Samba and Vista with IPv6

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I.T. TRAINING & CONSULTING SPECIALISTS

Quick Poll

- 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	No (NAT)	Yes
Stateless auto-configuration	No	Yes
IPSec standard	No	Yes
IP mobility	Impractical	Yes
Network renumbering	Difficult	Easy
Peer to peer applications	Difficult	Easy

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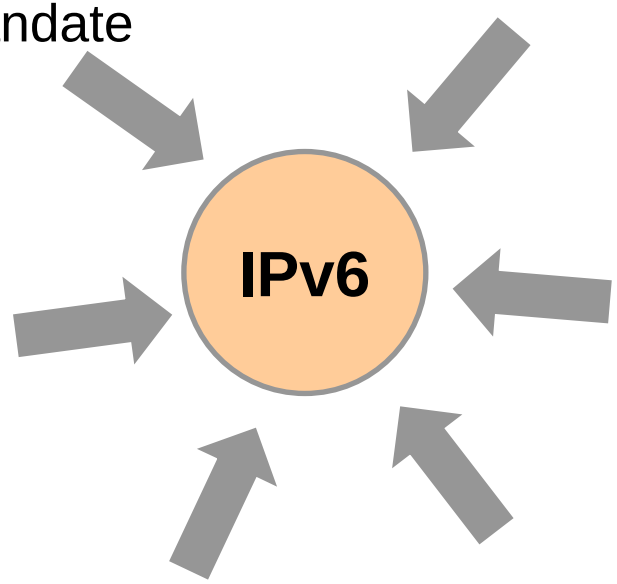
Motivations to Implement IPv6

- **Political**
  - Government mandate
- **Geographical**
  - Address allocation
  - Internet growth
- **Services**
  - IP mobility
  - Peer to peer
  - VoIP
- **Technical**
  - Peer to peer
  - Mobility
  - Security
  - QoS



- **Organisational**
  - DoD
  - Federal Government
  - Microsoft
- **Business Case**
  - Market opportunities
  - Cost reduction

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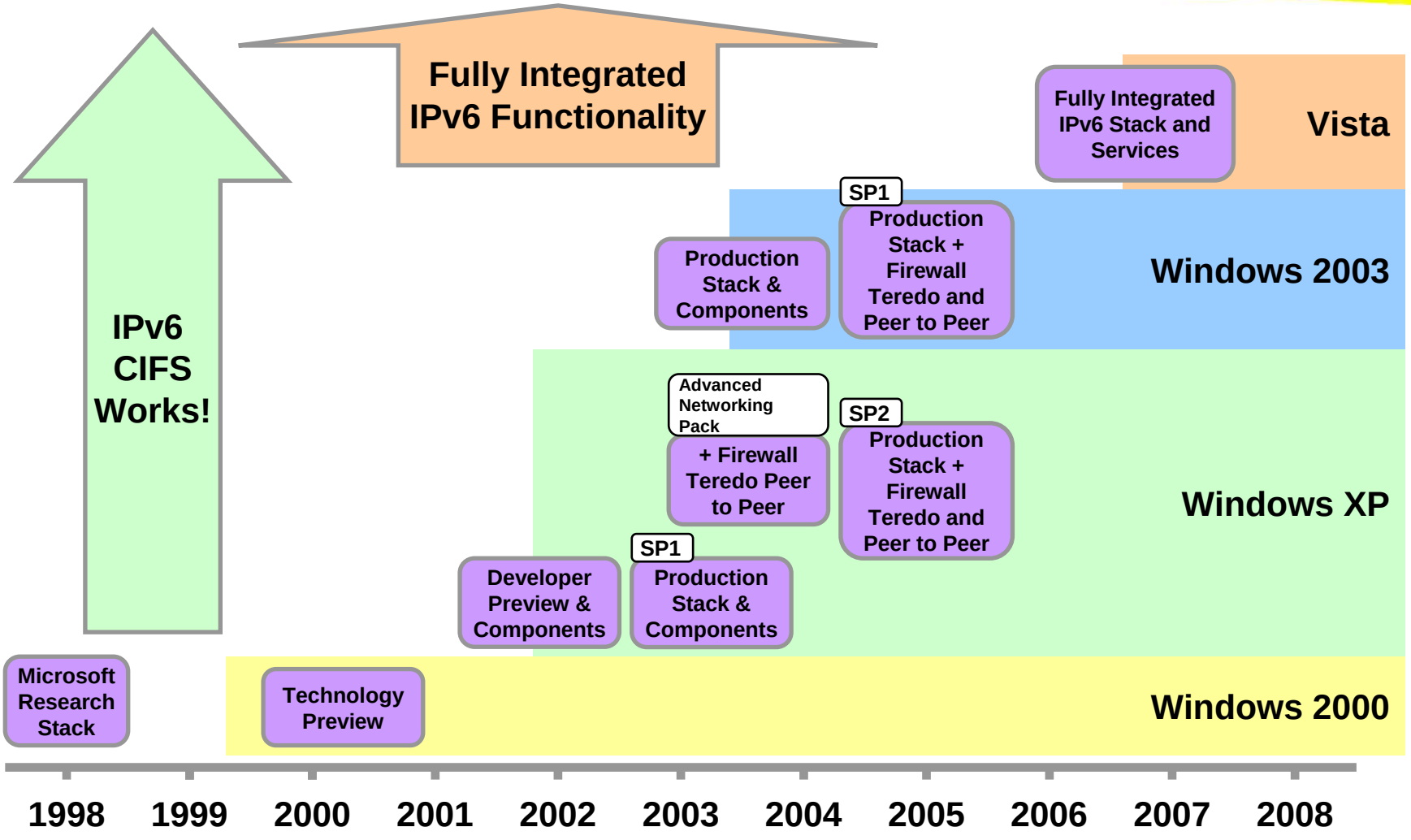
History of Windows and IPv6



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IPv6 and Vista and Longhorn

- Vista & Longhorn will introduce IPv6 into many networks

- IPv6 by stealth
  - Organisation implements Longhorn and/or Vista and uses IPv6 by default
  - Transition mechanisms enable IPv6 on IPv4 only networks
- IPv6 by design
  - Organisation implements Longhorn and/or Vista as a part of strategic plan to move to IPv6

