



# **LAN03**

## **eCS in SMB networks**

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# Introduction

This Warpstock EU 2007 presentation will focus on the networking capabilities of **eComStation** and **OS/2 Warp workstations** in heterogeneous **Server Message Block (SMB) networks**.

***Heterogeneous networks connect different operating systems, hardware and network applications. Not just "Microsoft Windows Networks".***

- SMB is a very basic protocol that has many offsprings.
- But as a result of the Microsofts successful **OEM policy** (90 % of the desktop system are Windows) Microsofts SMB implementations became *de facto* standards.
  - Competing Microsoft was expensive. Selling its OEMS was lucrative. Only Open Source projects like Samba stayed in the race. But Microsofts dominance had a price.
  - When connecting to eCS or even Windows 9x/ME the Network Connection wizards of Windows XP often don't work.
  - Samba will orient in the first place on Windows Networks.
- So both Samba Windows may need some fine-tuning.

# Some subjects

- **A brief history of SMB**
- **Network protocols using SMB**
- **Connecting and serving to Windows 2000/XP with NetBIOS via TCP/IP**
- **Connecting to Samba 3 servers with NetBIOS via TCP/IP**
- **EA support of Windows and Linux via the network.**
- **Common error message when connecting to other SMB servers.**
- **Making backups via the network.**
- **Using SMB via TCP with netdrive.**

# A brief history of SMB: ethernet frames

**1969** Ken Thompson en Dennis Ritchie (Bell Labs) develop the **UNIX** operating system for so called minicomputers. Hardware is expensive, so it is multi-user.

**1972 Ethernet** (IEEE 802.3) is first used at Xerox PARC. **Xerox Network Specification** stimulated Novell. Xerox's **Smalltalk** was the beginning of Object-oriented programming. Xerox also invented the mouse and the GUI.

**1973** UNIX was rewritten in the portable **c language**. UNIX became the standard OS.

**1981 IBM PC** with a floppy Disk Operating System (DOS) and Basic interpreter.

**1983 Novel Netware** (for DOS). Dr Barry A. Feigenbaum (IBM) develops the **Server Message Block (SMB)** file sharing protocol. Its a client-server, request-response protocol that can be used for client-server and peer-to-peer networking.

**1984 IBM PC Network** uses **SMB via Sitek PC LAN cards**. Richard Stallman starts the **GNU Project** to develop software for the GNU operating system, which should be a free version of UNIX. **GCC** and **EM(ulate uni)X** will be based on this.

**1985 NetBIOS Frames (NBF) protocol** (3COM, IBM, MS). **NetBIOS Extended User Interface (NetBEUI)**. NetBIOS Token Ring support. Windows 1.0.

**1986 Novell NetWare 2.0** (286) runs **NetBIOS via IPX**. 4.3BSD chosen by DARPA

**1987 MS OS/2 LAN Manager (OEMs)** using the NetBIOS Frames protocol. PS/2. IBM's **RFC 1001** describes a "**Protocol Standard for a NetBIOS Service on a TCP/UDP Transport**". Windows 2.0 supports **DDE** (Dynamic Data Exchange=> Object Linking and Embedding (1991) ).

# A brief history of SMB: From LAN to WAN

**1988 OS/2 1.10 Standard Edition (SE) with Presentation Manager (PM).** IBM OS/2 LAN Server OEM. David Cutler arrives at Microsoft for OS/2 3 (aka NT3).

**1989 OS/2 1.10 Extended Edition (EE) ships with IBM LAN Requester.** OS/2 1.20 with improved PM, HPFS, REXX, Database Manager and Communications Manager (3270 and 5250 terminal emulation) to access the IBM servers.

**1990 Windows 3.0** is very successful. The **schism**: IBM (large customers with network administrators) and MS (serving the common OEM man) go separate ways. **Novell** still owns the Network Operating Systems (NOS) market.

**1991 Linux:** Linus Benedict Torvalds announces his clone of Minix. It will use GNU software compiled with the **GNU C compiler** (1987).

**1992 Windows for Workgroups 3.1** (NBF, but without a TCP/IP stack), **OS/2 2.00** comes with the WPS. On 4-6 MB RAM PC systems Windows 3.x has better driver support, more native applications and is much faster.

**1993 Windows NT 3.1** and **Windows NT Advanced Server** (NBF, NBT, Netware). Andrew Tridgell releases **nserver 1.5** (NBT) under the GPL.

**1994 Samba** supports SMB user level security, IPC and named pipes needed to browse lists with "net view \\server". **CERNs Mosaic** reads **HTTP** and makes the internet browsable. The World Wide Web (**WWW**) is born.

# A brief history of SMB: Internet

**1995 Apache.** Dial up connections to **internet providers** become popular. **Warp Connect** bundled with TCP/IP, IBM peer (NBF, NBT), LAN Server 4.0 (NBF, NBT) and Netware requesters. **Windows NT 3.51** and **Windows 95** support TCP/IP, NBF (NetBEUI), NBT (TCPBEUI) and NetBIOS via IPX to serve **Novells NetWare**.

**1996 OS/2 Warp 4. OS/2 Warp Server 4** uses HPFS or HPFS386. **Windows NT 4.0** comes with NTFS. **Internet technology** and **Java** are booming business. **The browser war** is a webservice war: SUN, Netscape/AOL, IBM versus MS. MS renames SMB to **Common Internet File System (CIFS)** after SUN announces NfsWeb.

**1998 Windows 98** with IE integration and Media Player. **Netscape** becomes **open source software**. Economic **internet hype**, later called **dot-com bubble** (1997-2001).

**1999 OS/2 Warp Server for e-business** (JFS, new kernel, many tools). **Samba 2** becomes popular. It is well documented and it mimics a Windows NT 4 PDC! MS reacts with Active Directory Services and announce the end of the Windows NT.

