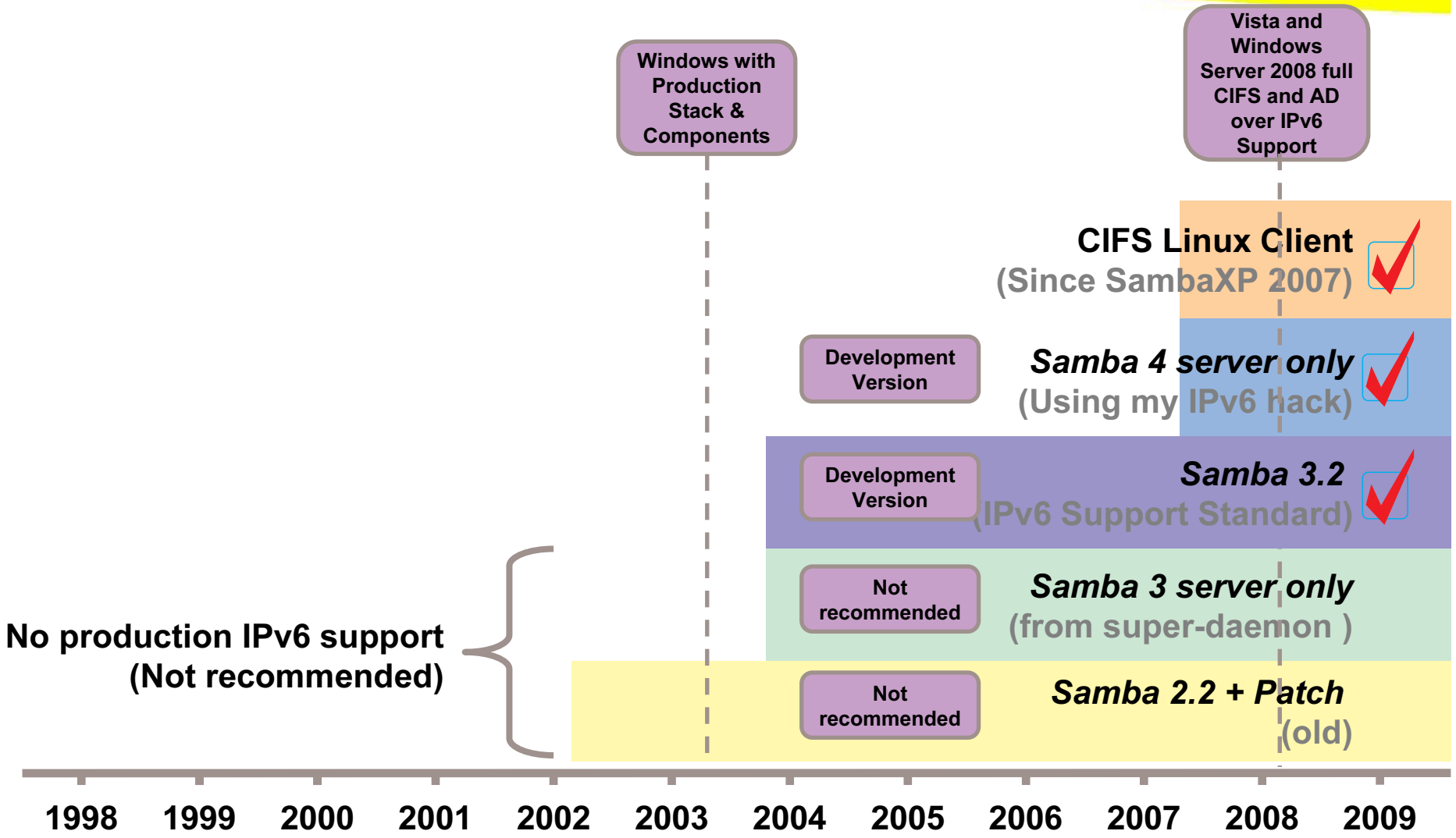
History of Samba and IPv6



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Progress Since SambaXP 2007

SambaXP April 2007

- Linux CIFS Client IPv6 Enabled (No name resolution)
  - First ever mount over IPv6 from Windows Server 2008
- Samba 4 IPv6 Enabled (File sharing and basic functionality only)
  - First ever sharing over IPv6 with Windows Vista and Windows Server 2008