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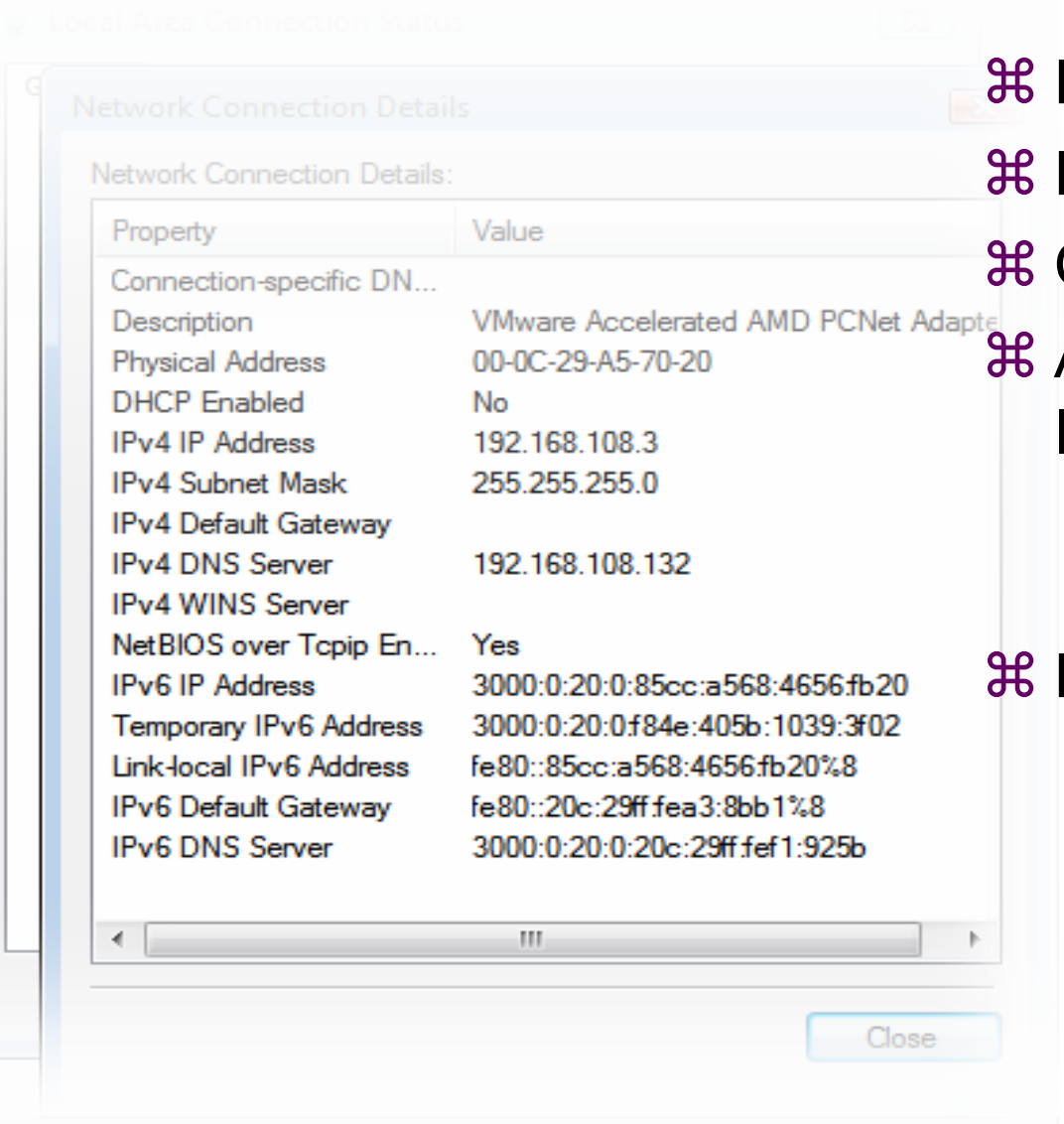
Configuring IPv6 on Vista



- Enabled by default
- Preferred protocol
- Configured automatically
- Attempts to work even in IPv4 only networks
  - Teredo
  - ISATAP
- Fully integrated into GUI