**2000 Windows 2000 Professional** (PnP, ADS, SMB via TCP). **WLAN** affordable

**2001 EComStation 1.0 OEM. 9-11<sup>th</sup> attack. Windows XP Home and Professional** get the security features of Windows NT/2000, but home users prefer god-mode.

**2003 Samba 3 with preliminary support for ADS** (Kerberos, LDAP, EA's).

**2004 Broadband internet** is needed to periodically update **Windows XP (SP2)** and your virus scanner. **eComStation 1.2** and **Linux** stay malware/virus free.

**2007** To fight malware **Windows Vista** enforces basic internet security to the “click and see” minded Windows home administrators. It introduces a **proprietary SMB 2**.

# The Server Message Block protocol

**The Server Message Block (SMB) file sharing protocol (1984)** was developed by Dr Barry A. Feigenbaum (IBM Boca Raton plant in Florida). He called it BAF.

- The SMB protocol is an **client-server, request-response protocol**.
- It regulates the **shared access** to files, printers, serial ports and other communications (named pipes, messages) between nodes on a network.
- The SMB protocol deliberately allowed **protocol extensions**.
- SMB provides an **authenticated Inter-process communication (IPC)** mechanism using named pipes to access files and devices via net(bios) commands.

**SMB was first used for file and printer sharing in IBM PC Network (1984).**

- The IBM Personal Computer was a single (personal) user system.
- MS Disk Operating System (MS DOS) had no security mechanisms.
- To solve this SMB was first implemented in the drivers of ethernet hardware. Drivers accessed the NetBIOS API of the adapter ROM.
- So the “NetBIOS” ROM drivers of the with **unique MAC addresses** equipped **ethernet LAN adapters** became the places to securely “log on”.

# SMB security levels

The original **SMB** protocol and the **NetBIOS** API provided two **security levels**:

- **Share level**: A share can be password protected.
- **User level**: The user needs to log in to the server with his username and password. After correct authentication he will get an user ID. Access to the share is regulated via the **Access Control List (ACL)** of the share on the server.

We see this back in MS Windows:

- **Share level** (only) was used in Windows for Workgroups 3.11.
- Share and **user level** were supported by Windows 9x. User level logins require an userid and password. With Esc you log in as user "guest".
- Under OS/2 Warp Connect the option "**Basic**: grant access to all users" resembles shared level, but it is not. It is user level security with ACLs wide open.

## Complications, refinements an deviations

- **SMB user rights** can be stored in **local ACL files** (IBMLAN\ ACCOUNTS\ NET.ACC) , in the **file system** (HPFS386, NTFS) and/or on Lan Manager (now obsolete), OS/2 Warp, Windows NT or ADS **domain servers**.
- Having remote access to the share (net access c: /grant sjoerd:rwxcd) does not mean that user "sjoerd" has access to C:\Windows: local NTFS ACLs matter too.
- To enable "Basic: grant access to all users" on NTFS Microsoft invented **Simple File Sharing (SFS)**: *any* user can remotely log in and gets a guest account that will grant him access to all of the shares of the NTFS group Everyone.

# Syteks use of SMB in PC LAN

In 1983 IBM hired LAN adapter manufacturer **Sytek Inc.** to assist them with **PC Network (1984):** A Local (ethernet) Area Network (LAN) for PC's.

- IBM's Systems Network Architecture (SNA) was just too complicated for low memory IBM PC's running DOS from a floppy diskette...
- But there was a much simpler LAN protocol called SMB. That would run mainly on ethernet hardware.

The strength of the original IBM PC concept of Philip Donald Estridge, was that PC BIOS and adapter ROM routines could be used by DOS programs and drivers to steer and enhance the basically *interrupt driven* PC.

- So Sytek implemented its Network Basic Input/Output System (NetBIOS) in the adapter ROM of its PC card.
- Syteks under DOS running NetBIOS API drivers supported the Server Message Block protocol via the generation of special ethernet frames.
- Thanks to its implementation in fast interrupt driven ethernet hardware the SMB communication was much faster than DOS (ethernet hardware still is).
- Thus Syteks idea aroused a great deal of interest...

# The NetBIOS API specifications

Syteks ethernet frames that implemented the SMB protocol via the adapter ROM (“NetBIOS”) of PC Cards were analyzed by others (3COM, Microsoft, IBM), documented, protocolized, improved and modified (1985).

- After that NetBIOS drivers relied less on Syteks proprietary adapter ROM.
- IBM's early Token-Ring networks (1985) got NetBIOS emulators.
- The **NetBIOS Extended User Interface (NetBEUI)** was written.
- This joint work also laid the basis of Microsofts (with 3COM and IBM developed) **NetBIOS Frames (NBF)** protocol used by MS LAN Manager.
- And the by MS OS/2 LAN Manager used Network Driver Interface Specification (NDIS) of Microsoft en 3COM.
- IBM's RFC 1001 (1987) became the basis for **NetBIOS via TCP/IP** of Warp Connect and TCPBEUI of Windows 95 and Windows NT 3.5.
- But because of its market share, **Microsofts implementation of SMB** (the protocol) via its **NetBIOS API protocol drivers (NetBEUI, TCPBEUI)** became the standard.
- These protocol drivers soon became known as part of the “**Microsoft Windows Networks**”, referring only to Microsofts implementation of IBM's NetBIOS API under Windows.

# NetBIOS: API or protocol?

The **Network Basic Input/Output System (NetBIOS)** was originally an Application Programming Interface (API) for **ethernet adapter ROM**.

Its use to implement the SMB file sharing protocol was continuously expanded.

- Novell supported NetBIOS since Advanced NetWare v 2.0 (1986).
- DOS, Windows and OS/2 applications made use of it (SUBST, NET).
- Lotus Notes and MS Office used techniques like Net DDE (Dynamic Data Exchange) to exchange data.

