64 - Samba Server (**S**erver **M**essage **B**lock)

A - Description of SAMBA and what it can do
- Joint agreement of use between Microsoft and IBM to communicate low-level Data between
  Windows and IBM UNIX Servers on a TCP/IP network.
  It was used as their standard since the days of DOS 3.0
- Does Windows 95/98 authentication, File and Printer sharing

B - Who created Samba and where to get it and where is help (section 20)
Created by Andrew Tridgel at home in Australia in 1991

To get it:
- In SuSE distribution or
- http://www.samba.org

C - Install Samba with YaST (Appendix A)
- Series 'n'
- Turn START_SMB in SuSE Config Datei /etc/rc.config

D - Setting-up minimal settings in /etc/smb.conf (Appendix - B and H)

E - Start and Stop Samba (Section 18)

F - SMB Protocol and where it's used (Section 1)

G - Theory of protocols stacks: (Section 2,6 + Appendix G)
- BIOS
- NetBIOS, NetBIOS over TCP/IP, NetBEUI, NetBIOS over IPX (Section 2 & Appendix - E)
- SMB/CIFS Protocol uses NetBIOS (CIFS is implemented in Win2000)
- NetBIOS services (in /etc/services): (Section 6)
Name Service----------->	netbios-ns	Port 137
Datagram Service------->	netbios-dg	Port 138
Session Service--------> netbios-ssn		Port 139

H - NetBIOS and Windows environment (Sections 3, 4, 5, 7, 8, 9, 11)
- NetBIOS Name Server NBNS (Section 3 & 4)
- Workgroup (Section 5)
- Windows Domain = Workgroup + Domain Controller (Section 7 & 8)
- Local Master Browser and Local Backup Browser (Section 9)
- Name Service (NBNS and WINS) (Section 11)

I - What Services Samba can do (section 13)

J - What are the files involved in the Service (section 14)

K - Configuration of [Global] of smb.conf (section 15 / Appendix - B and H)

L - Configuration of the Shares (Directories) of smb.conf (section 16)
- [Homes] Directories
- [Printers]
- [Extra shares]

M - Setting-up Users for authentication (section 17)

N - Troubleshooting Samba (see appendix C and D)

M - Special settings for Samba as PDC (logon server) (Section 16)

O - Using SWAT to configure Samba (section 19)

P - Connect to Samba from Linux - local or remote (section 21)

Q - Variables substitutions in smb.conf (Appendix F)

R - Windows Domains spreading over Multiple Subnets (Section 10/Appendix G)

1 - SMB Protocol introduction and Opersating Systems that uses it

2.1 - SMB Protocol allows:
- Serve UNIX files to Windows, OS/2, and others
- Serve Network Printers to to Windows clients
- Provide Name service (broadcast and WINS)
- Allow UNIX Clients to access PC files

2.2 - OS that uses SAMBA:
- Windows 95/98
- WINDOWS NT /2000
- UNIX
- Open VMS
- OS/2
- AmigaDOS
- Netware

2 - BIOS, NetBIOS and NetBEUI Protocols (Appendix - E)

BIOS: Description and diagram (see BIOS Diagram)
- Use the diagram and the MacDonnald Burger stores example.
- Same Menu over all stores but different kitchens, cooks, tellers, Heating equipment, etc.

NetBIOS: **Net**work **B**asic **I**nput/**O**utput **S**ystem
Basic Network API for low llevel transport protocol that transport requests and responses across a network from one computer to another.
See. /etc/services   Service no
137   NetBIOS-ns (name server)
138   NetBIOS-dgm(Datagram)
139   NetBios-ssn(Session Service)

NetBEUI : **Net**B**IOS **E**xtended **U**ser **I**nterface
NetBIOS designed for LAN (fewer than 255 nodes) that let machines claim a unique name (max 15 char) . Very popular with Windows For Workgroups.
Later Novel implemented NetBIOS over IPX

NetBUI uses names and TCP/IP uses numbers to identify machines
From this standards became known as NetBIOS over TCP/IP (NBT) which developed 3 services:
Name service, Datagrams, Sessions
Name Service solves the Name to number problem seen above (No DNS)
Datagrams and Sessions are data transfer protocols

With NetBIOS each machine that comes online claims a name.
It's called: Name registration. It is done to a **N**et**B**IOS **N**ame **S**erver(NBNS)

3 - Name to IP resolution:

To resolve the name to an IP Address it uses 2 methods:

Broadcast: Request sent to all machines to resolve a specific name.
The concerned machine answers back with it's IP
This method is for networks without a NBNS or for single
subnets.

NBNS: Ask the **N**et**B**IOS **N**ame **S**erver for name to IP resolution
Prefered in larger LANS with more than one subnet where
routers don't allow broadcasting across different subnets.

Each machine gets to be designated a noded type as per its way of doing name registration and
Name resolution:

b-node   Uses only broadcast for name registration and name resolution
p-node   Uses NBNS for registration and resolution
m-node   Uses broadcast for name registration. It notifies the NBNS server of the result.
   It uses broadcast for resolution. If not successfull uses NBNS.
h-node   Uses NBNS server for registration and resolution. If not sucessfull, then uses
        broadcast.

Windows innvented and uses h-nodes which are more fault tolerant then the others.
Under Windows the command **ipconfig /all** gives the Node Type as well as other info.