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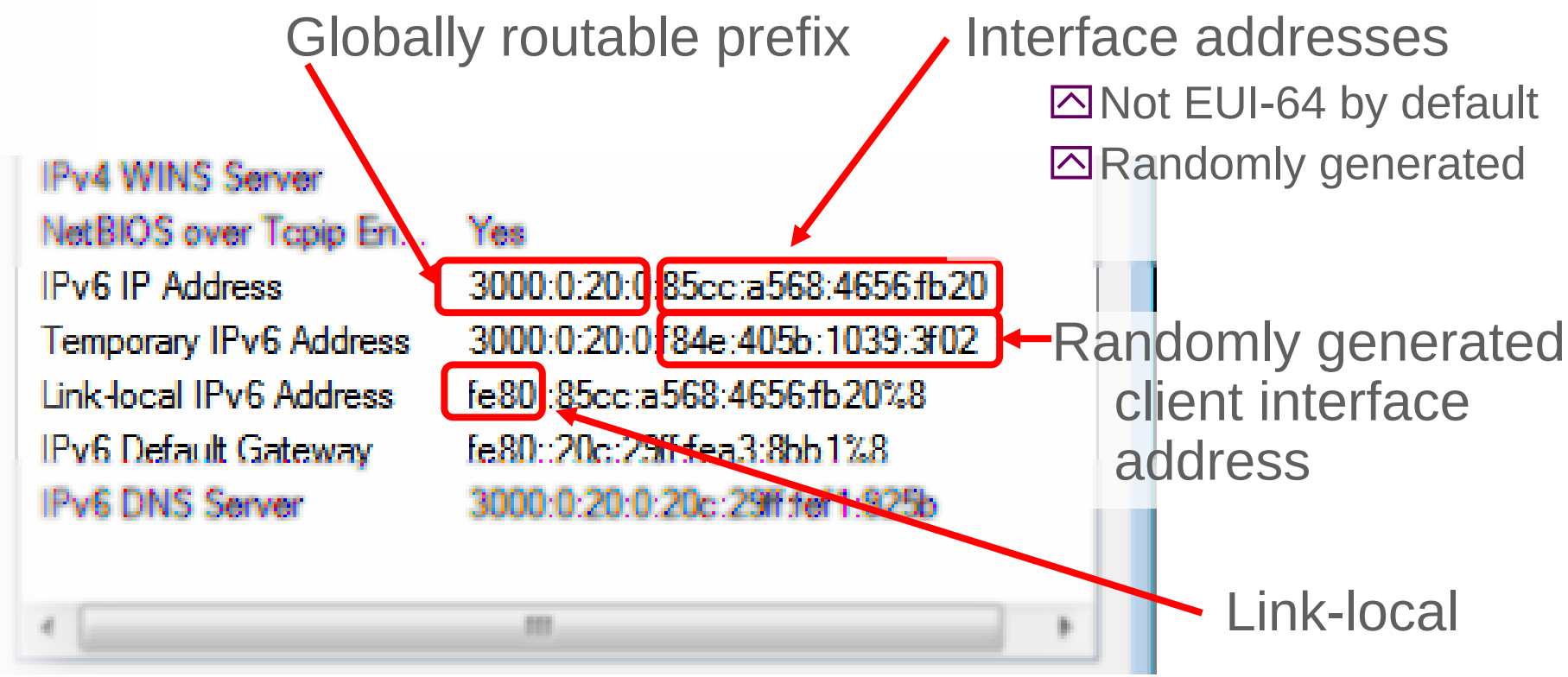
IPv6 Addresses and Vista

- Interfaces have **many** IPv6 Addresses
- Be aware of this when working with Samba



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NetBIOS NBT and IPv6

- NetBIOS does not work over IPv6
- Raw SMB over IPv6 works 

Port	Protocol	Description	
137	UDP	NBT Name Service	Will never work with IPv6
137	TCP	NBT Name Service	
138	UDP	Datagram service	
138	TCP	Unused	
139	UDP	Unused	
139	TCP	Session Service	
445	TCP	Raw SMB over TCP/IP	Will work with IPv6

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Name Resolution for IPv6 CIFS

- NetBIOS name resolution is IPv4 only

  IPv4 Only

- Link-local Multicast Name Resolution (LLMNR)

  IPv4 and IPv6

- DNS

  IPv4 and IPv6

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Link-local Multicast Name Resolution (LLMNR)

- Performs name resolution without DNS
- Essentially DNS over multicast
- Works for IPv4 *and* IPv6 hosts
- Uses multicast addresses
  - IPv6 **FF02::1:3**
  - IPv4 **224.0.0.252**

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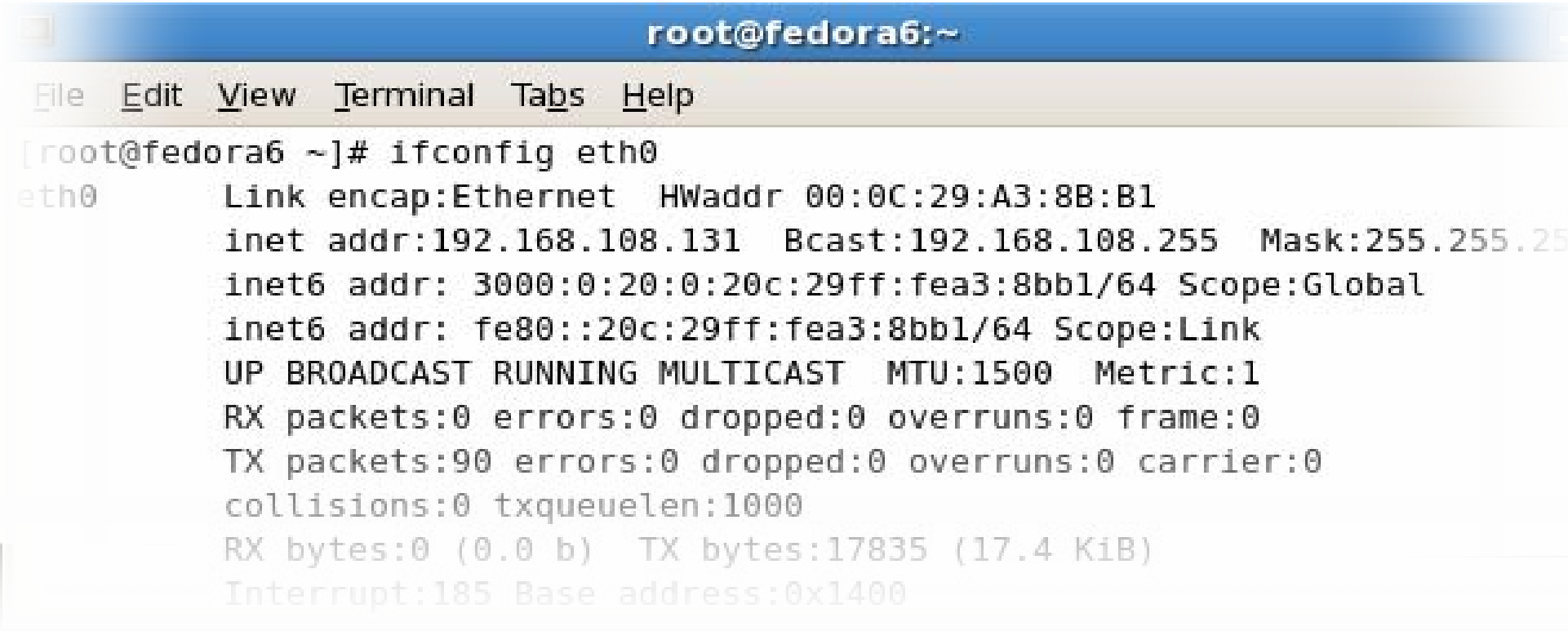
Linux/Unix and IPv6