IBM and Microsoft speak of the "NetBIOS Frames (NBF) Protocol" to refer to the applications that are using the NetBIOS Frames interface as an API for their network communications.

- But most of these NetBIOS application and session "protocols" are proprietary.

As <http://www.faqs.org/rfcs/rfc1001.html> (march 1987) states:

- NetBIOS defines a software interface not a protocol. There is no "official" NetBIOS service standard. In practice, however, the IBM PC-Network version is used as a reference. That version is described in the IBM document 6322916, "Technical Reference PC Network"[2].

This would change soon..

# SMB, NetBIOS and NBT overview

- 1) The first SMB implementations (**IBM PC Network**) used Sciteks **NetBIOS** programming interface for its **PC LAN ethernet adapters**, as DOS had no support for named pipes or any other proces and/or user identification.
- 2) A year later SMB implementations used **NetBIOS emulating drivers** to support more network devices (3COM and other ethernet adapters, token ring) via the now standardised **NetBIOS Frames Protocol (NBF)** or the **NetBIOS Extended User Interface (NetBEUI)** API's.
- 3) Drivers that **encapsulated NetBIOS Frames** enabled the transport of the SMB protocol messages via **modems** and **routers** over **WANs** and **the internet** (**NetBIOS via TCP/IP, NetBIOS over IPX/SPX, Open Source Samba**).
- 4) The latest (W2k and later) implementations (**SMB via TCP**) bypass the NetBIOS interface using TCP port 445 (Microsofts Directory Service).
- 5) MS Windows Vista and Longhorn server use a more efficient **SMB version 2.0** when possible. Otherwise they will fall back to the W2K or XP version of the SMB via TCP or NetBIOS via TCP (if enabled).

**Wiki: "SMB the protocol"** is not to be confused with the **SMB services** that run on it, nor with NetBIOS, nor with the DCE/RPC services that use SMB as an authenticated Inter-process communication channel (over named pipes), nor with the "Network Neighborhood" protocols which primarily but not exclusively run as datagram services directly on the NetBIOS transport.

- SMB the protocol allowed for **protocol extensions**.
- But most of them were implemented via closed source "protocol drivers".

<b>OSI layer</b>	<b>The NetBIOS Frames family</b>				<b>SMB via TCP</b>
<b>Application</b>	<b>Server Message Block Applications</b>				<b>SMB via TCP Application</b>
<b>Presentation</b>					
<b>Session</b>	<b>NetBIOS</b>	<b>NetBEUI</b>	<b>NetBIOS</b>	<b>NetBIOS</b>	
<b>Transport</b>	<b>IPX</b>		<b>DECnet</b>	<b>TCP/UDP</b>	<b>TCP/UDP</b>
<b>Network</b>				<b>IP</b>	<b>IP</b>
<b>Link</b>	<b>802.2, 802.3, 802.5</b>		<b>Ethernet V2</b>		<b>Ethernet and others</b>
<b>Physical</b>					

**Relation of SMB to NetBIOS and other protocols (after Richard Sharpe)**

# OSI layer

# MS OS/2 LAN Manager

7 - Application	User Applications						
6 - Presentation	Operating System & Microsoft OS/2 LAN Manager						
***** NetBIOS Interface *****							
5 - Session	Microsoft	XNS	Other	Ungermann			
	NetBEUI	Protocol	Protocol	Bass			
	Protocol	Driver	Driver	PCNIU			
	Driver			Driver			
4 - Transport							
3 - Network							
***** NDIS Interface *****							
2 - Data Link	IBM Token	3Com Ethnt	Other				
	Ring MAC	MAC	MAC				
	Driver	Driver	Driver				
1 - Physical	TR	TR	Ethernet	Other	UB PCNIU		
	Adptr	Adptr	Adapter	Adapter	LAN		
	#1	#2			Adapter		

After: Description of OS/2 LAN Manager Device Drivers and NDIS  
 (<http://support.microsoft.com/kb/51088>)

# The SMB/CIFS implementations

In 1996 MS renamed SMB to **CIFS**: an acronym for **Common Internet File System**.

**The three variants of SMB/NetBIOS/CIFS existed:**

- 1) **The original non routable “LAN” NetBIOS and Extended NetBEUI versions:**  
Fast “shouting” ethernet cards communicating via local hubs or switches to other ethernet cards (nodes) in the same workgroup (or local domain). The SMB messages were send via ethernetframes. In these NetBIOS LANs the NetBIOS names of computers/nodes were coupled to there unique MAC addresses.
- 2) **The NetBIOS over TCP/IP variants that connected CIFS nodes via switches, hubs and IP routers:** CIFS (in practice NetBIOS via TCP/IP) worked between IP hosts (incl. modems) via IP routers, making it usable in Wide Area Networks (WANs) and even on the internet (being abused by virus writers and hackers). The NetBIOS names were identified by their IP addresses by means of a NetBIOS name server (like WINS). An “stateless” ARP would show their MAC address. CIFS (NBT) used TCP port 139 (NetBIOS Session Service), UDP port 137 (NetBIOS Name Service) and UDP port 138 (NetBIOS Datagram Service).
- 3) **NetBIOS via IPX enabling Netware clients to connect to SMB and NetBIOS applications.** Microsoft en IBM still supported Novell because they had to. Novels NetWare Network Operating Systems (NOS) dominated the market since DOS times. So Novell had to support their NetBIOS applications (DOS utilities, MS Office, Lotus Notes) and technologies.

# CIFS: TCPBEUI insecurity

Microsofts Windows 9x/ME supported **NetBIOS via TCP/IP (TCPBEUI)** and Novels NetBIOS via IPX. NetWare dominated the LAN and WLAN market. But Microsoft also wanted to promote Windows NT.