Google CIFS Engineering Workshop September 2007

- First ever join over IPv6 of Windows Server 2008 to a Samba 4 domain
- Jeremy challenged to IPv6 enable Samba 3.2

January 2008

- Jeremy IPv6 enables Samba 3.2
- First ever IPv6 join of Samba 3.2 to Windows Server 2008 domain
- Testing shows surprisingly few bugs ;-)

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Linux CIFS and IPv6

- Kernel CIFS module is IPv6 enabled by default
- **`mount.cifs`**
  - Supports IPv6 addresses in the **`ip`** option

```
# mount -t cifs //W2008KENT/TESTSHARE /mnt/erion \
    -o ip=2a01:384:e14:0:fc6f:e78f:6507:4ad,    \
    user=Administrator,pass='Pa$$w0rd'
```

  - **Note:** No IPv6 name resolution

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Linux CIFS and IPv6 Name Resolution

- IPv6 patch enables IPv6 name resolution
  - See http://www.ipv6consultancy.com/ipv6blog/?p=32

```
# ./mount.cifs //W2008KENT/TESTSHARE /mnt/erion \
    -o user=Administrator,pass='Pa$$w0rd'
```

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Samba 3.2 and IPv6

- IPv6 enabled by default
- IPv6 transport works!
  - Client and server side functionality over IPv6
  - Join Windows Server 2008 domains over IPv6
  - Serve shares and printers over IPv6
- IPv6 addresses can be used in:
  - Configuration files
  - Command line utilities

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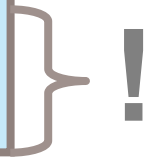
Samba 3.2 and IPv6 Example

```
# smbclient -L //3000::1 -U Administrator
Password:
Domain=[TREE] OS=[Windows Server (R) 2008 Enterprise 6001 Service
Pack 1] Server=[Windows Server (R) 2008 Enterprise 6.0]
        Sharename       Type      Comment
        ---------       ----      -------
        ADMIN$          Disk      Remote Admin
        C$              Disk      Default share
        IPC$            IPC       Remote IPC
        NETLOGON        Disk      Logon server share
        SYSVOL          Disk      Logon server share
        TestShare       Disk
timeout connecting to 3000::1:139
Connection to 3000::1 failed (Error NT_STATUS_ACCESS_DENIED)
NetBIOS over TCP disabled -- no workgroup available
```



- Works
- But still some things to fix (generally doesn't stop it working though)

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Samba 4 and IPv6

- IPv6 *not* enabled by default
  - IPv6 provisioning works with IPv6 address option
- IPv6 can be enabled with patch
  - See http://www.ipv6consultancy.com/ipv6blog
- With patch IPv6 transport works!
  - IPv6 client and server side functionality
  - IPv6 Domain controller functionality
  - Join Samba4 domains over IPv6

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IPv6 Enabling Samba 4

1. Configure IPv6
   - Global IPv6 addresses required
2. Obtain Samba 4 source and apply IPv6 patch
3. Build and install as normal
4. Provision

```
./bin/smbpython setup/provision --realm=TREE.COM --domain=TREE \
--adminpass=password --server-role='domain controller' \
--host-ip='192.168.108.53' --host-ip6='3000::3'
```