- Current versions of Linux, BSD and Unix support IPv6
- Usually enabled by default
- Majority of applications support IPv6



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Samba 3 and IPv6

- **nmbd**
  - NetBIOS name resolution IPv4 only
  - WINS IPv4 only
  - NetBIOS also IPv4 only
- **smbd**
  - SMB protocol is network layer independent
  - Requires name resolution
    - Can be provided by any IPv6 aware mechanism (DNS)
  - Problem – stock **smbd** not IPv6 enabled

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smbd over IPv6 using **xinetd**

1. Run **smbd** from IPv6 enabled internet service daemon
2. Create /etc/xinetd.d/smb

```
# Samba smb service
service microsoft-ds
{
        flags                   = REUSE IPV6
        socket_type             = stream
        wait                    = no
        user                    = root
        server                  = /usr/sbin/smbd
        log_on_failure          += USERID
        disable                 = no
}
```

port 445 in /etc/services

Enables IPv6

3. Start **xinetd**

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Samba 3 SMB over IPv6 (1)

- On Samba box check for IPv6 SMB listener

```
# netstat –inet6 –an | grep 445
tcp 0 0      :::445  :::*LISTEN
```

- Works! 

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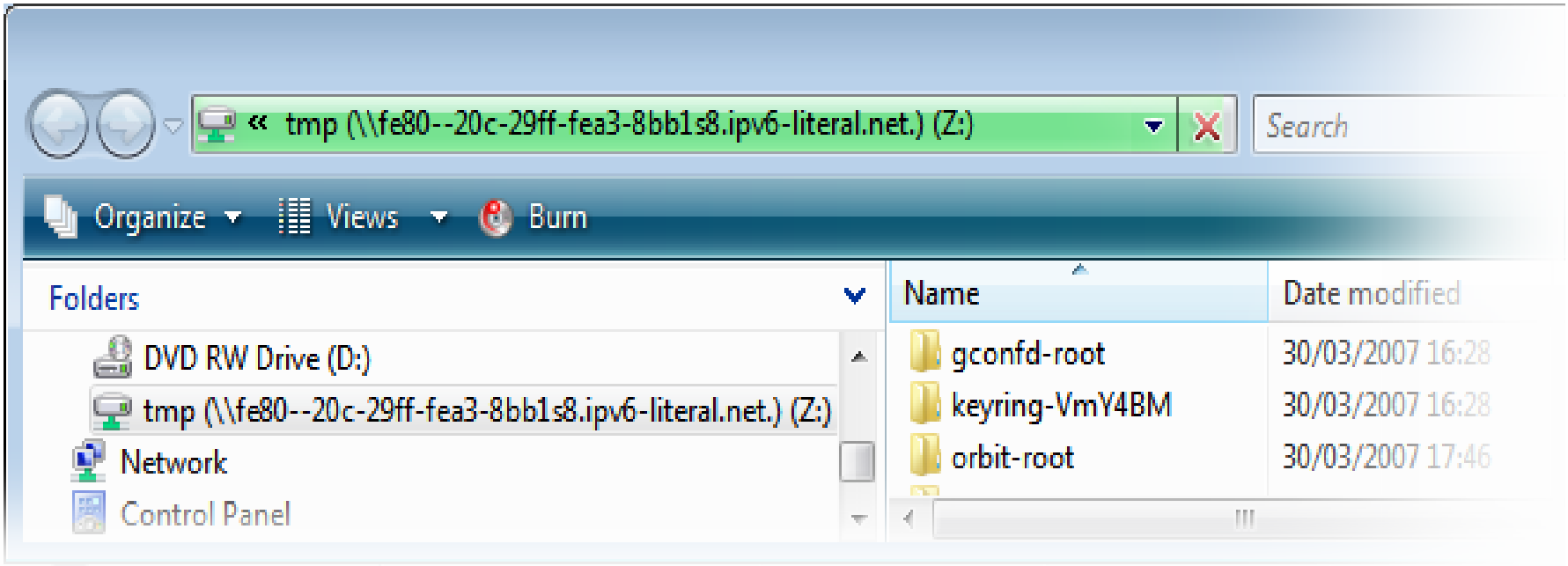
Samba 3 SMB over IPv6 (2)

- Connect from Vista using link local address and no DNS



  - Literal DNS name converts to IPv6 addresses
  - Hyphens replace colons in domain name
- Works!