- To make life easier for the Windows NT network specialists the Microsoft Windows 95 Client for Windows Networks setup defaulted to use the TCPBEUI interface.
- And even Windows home users trying to install NetBEUI for their LAN automagically also had Common Internet File System (TCBEUI) shares on the dial-up interface of their MODEM.
- As every user of Windows 9x had administrator rights, a click here mail or URL or even an autorunning CD might install and launch auto-dial software.
- Microsofts TCPBEUI and WINS servers allowed IP addresses (net view \\ip\_address or IP\_host\_name) instead of the real NetBIOS names.
- So one could easily connect to other domains (incl. MSHOME, WORKGROUP). See: <http://www.grc.com/faq-shieldsup.htm>. Many Internet Providers were forced to block CIFS ports like 135 and 139.

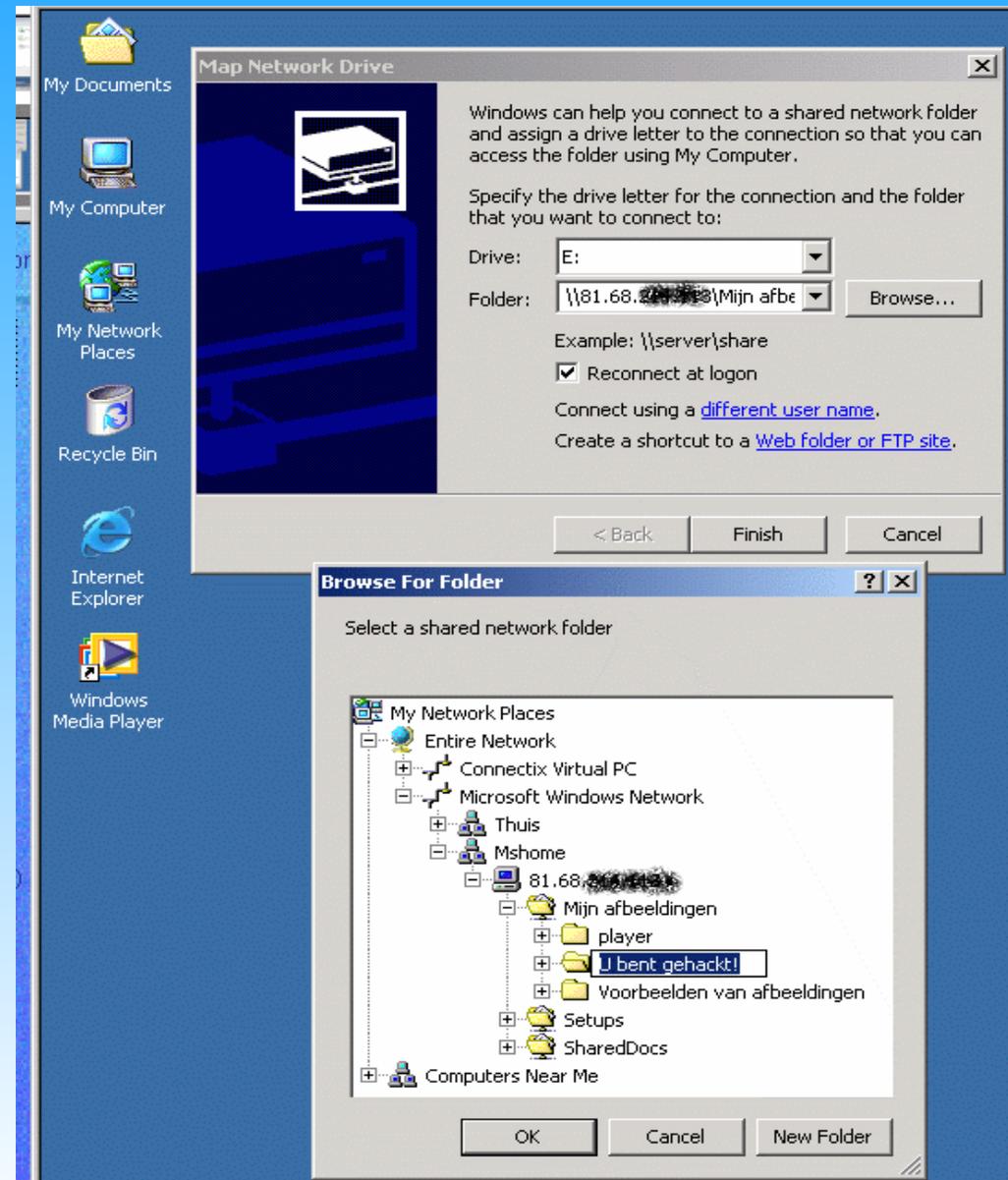
# Browsing the Windows network neighbourhood with CIFS

Under OS/2 NetBIOS hostnames (15 characters) and IP hostnames (256 characters) are not the same.

Under Windows 95, NT4 and later most of the times DHCP assigned IP addresses and hostnames are used by WINS.

To make CIFS and browsing easier (but less secure) even “net view \\61.250.92.175” was allowed.

By contrast, an OS/2 server will only accept valid NetBIOS names and will send its UDP broadcast only to his broadcast list which is empty by default.



# Host names and the DNS

In **UNIX TCP/IP** networking, the logical **IP hostnames** were resolved by the TCP/IP stack in 32 bits IP addresses by reading the file `/etc/hosts` (mptn\etc\hosts):

```
127.0.0.1    localhost
192.168.1.2  zolder.thuis    nbtserver
```

Note that the alias “zolder” can be used as a shortcut for the Fully Qualified hostname (host.domain) or as the NetBIOS name for a Windows NT domainserver.