   - IPv6 enable DNS Server

```
listen-on-v6 port 53 { any; };
```

5. Start smbd

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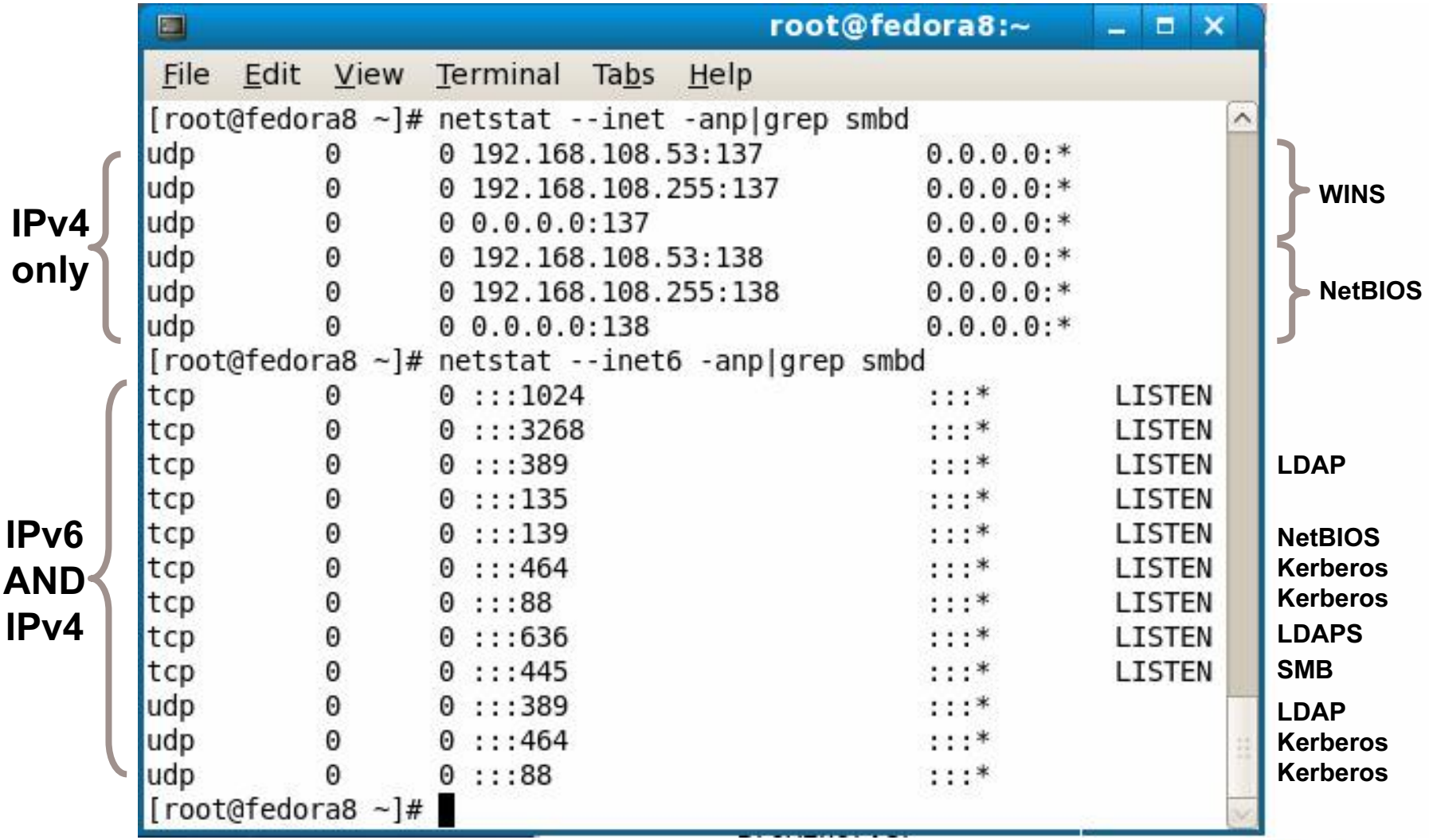
IPv6 Enabled Samba4