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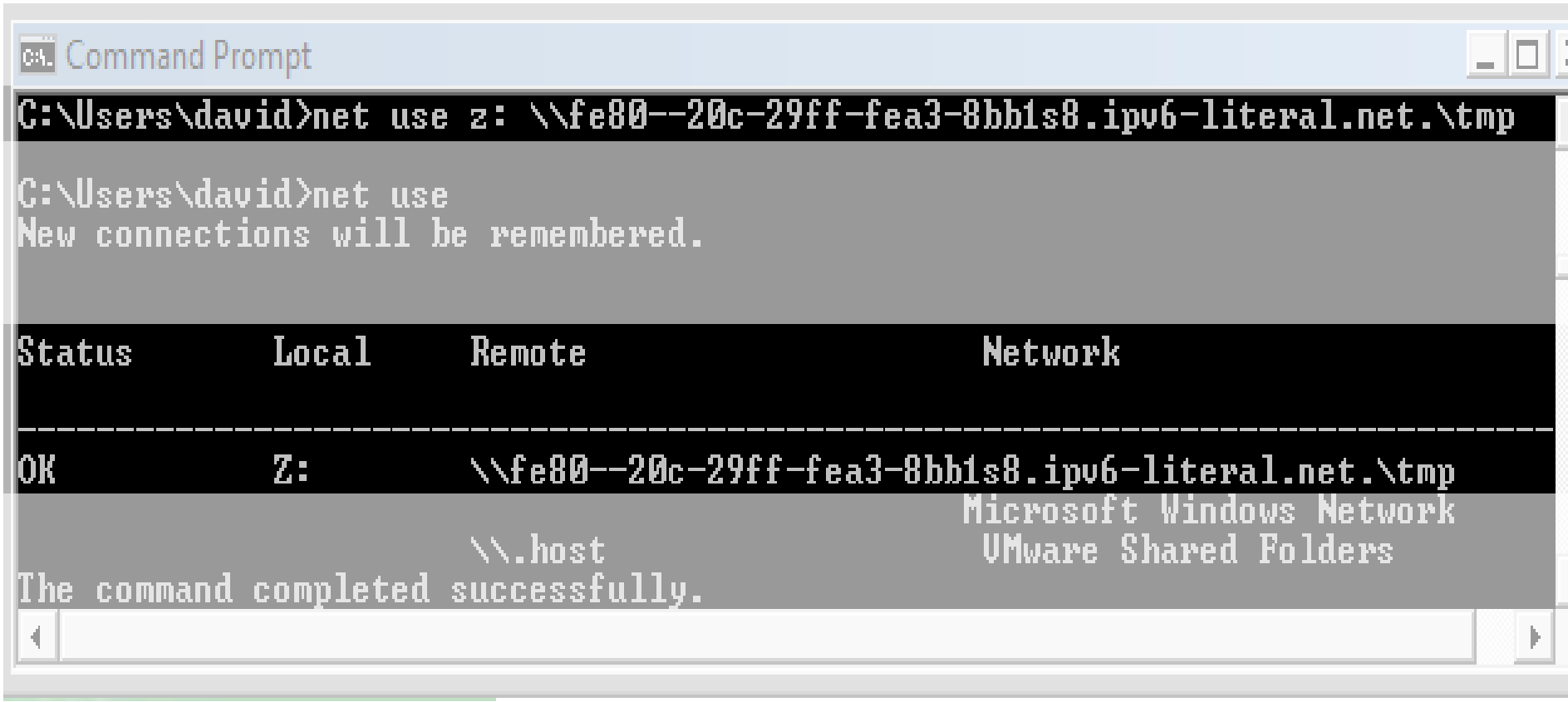
Vista **net use** over IPv6

- Works from the command line too



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IPv6 and **xinetd** Gotcha

You might be tempted to:

- Enable IPV6 in **xinetd**

`/etc/xinetd.conf`

```
v6only = yes
```

- And remove IPv6 in the **smb** configuration

`/etc/xinetd.d/smb`

```
flags                    = REUSE IPV6
```

- This will configure SMB over *IPv4*!
  - Dual stack uses IPv4-mapped IPv6 addresses

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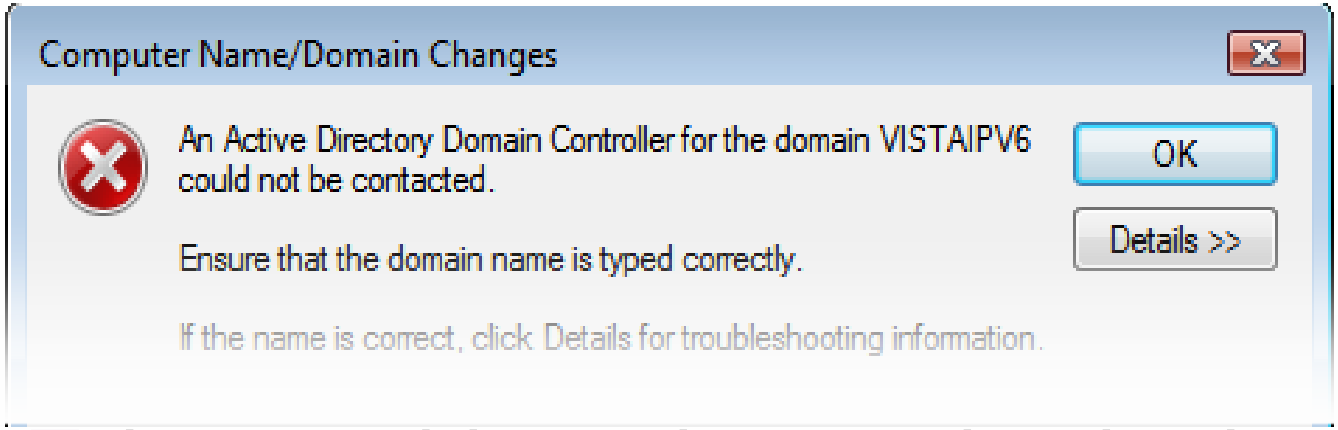
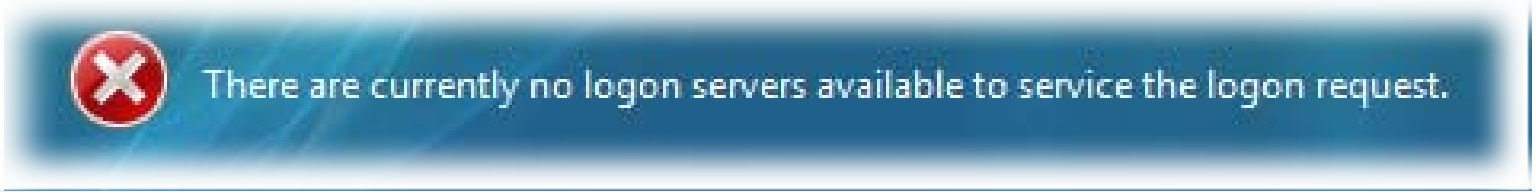
Samba 3 as IPv6 PDC

- Samba 3 cannot be Active Directory domain controller
- Vista ***only*** contacts Active Directory DC using IPv6