IP host names and IP addresses are assigned to **network interfaces**, not to computers. So I can have a “private” locally “unique” IP adres (192.168.1.2) and hostname (zolder.thuis) on the LAN ethernet interface and a really unique “public” internet IP adres and hostname (provider-adsl123) on the interface to my ADSL modem.

Because of the growing number of internet hosts, the distributed **Domain Name Service (DNS)** server system provides for a hierarchically organized administration for IP hostname resolution.

When the IP addresses of the default route (“**route add default** 192.168.1.1 -hopcount 1” in \MPTN\BIN\setup.cmd) and the DNS servers (“**nameserver** 192.168.1.1” in \MPTN\ETC\RESOLV2) are known, the IP address of any “public” host can resolved.

```
[F:\]host www.warpstock.eu
www.warpstock.eu = 85.199.129.172
```

When using **Dynamic Host Configuarion Protocol (DHCP)** the DHCP server will provide the IP addresses of the host, default route and DNS servers.

# Ethernet LM, NBNS and WINS servers

**Microsoft LAN Manager** first relied on the LMHOSTS file to resolve the 15 character long **NetBIOS names**. NetBIOS names refer to NetBIOS hostnames or groups (workgroup, domain). The 16th byte designated the type.

Under OS/2 the **LMHOST** file is IBMCOM\RFCNAMES.LST. It maps the NetBIOS name between parentheses to an IP host name or a 32 bits IP address.

"zolder"	zolder
"win98"	192.168.1.18

If the needed NetBIOS name was not found in the name cache (OS/2's binary IBMCOM\RFFCCACHE.LST), and not in the LMHOST file, then a NetBIOS name resolve request would be broadcasted to other ethernet B(roadcast)-nodes.

To minimize local NetBIOS via TCP/IP UDP broadcasting and to enable large WANs, MS introduced the **NetBIOS Name Service (NBNS)** running on port 137. NetBIOS name servers were always used by P(oint-to-Point)-nodes (unicast name resolution).

With the introduction of CIFS, MS introduced **Windows Internet Names Servers (WINS)** hosted by Windows NT. It's just a MS version of NBNS (RFC 1001).

According to kb161431 **OS/2** can act as a **WINS client**. But OS/2 and Windows were differently treated (See Technical Document # - 7775533) by WINS.

You can set a NetBIOS Name Server in MPTS: Configure MPTS / Configure LAN adapters and protocols / Edit IBM NETBIOS OVER TCP/IP /Configure Driver Parameters. The Windows (lm)host files are in \Windows\System32\Drivers\etc.

# Lan Manager announce

## LM announce

When you locally log in to a Lan Manager domain or local workgroup, OS/2 LAN Requester will announce your new network node via UDP port 138 of the NETBIOS Datagram Service. Under NetBIOS this happens directly via SMB ethernetframes.

The by OS/2 used **LM announce Broadcast list** is found in \IBMCOM\RFCBCST.LST. Or via Edit IBM NETBIOS OVER TCP/IP in MPTS. It can contain the broadcast address of the local network (192.168.1.255), IP addresses or resolvable IP host names of peers and (NBNS) servers. It is empty by default.

SMB nodes that pick up the LM announce can put the NetBIOS names in their name cache. But Microsoft disabled the by OS/2 used Lan Manager 2 announce in Windows. So Windows servers won't spontaneously pop up in OS/2 browse list and Windows clients do not see OS/2 (unless they respond to OS/2's LM announce and have NetBIOS via TCP/IP enabled).

To enable LM announce in 32 bits Windows use **regedit** as administrator:  
HKEY\_LOCAL\_MACHINE \ SYSTEM \ CurrentControlSet \ Services \ lanmanserver \ parameters \ LMAnnounce=1 (the D word is not case sensitive).

## GUI Browsing

When \IBMLAN\IBMLAN.INI (eCS) contains “**srvhidden = yes**” (default), the sources of the server are not browsable via the GUI, but “net view //nbserver” will show them. It is the equivalent of “browsable = no” in smb.conf.

# SMB over TCP (Windows 2000, XP, Vista)

In 1999 Microsoft introduced a third major SMB variant: **SMB over TCP** running on TCP port 445. It was pushed to the market to compete Samba 2 (mimicking a Windows NT 4 Primary Domain Controller under Linux ) and Novels NetWare 4.1. To promote it Windows 2000 and later defaulted to use *only* ADS port 445.

- Port 445 gives access to the **Active Directory Service (ADS)** of Windows 2000 and 2003 servers.
- ADS is an implementation of Lightweight Directory Access (**LDAP**) Protocol.
- It hierarchically stores information about users, resources en services across large domains. It scales better then Windows NT.
- ADS resembles the Novell Directory Services (NDS) of NetWare 4.1 (1996).
- **ADS domains** rely on the DNS for hostname resolution (no NetBIOS layer), Kerberos for authentication (telling who you are) and CIFS/SMB for file exchange. Authorisation (user right management) is done by Windows.
- In Samba version 3 “ADS” became a third SMB security type (after “SHARE” and “USER” level).

SMB over TCP is also used in the peer to peer networking of Windows 2000, XP and Vista. Here it functions like the NetBIOS API as a way to browse the network environment, share files and printers via the SMB protocol. But Samba 2, Windows 9x and OS/2 are not seen without the disabled NetBIOS (via TCP/IP) protocol.

# CIFS support of EcomStation

The eComStation OEM 1.0 client uses the components of OS/2 Warp 4 workstation (1996) for its SMB networking.

The Peer-to-Peer Service (**OS/2 PEER**) is started with “net start peer” by the administrator (typically in startup.cmd) or via Start Services in the WPS object Sharing and Connection. Normal users can only start the requester.