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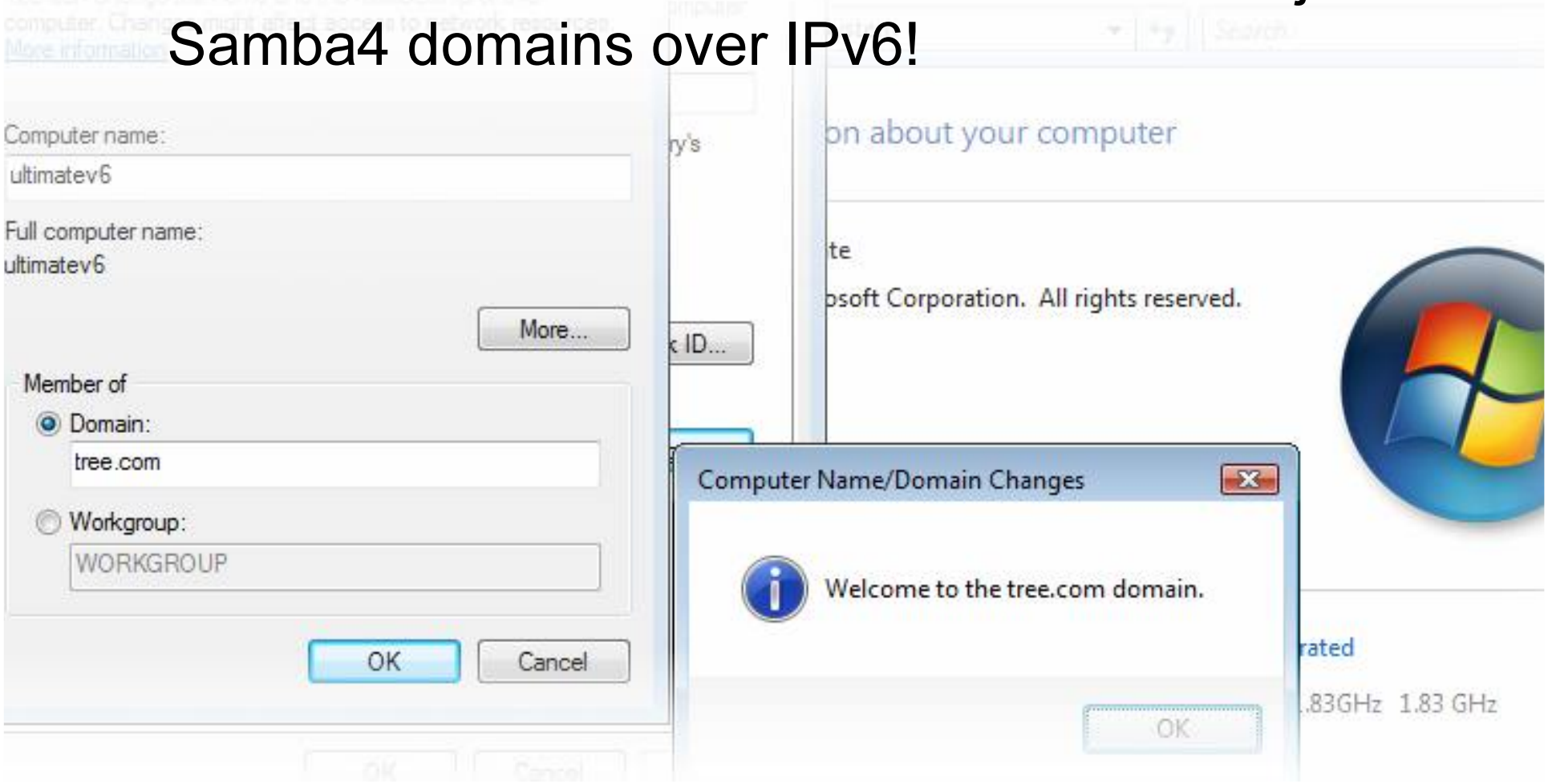
Joins to Samba4 over IPv6

- Windows Vista and Windows Server 2008 join Samba4 domains over IPv6!