- **Vista cannot join or login to a Samba 3 domain over IPv6**



- Share SMB/CIFS user authentication ***does*** work

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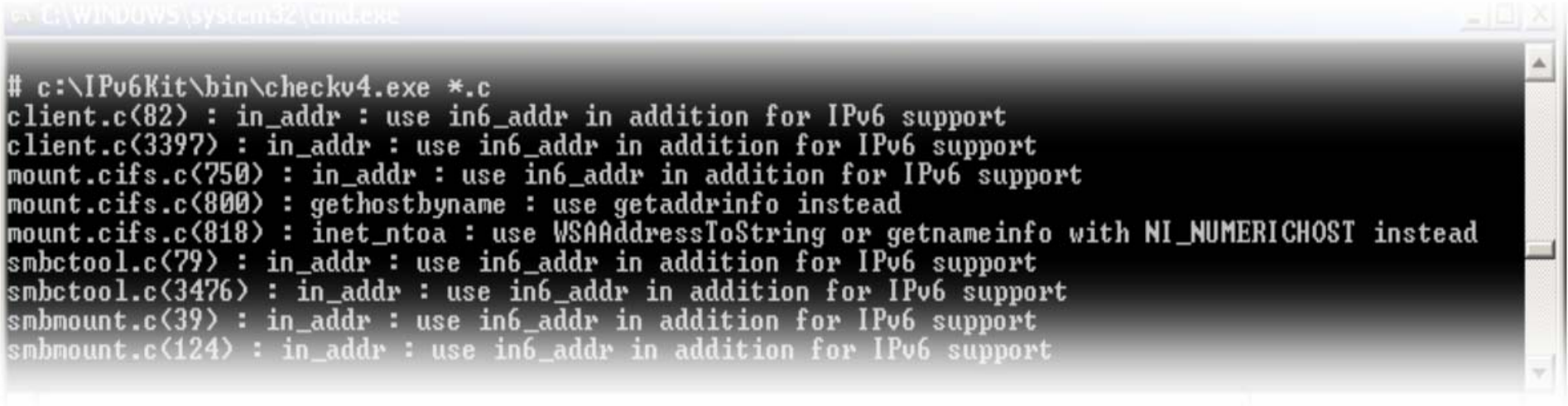
Samba 3 IPv6 Client Side

- Support not complete in Samba 3 client code
  - Quite a bit of work to do



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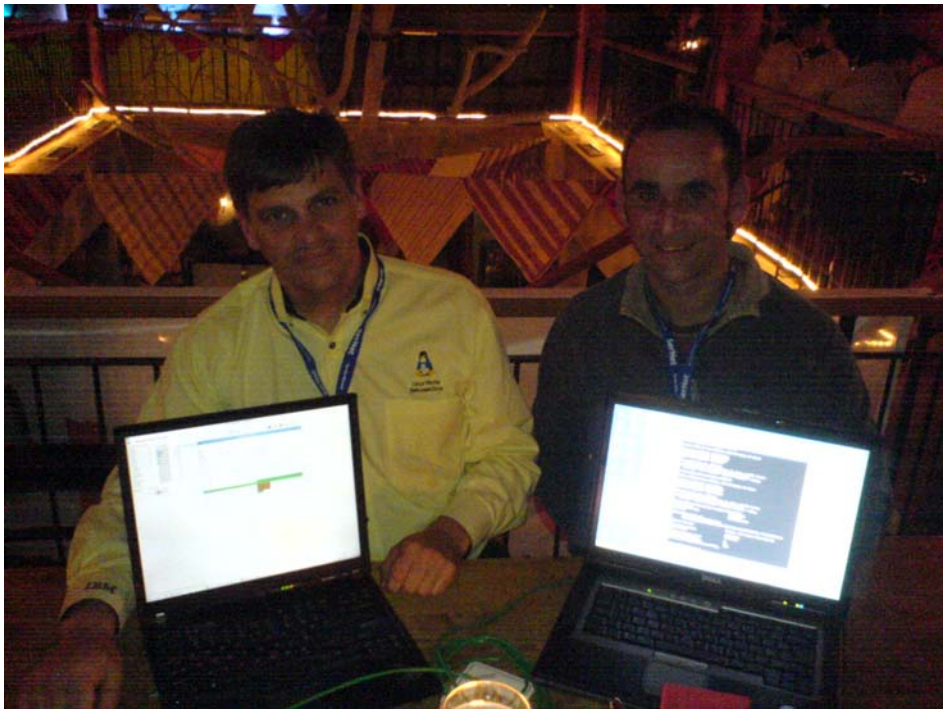
Linux CIFS IPv6 Client

- *"Linux CIFS Client Guide"* by Steve French
  - "*IPv6 Support is planned for the future and is almost complete*"
- Now working as of SambaXP 2007 Party!



Steve French and David Holder – The first ever CIFS client connection over IPv6

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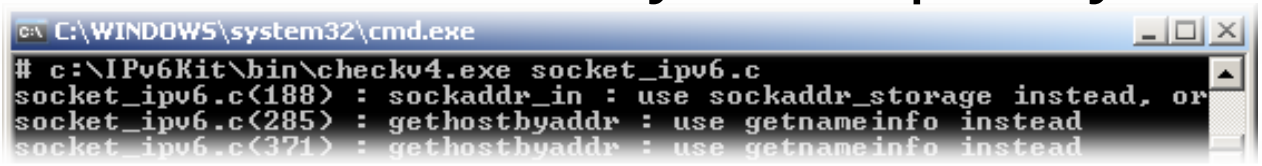
Samba 4 and IPv6

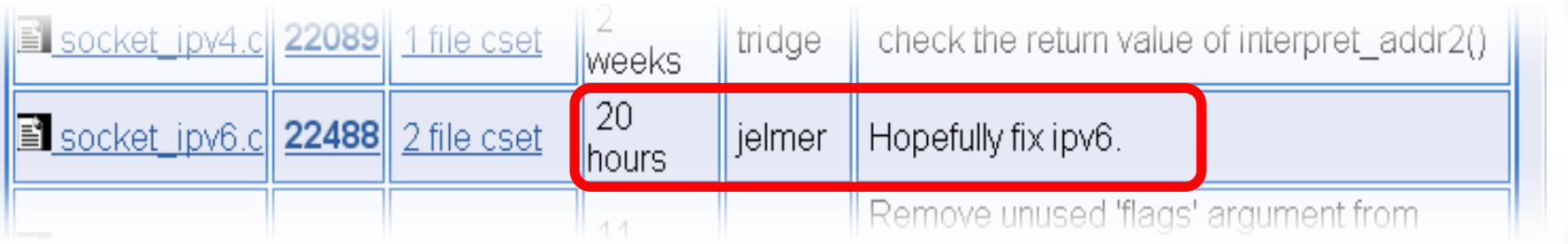
- Samba 4 code is not yet completely IPv6 clean