The **OS/2 LAN Requester v. 4** supports **NetBIOS** and/or **NetBIOS via TCP/IP** with:

- Microsoft Lan Manager, IBM LAN Server Version 3.0, 4.0 and Warp Server
- IBM DOS Lan Services Version 4.0, IBM PC Lan Program (PCLP)
- Microsoft Windows for Workgroups, NT Workstation, NT Advanced Server, Windows 95, 98 and ME clients.
- And of course Samba on TCP port 139.

The native OS/2 support has all the possibilities and limitations of HPFS:

- Support for DOS attributes, HPFS 64 KB/file Extended Attributes (EA), long file names and file-sizes of up to 2 GB.
- Of course remote FS and SMB servers must allow them as well. HPFS and JFS on OS/2 and NTFS on Windows do this, as do some Unix/Linux FS (Reiser, XFS and JFS) under the Virtual FS of samba/3 with EA and DOS support enabled.
- Use always NTFS under Windows. Windows does not export the long file names of FAT(32) to OS/2. But a W2K NTFS share performs better than a HPFS share.

# Using Windows NT, 2000 and XP with eCS or OS/2 via NetBIOS via TCP/IP

**There are two major incompatibilities:**

- 1) **Windows NT** Fixpack 3 (1997) introduced the **NT LM 0.12 protocol** with double sided encryption, which is not supported by OS/2.
- 2) **Windows 2000** and **XP** defaulted to **SMB via TCP**, which is only supported by the samba Netdrive plugin. Windows Vista used **SMB version 2**.

**But in practice all modern Windows servers and clients can be used with OS/2**, as Windows 2000, XP and Vista servers and workstations needed to support legacy Windows clients and servers with the **Lan Manager 2.1 protocol** from 1992.

- W2K and later still contain and will “fall back” to the LM 2.1 authentication when the SMB client does not react to the NT LM challenge response.

**Since Windows 2000 NetBIOS via TCP/IP has to be activated by hand.**

- Start / Settings / Control Panel / Network and Dial-up Connections. Right-click on Local Area Connection. Select Properties / Internet Protocol (TCP/IP) / Properties. Click Advanced. Select the **WINS** tab. **Enable NetBIOS via TC/IP.**
- Now a Windows server will respond to OS/2 via ports 37/UDP and TCP, 138/TCP and 139/TCP and a Windows client connecting will use server ports 137-139 if port 445 is not available. But open them in your firewall for your “private” IP LAN address ranges like 192.168.1.255 or 192.168.1/24 only.
- When using samba's NMBS (nmb), you can add its IP address as a WINS server.

# Enable NetBIOS over TCP/IP under W2K and XP!

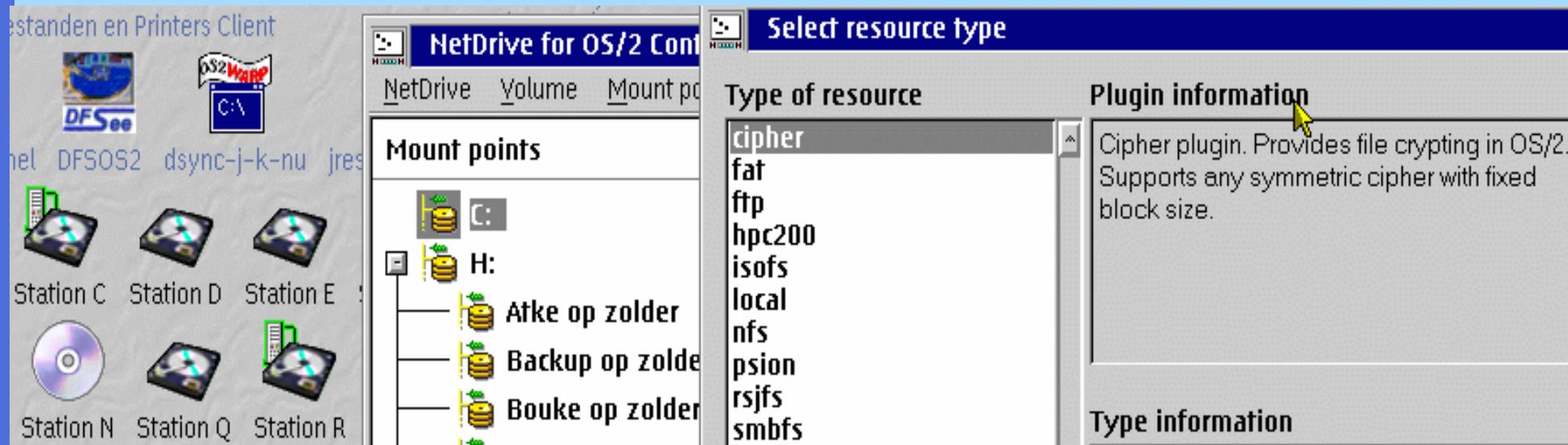
The image shows a collage of Windows XP network configuration windows. At the top left is the 'Map Network Drive' dialog box, which prompts the user to specify a drive letter (set to 'E:') and a folder path. To its right is the 'My Network Places' window, displaying a tree view of network locations including 'Entire Network', 'Microsoft Windows Network', and 'This' with sub-items like 'Connect', 'Laptop', 'Multiboot', 'Vpc-w2k', 'Zolder', 'Vpc', and 'Os2server'. Below these are three overlapping configuration windows: 'Local Area Connection Properties' (General tab) showing the connection using an 'Intel 21140 Based PCI Fast Ethernet Adapter' and listing checked components: 'Client for Microsoft Networks', 'File and Printer Sharing for Microsoft Networks', and 'Internet Protocol (TCP/IP)'; 'Internet Protocol (TCP/IP) Properties' (General tab) showing options to 'Obtain an IP address' and 'Use the following IP address' (with fields for IP address, subnet mask, and default gateway); and 'Advanced TCP/IP Settings' (WINS tab) showing 'WINS addresses, in order of use:' with '192.168.1.2' listed, and the 'Enable NetBIOS over TCP/IP' radio button selected.