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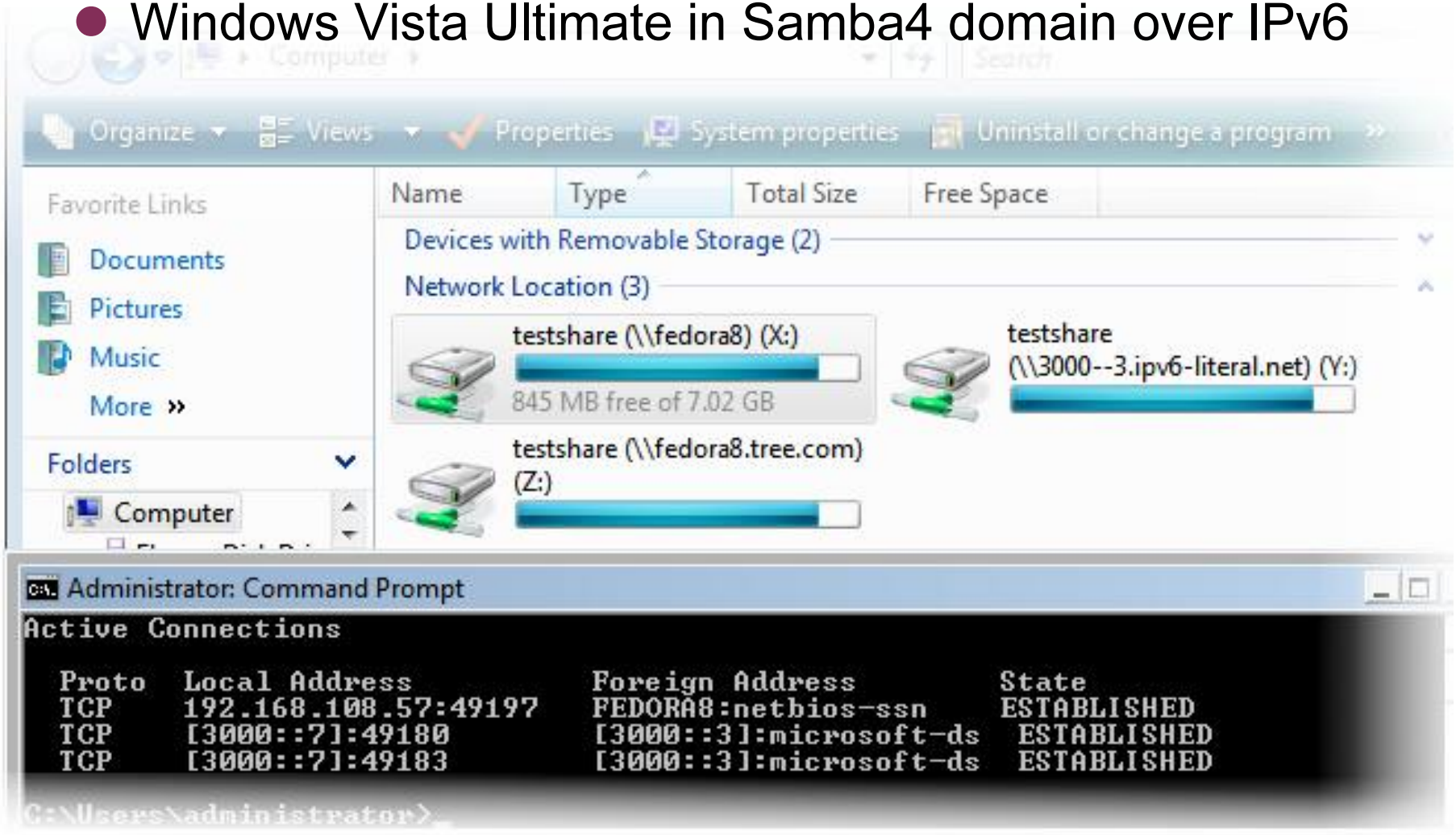
Samba4 IPv6 Shares

- Windows Vista Ultimate in Samba4 domain over IPv6



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Samba4 and IPv6 Dual Stack

- No IPv4 sockets even for IPv4 connections!
- Everything uses IPv6 API!
- Samba4 with IPv6 patch is an IPv6 application

```
[root@fedora8 /]# netstat --inet6 -na|grep ESTABLISHED
tcp 3000::3:445                 3000::7:49180               ESTABLISHED
tcp ::ffff:192.168.108.53:139   ::ffff:192.168.108.57:49197 ESTABLISHED
tcp 3000::3:445                 3000::7:49183               ESTABLISHED
[root@fedora8 /]#
[root@fedora8 /]# netstat --inet -na|grep ESTABLISHED
[root@fedora8 /]#
```

```
Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    192.168.108.57:49197   FEDORA8:netbios-ssn    ESTABLISHED
  TCP    [3000::7]:49180        [3000::3]:microsoft-ds  ESTABLISHED
  TCP    [3000::7]:49183        [3000::3]:microsoft-ds  ESTABLISHED

C:\Users\administrator>
```