- Server side now IPv6 clean as of this week, **but**
  - IPv4 is hard-code in some places

```
status = stream_setup_socket(event_context, model_ops,
                             &ldap_stream_ops,
                                     "ipv4", address, &port,
                             ldap_service);
```

- You can hack Samba 4 server to work over IPv6



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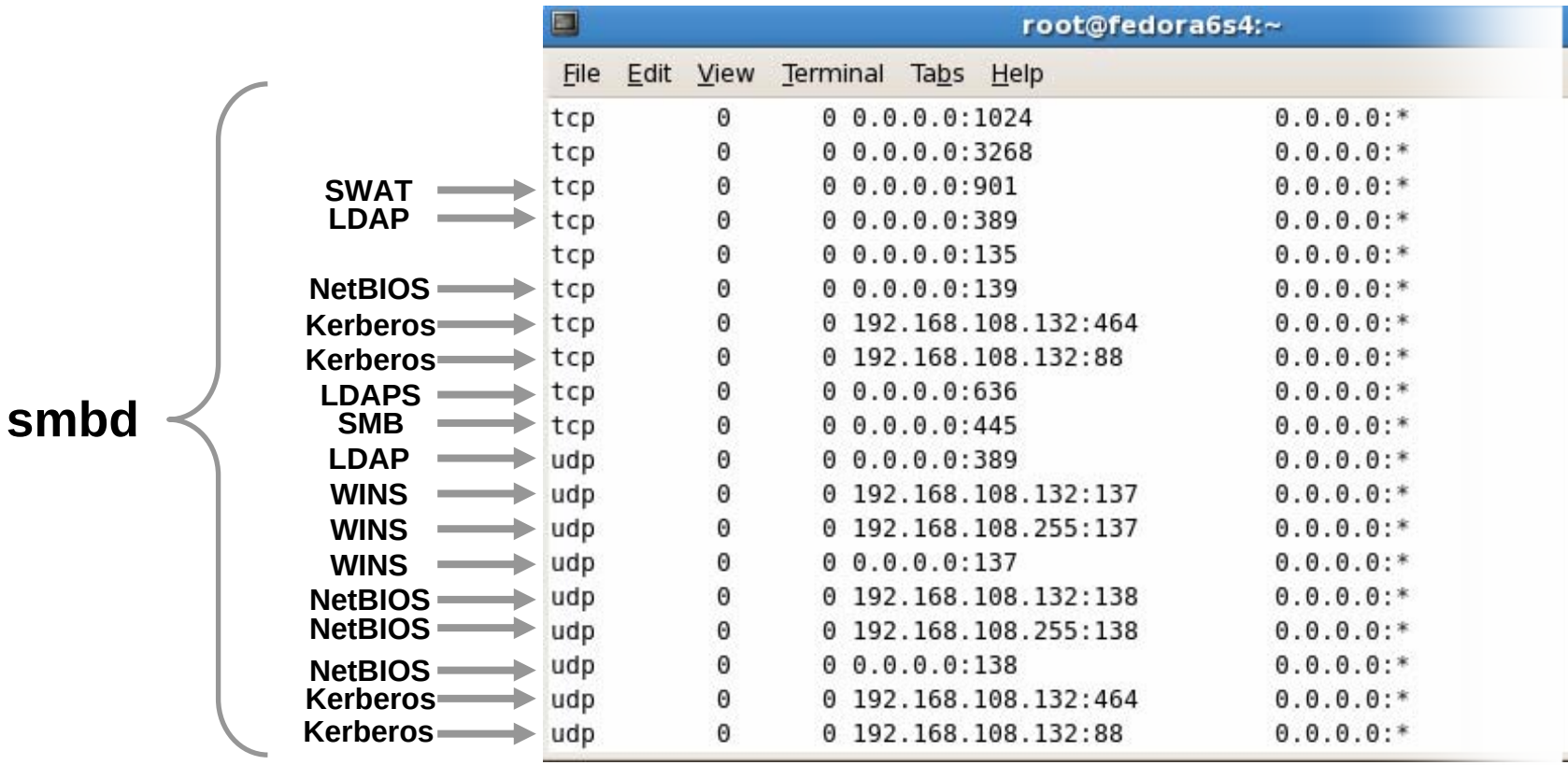
Samba 4 and IPv6

- Cannot run Samba 4 from Internet Super Daemon
  - Samba4 **smbd** listens on multiple ports
  - Internet super daemons one port per daemon



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Samba 4 and IPv6

- Use IPv6 hack or port forwarder for Samba 4 over IPv6

  - Hacked version also listens on IPv4 (dual stack)
- Works for mapping network drives and simple tasks
- Vista *fails* to join domain over IPv6
  - **No** difference from IPv4