# Using the samba for OS/2 client

**Netdrive for OS/2** (Blueprint, € 21.14 shareware) is a very handy requester application, that can map all kind of remote shares (ftp,smb, nfs2, etc) and local filesystems (iso,vfat) via Netdrive for OS/2 plugins to selected mount points on the OS/2 file system.

Netlabs regularly releases **Samba client plugins for Netdrive**. They enable you to access SMB shares via NBT (port 139) and SMB via TCP (ADS port 445). Netdrive supports >2GB files with or without EA's, but of course your OS/2 applications must handle them too. For that reason it is better to try out shares with FC/2 then with the OS/2 EA's using WPS.

Under Netdrives Samba client plugin you can log in and share remote files as any user, but the as ADS or NT Domain user logging in to a Windows NT or ADS domain is not supported. Netdrive only supports peer-to-peer networking, as does Windows XP Home client.



# Samba server for OS/2

The **Samba Server for OS/2 & eComStation** port of Paul Smedley and others (2007) gave OS/2 users a Samba/2 server, but current versions still have many limitations.

One problem is that OS/2 lacks native support for virtual file systems: for this reason we need the **Netdrive** plugin to do a **smbmount**. The other problem is that samba is made for multi-user operating systems.

**Security/2** provides the best solution, but it does not run under the WPS. Therefore Samba/2 server was compiled to use the rudimentary multi-user support of Innoteks Libc's API. This one does not yet support local user passwords, but when an shadow password file is made for local users with an empty password in master.passwd (wd\_mkdb.exe path\master.passwd), a new smb user with samba password can be made with `smbpasswd -a(dd) username`. The trick is that the passwords of Unix users (empty string) and the samba server do not need to be same!

Another problem is that Samba/2 can only be fully used after removing the NETBIOS over TCPI/IP in MPTS, as the transport driver **TCPBEUI.OS2** blocks ports 137 and 139. Using NetBIOS (NETBEUI.OS2) is not a problem, and even OS/2 port 139 can be used by TCPBEUI.OS2, but not by Samba/2 and TCPBEUI.OS2 at the same time. Port 445 is always available.



# Windows 2000 / XP networking tips

**Windows XP Professional (2001)** had the networking capabilities of **Windows 2000** giving access to peer-to-peer workgroups (NetBIOS, NetBIOS via TCP, SMB via TCP), NT and Samba 2 domains (NetBIOS via TCP on TCP port 139) and to the Active Directory Service of W2K servers (SMB via TCP on TCP port 445).

- But to enforce the use of MS ADS, Windows XP and 2000 *did not install* NetBIOS / NETBEUI and *disabled* its NetBIOS protocol driver TCPBEUI or NetBIOS via TCP (NBT). NetBIOS was hidden on the XP CD.
- Both activated only **SMB via TCP** “for better security”. CIFS was not any more in the picture at all, as Samba 2 did well as a NT PDC even in Linux user mode.

For this reason, Windows 9x/ME, NT, Samba 2 and OS/2 were suddenly not seen in the Windows network environment any more.

- **Remedy: Enable “NetBIOS over TCP”** and **enable LM announce** or install the NetBIOS driver from the Windows CD (Valueadd\msft\net\netbeu).

Always use **NTFS** and password protected **user accounts** for better security.

- Unlike Windows vFAT and FAT32 shares, Windows NTFS shares support long file names and OS/2 Extended Attributes under OS/2 LAN requester and PEER.

**Disable Simple File Sharing** in peer to peer **Workgroups** (see next).

- Log in as Administrator. Open My Computer or Explorer. Select Tools, then Folder Options. Click on the View tab and disable "Use Simple File Sharing (Recommended)". Click OK. No reboot needed.

# Windows XP Home networking

## Windows XP Home

Windows XP Home edition was based on the same Windows NT technology as Windows 2000. So why should one buy XP Professional?

- Microsoft's trick was to **remove** from Windows XP Home any code and services that could permit a Lan Manager, Windows NT or ADS **domain login** in Windows XP Home to take place.
- Kernel space code to keep Samba away from Windows was also available.

Professional users needing the **domain login** to access their shares on NT Windows, Samba or ADS domains were forced to buy **Windows XP Professional**.

- Home users can of course login locally and access SMB shares via net use or the GUI (peer to peer networking).
- There are tricks to mimic a domain login. But the ones I saw were examples of peer to peer networking, where the workgroup name was the NT domain name.

The **Windows XP Home** security tools are very poor.

- Only when starting up Windows with F8 you see a NTFS Security tab.
- Windows XP Home defaults to Simple File Sharing.
- SFS cannot be changed, but a locally effective NTFS Security Tab is provided by the [FaJo XP File Security Extension \(XP FSE\)](#) .

# Simple File Sharing (SFS) on the LAN

## Windows XP home was made for Windows 9x/me home users

- Windows 9x/ME OEM users were accustomed to **Personal Computers** with **administrator rights**. Via **Click here Wizards** they installed their software.
- So Windows XP Home made any user **Administrator** by default. Otherwise millions of the to DOS\Windows 9x accustomed XP home users would complain about not being able to install software, drivers and the like.
- Windows users also wanted a simple way of file sharing. Locally and on the LAN. No one should be hindered by NTFS user rights (even Administrators can).

## Windows XP offered **Simple File Sharing** locally and in the LAN/ workgroup.

- **Local SFS:** You could make your private folders (My Documents/username ) simply **Private** (with NTFS rights) or **Shared** (by any local user, the FAT way).

Only the by **Everyone** owned FAT (always) or NTFS drives (locally shared folders) can be accessed via the guest account using **SFS shares**:

- **LAN SFS:** A remote user logs in and gives his password. Windows gives him the guest account. LAN SFS works with *any* user name or password. But disabling the quest logon will even prevent an Administrator to remotely log in.