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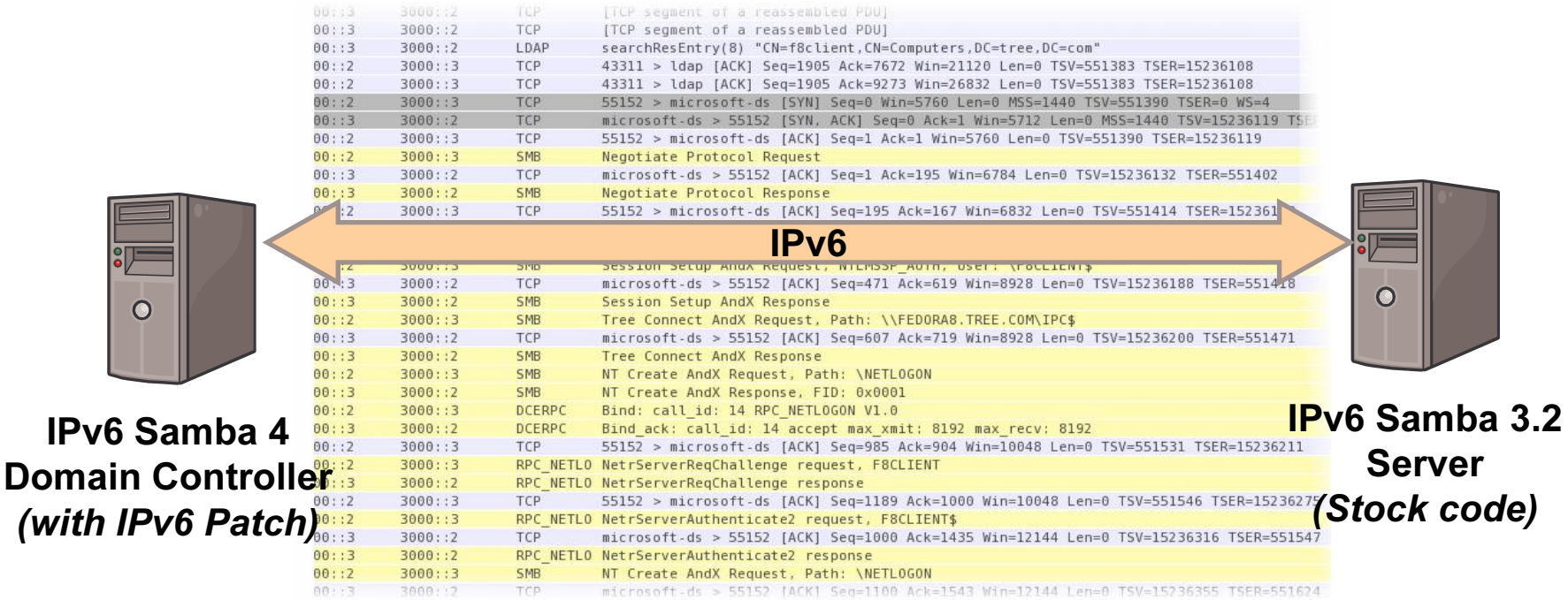
Samba Only IPv6!

- Samba 3.2 joins Samba 4 domain over IPv6
  - Create IPv6 AD domains using only Samba …
  - "Everything" "works"



Samba and IPv6 Where Next?

- Linux CIFS Client
  - Potential for new IPv6 feature
- Samba 3.2
  - Fix bugs – if there are any ☺
- Samba 4
  - Make IPv6 support standard in development code
  - Make code protocol independent where appropriate
  - Use lib/replace rather than IPv6 and IPv4 specific functions
  - Use current IPv6 API everywhere
  - One set of standard functions for both protocols
- Testing and more testing…

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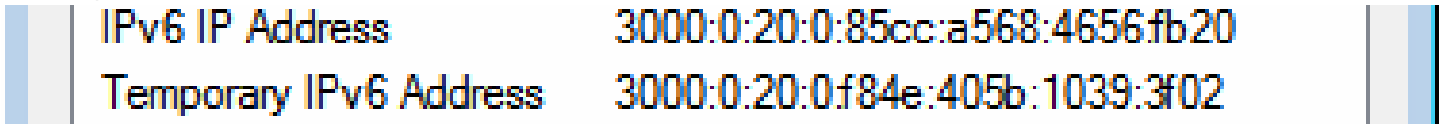
Things to Watch Out For

- Name resolution
- Global verses Link local addresses

- Privacy addresses



- IPv4-mapped IPv6 addresses
- Textual address formats
  - IPv6, IPv4-mapped IPv6, UNC, URI and literal.net
- Name resolution

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Questions?

And thanks for listening…

IPv6 and Samba References

- Google CIFS Workshop Presentation
  - http://www.ipv6consultancy.com/ipv6blog/?p=21
- SambaXP 2007 Presentation
  - http://www.sambaxp.org/files/SambaXP2007-PDF/Holder-SambaVistawithIPv6V2.pdf
  - http://www.ipv6consultancy.com/ipv6blog/?p=8
- Linux CIFS Client
  - http://www.ipv6consultancy.com/ipv6blog/?p=9
- Samba4 Hack (*old version*)
  - http://www.ipv6consultancy.com/ipv6blog/?p=12

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Erion and IPv6

- IPv6 Services
  - http://www.erion.co.uk/ipv6.html
- IPv6 Blog
  - http://www.ipv6consultancy.com/ipv6blog
- IPv6 Training
  - http://www.ipv6training.com
- IPv6 Consultancy
  - http://www.ipv6consultancy.com

- Contact david.holder@erion.co.uk

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