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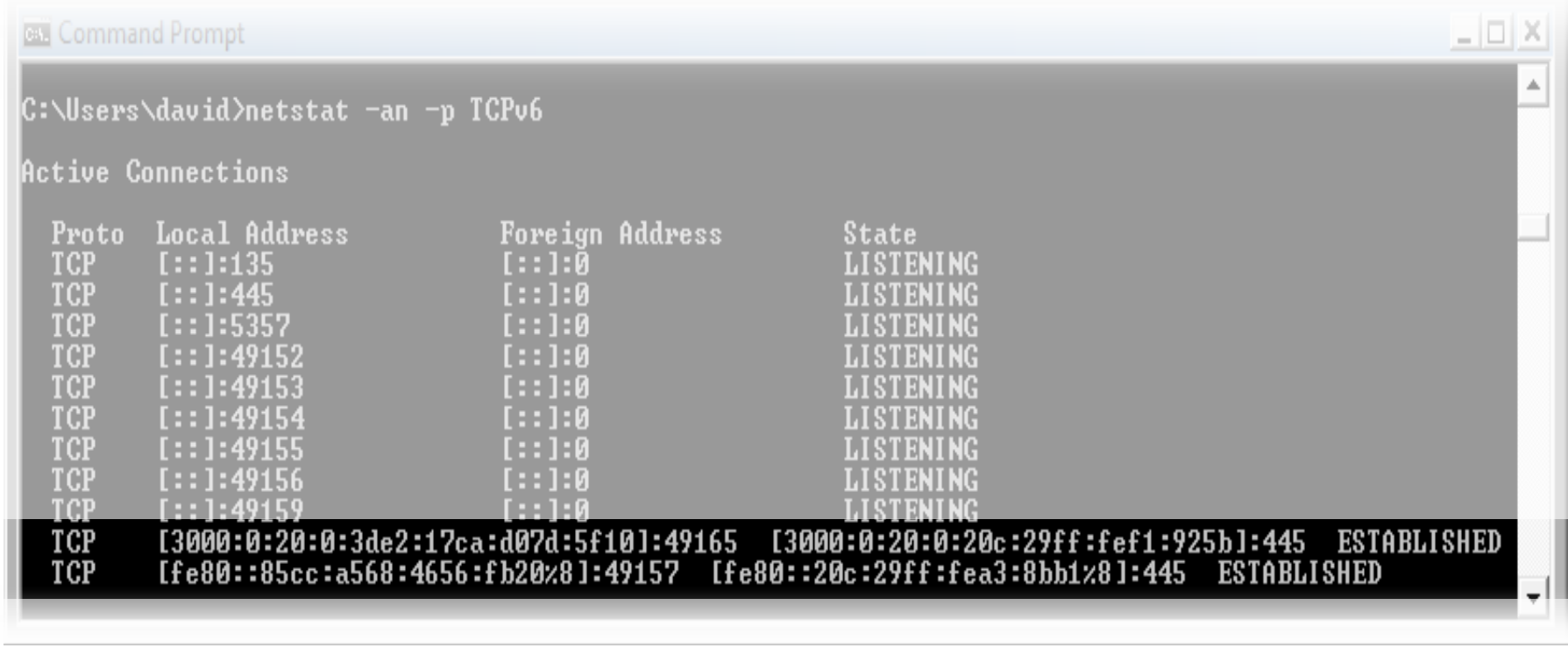
Vista to Samba 4 over IPv6

- SMB over IPv6 works using:
  - IPv6 hack
  - Port forwarding



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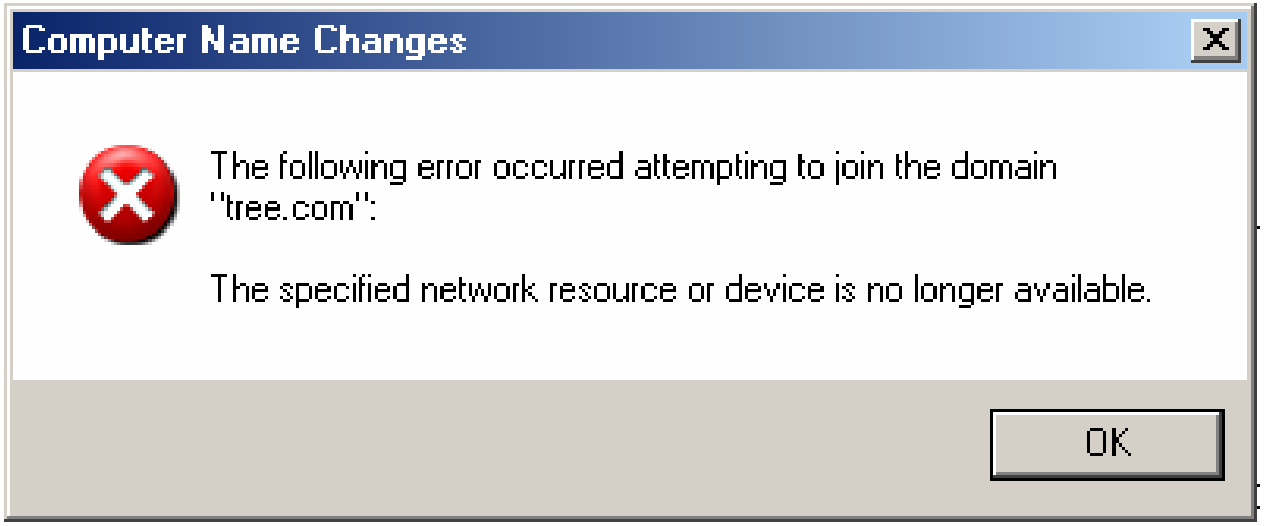
Longhorn IPv6 and Samba

- Longhorn fails to join Samba 4 domain



- Longhorn can use SMB shares over IPv6 to Samba 3/4

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IPv6 and Samba Summary

Version	Role	Works?	Requirement
Samba3	Raw SMB over IPv6	Yes	None
	NT DC over IPv6	**No**	No requirement
	CIFS Client	Yes	As of SambaXP 2007
	AD Client over IPv6	**No**	Required for Longhorn AD domains
Samba4	Raw SMB over IPv6	**Yes***	Required. *only with hack
	AD Client over IPv6	**No**	Required. Can be simulated by port forwarding.
	AD DC over IPv6	**Yes***	Required. *only with hack Can be simulated using port forwarding. IPv6 AD clients (Vista/Longhorn) cannot join a Samba4 domain.
	LLMNR	**No**	Required

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Where Next with Samba and IPv6?

- Samba with AD is required combination for IPv6
  - AD DC – Samba 4
- Samba 4 can be hacked to support IPv6
  - Server only
- Samba4 server code is close to supporting IPv6
  - Needs changes to build and test

Deployment of Vista and Longhorn will make Samba over IPv6 critical for some organisations

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Questions?

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Contact Details

- Erion IPv6 Services:
  - www.ipv6training.com
  - www.ipv6consultancy.com
  - www.erion.co.uk
- Samba and Windows Integration
  - www.erion.co.uk
- David Holder
  - david.holder@erion.co.uk