This was a great marketing concept because home users were not accustomed to enter user names and passwords. And the hidden Administrator account of F8 seldom has a password. Windows XP Home users had no idea of the MCSE course stuff. All that they wanted was to get to the internet and access their LAN fast and quickly.

# Making backups via the network

## What you want is a simple solution

- The backup software and data files should be available via the CLI of a boot CD to restore your boot partition via an USB hard disk or DVD mirror.
- Ideally it should backup only the changed files (synchronising the source and destination of the backup).
- Selected backups (need scripting) should be scheduled (WPS tab schedule) and must run smoothly in the background while you do your work. .

## The xcopy tool: `xcopy [source]\*.* [destination] /h/o/t/s/e/r/v`

- xcopy will fail with network time-outs or locked files.
- xcopy changes the date of directories.
- Xcopy does not synchronise (xcopy will keep deleted files on the destination).

## Backup up harddisk images with dfsee.

- Use < 2 GB image file option (default).
- Dfsee allows batches and scripting (see dfscmds.txt, but this is not easy).
- Set lowest priority (SET PRIO m) if you backup Windows drives via a script.
- Make the images locally or on an USB harddisk, then copy them via the CLI.
- Dfsee Backups whole partitions, not files (so a partial restore of a directory or file is not possible).

# Dsync for OS/2: synchronising drives and directories via USB or the network

**Dsync for OS/2: Directory synchronisation utility** (several free versions). I use <http://www.os2site.com/sw/util/backup/dsync016z.zip> which is:

- Feature rich (EA support, preserves dates, copies locked files, logging, interactive for “dsync now” and server mode for scheduled backups).
- Fault tolerant (retries and unlocks files where xcopy will halt).
- Dsync can backup the boot drive of an running OS/2 system.
- Being CLI, dsync can be run from OS/2 boot CD's and diskettes. Restore the image via xcopy or better dsync (with preservation of directory dates).
- Tested on FAT, HPFS, HPFS386, JFS, network drives of PEER, Netware, NFS. Dsync works with USB drives and Linux/samba servers or NAS drives with 64 KB EA support per file too.

**Syntax: dSync [-v] [-i] [config\_file]**

-v Prints the info on the screen. Without this key the messages will be printed to the log file only.

-i Ignore Daemon=On in config file, do the immediate single run of the program.

-u Update only mode. Old files do not deleted from DstPath.

config\_file - specify the alternative config file.

# Dsync to mirror drives

**Synchronise data partition D (laptop) with the SMB share J (server)**

**DSYNC.EXE -i j-d.cfg**

**03/09/2005 17:48:58 [Info] Starting dSync for OS/2, Version 0.1.6z (c) 2001-2003 by MaDdEd-Ii.**

03/09/2005 17:48:58 [Info] ...

03/09/2005 17:48:58 [Info] Phase #1 : Scan SrcPath=J:.

03/09/2005 17:50:38 [Info] Phase #1 finished, found 1740 dirs, 25368 files, 0 errors.

03/09/2005 17:50:38 [Info] Phase #2 : Scan DstPath=D: and kill old files.

03/09/2005 17:52:04 [Info] Phase #2 finished, found 1739 dirs, 25366 files, 0 errors, killed 6 objects.

03/09/2005 17:52:04 [Info] Phase #3 : Mirroring SrcPath to DstPath.

03/09/2005 17:58:07 [Info] Phase #3 finished, found 0 errors, 32 dirs changed, 8 files changed.

03/09/2005 17:58:07 [Info] Job finished with 0 total errors.

03/09/2005 17:58:07 [Info] Program ended.

# A simple (alternative) dsync j-d.cfg configuration file

```
; *****  
; dSync for OS/2, Config file.  
; (c) 2001,2002 by madded2.  
; *****  
; Econome CPU usage. 0..100. 0 - full usage, 100 - less usage.  
; Default value = 0.  
EconomeCPU = 50  
UseArchive = On  
SrcPath = J:\  
DstPath = D:\  
; other jobs:  
;SrcPath = D:\WWW\  
;DstPath = f:\Back\WWW
```

# The end

The screenshot shows a Windows XP desktop with a taskbar at the bottom. The desktop background is a light blue pattern. The taskbar contains several icons, including a folder named 'Wikipedia N'. A command prompt window titled 'dsync-j-s-nu.cmd' is open, displaying a list of files being transferred from a network location to a local drive. The files include PDFs, DOCs, and a directory. An 'IP Speed' utility window is also open, showing network statistics for the 'Ethernet-Csmacd' interface. The utility displays a line graph of network activity and a table of statistics.

boot    Netwerkkverbindingen    Station A    Station B    Station C    Station D    Station E    Station F    Station G    Station H    Station I    Station J    Station K    Station L    Station M    Station N    Station Q    Station R    Station S    Station T    Station U    Station V    Thuis    USB Device Monitor    Verwijzen    Verwisselbare

dsync-j-s-nu.cmd

```
ter.pdf
changed file S:\Data\B
tens!!B5098 ! 9 decemb
changed dir S:\Data\B
changed file S:\Data\Bedrijf\waojurisprudentieoverzichtseptember2005.doc
changed file S:\Data\Bedrijf\Werkwijze INS.pdf
changed file S:\Data\Bedrijf\werkwijzer_levensfasebeleid.pdf
changed file S:\Data\Bedrijf\WetREA.doc
changed file S:\Data\Bedrijf\wetten\2001-145.doc
```

IP Speed

Interface: Ethernet-Csmacd

Nominal speed: 1000000000 bps

Total bytes	Average cps	Max cps
15403140 in	33724 in	54100 in
664553514 out	3196321 out	5648759 out

Mat