4 - NetBIOS names:

- NetBIOS names are NOT composed of dots for domaines.
- Limited to Max 15 char long
- Only Normal chars are allowed as well as: ! @ # $ % ^ & ( ) - { } . ~
- Period '.' is allowed but not guaranteed to work in next version of NetBIOS over TCP/IP.
- All DNS names are valid NetBIOS names. eg. phoenix.ora.de is PHOENIX for NetBIOS
- Names have a 16th byte that tells what services it offers. It needs to register its name as many
  times as it has services to offer.
- The command NBTSTAT on Windows machine tells the list of services offered:
  the number of each service is enclosed in < > . eg. PHOENIX <00>

List of standard services:
* <00>   Standard Workstation service
* <03>   Messenger Service (WinPopup)
  <06>   RAS Server Service
  <1B>   Domaine Master Browser Service for Primary Domain controller
  <1D>   Master Browser Name
  <1F>   NetDDE service
* <20>   File Server including Printer Server
  <21>   RAS Client Service
  <BE>   Network Monitor Agent
  <BF>   Network Monitor Utility

5 - Workgroups and SMB Groups

- WORKGROUP: Name for a group of computers and resources on a SMB Network
- SMB Groups are the same as Workgroups
Group names have the following attributes shown with the command NBTSTAT -a servername
<00>   Standard Workstation Group
<1B>   Domain Master Browser Name
<1C>   Logon Server Name
<1D>   Local Master Browser Name
<1E>   Normal Group Name (used in browser elections)
<20>   Internet Group Name (administrative)
<01>   <01><02>_ _MSBROWSE_ _<02>

_ _MSBROWSE_ _ is used to announce a group to other Master Browsers

6 - Datagrams and Sessions

NBT Datagrams	- Used to send messages and data that need no confirmation: - Uses UDP. - Used to broadcast to multiple NetBIOS machines. - Unreliable.
NBT Sessions	- Used to transmit messages and data that need confirmation. - Uses TCP. - Always occur between 2 and only 2 NetBIOS Machines. - Is the method used by resource sharing on NBT network.

7 - Windows Domains

- A Windows Domain is a Windows Workgroup with one or more Domain Controller.
- A Domain Controller is a Logon Server:
- There are 2 different protocols used by Domain Controllers:
      - Windows 95/98   Supported by Samba
      - Windows NT   Not Supported yet by Samba...Maybe in version 2.1
- A Domain Controller is the center of Windows Domaine
- No Domain Controller....No Windows Domain (also called Windows NT Domain)
- The main function of a Domain Controller concerned here for Samba is:
      - Authentication: Granting the access of shared resources on resources servers.
            It uses **S**ecurity **A**ccount **M**anager (SAM) to maintain users/passwords
            lists.

- Process of sharing resources on a server:
      - Each time a non-authenticated client wants a resource on a server, the server asks the
        Domain Controller to authenticate the client. If it is correct, shared resources with pre-
        selected privileges are accessible to him. If not it will be refused the access.

      Note: On the Resource Server an authenticated client carry a token given by the Domain
            Controller that allows him to use other shared resources in the same Domain.

8 - Primary and Backup Domain Controllers

- The active Domain Controller is called **P**rimary **D**omain **C**ontroller (PDC)
      - The **B**ackup **D**omain **C**ontrollers(BDC) are there to take over in case the PDC doesn't respond
      - The BDC sychronizese periodically with PDC for users/passwords lists (SAM).
        This SAM List is Read-Only on BDC. Changes are made only on the PDC.
      - Samba can only serve as a PDC and not a BDC
      - Samba as PDC can only be used for authentication
      - Other PDC functions are maybe available in Samba version 2.1 as full PDC for NT clients.

9 - Browsing
- Is the function of scanning for all available machines, workgroups and domaines on a Windows
  Network.
- On windows machine the browsing function is triggered by clicking on the Network Neighborhood.
- There are 2 types of Browsing:
  - List of machines on a network
  - List of resources on a specific machine
- A **Local Master Browser** is responsible for keeping a list of machines that are accessible in the
  Windows Domain. The list is called *Browse List*.
- Each Windows Domain(workgroup) needs at least one Local Master Browser
- Local Master Browser Machines are used to avoid too much network traffic of individual machine
  polling.
- To get the list of Resources on a Server, the Client authenticates itself, if not already done, and
  gets the resource list from the server.
- Each Resource Server is required to announce itself to the Local Master Browser at boot-up
  and shutdown. The Local Master Browser records what the Resource Server has announced.
- Note: The Local Master Browser may or may not also be the NetBIOS Name Server.
- Any Windows Machine can act as a Local Master Browser if it advertizes this service.
- A Local Master Browser is selected by an election process:
  - This election process selects the Local Master Browser and Local Backup Browser(s)
  - The election selection is according to the following criterias:
    - Version of election protocol used
    - Operating system on the machine
    - Amount of time the client has been on the network
    - Hostname of the client.
- This above information is broadcasted via Datagrams to other computers
- An new election of Local Master Browser and Backups takes place every time a new computer
  comes online registers itself.
- Backup Browsers are selected during election according to the following rules:

Network Hosts	Number of Backup Browsers selected
1 to 32 NT Workstations or 1 to 16 Win95/98	1
33 to 64 NT Workstations or 17 to 32 Win95/98	2
for each extra 32 NT Workstations or 16 Win95/98	1 more Backup Browser

10 - Windows Workgroup spreading over multiple subnets.

- The same Primary Domain Controller can be used across the subnets
- The Local Master Browser is not so easy.
  - Each subnet needs a Local Master Browser
  - Each Windows Domain needs a Domain Master Browser.
    - The Main Browse List is maintained in the Domain Master Browser
    - Each Local Master Browser synchronizes its Browse List with the Domain Master
      Browser
    Difficulties in this design:
      - The Primary Domain Controller(NT only) must be the Domain Master Browser
        also. Therfore Windows 95/98 cannot become a Domain Master Browser
      - Windows 95/98 cannot become a Local Master Browser because they cannot
        contact the Domain Master Browser.
      - This forces each subnet to have at least one NT machine used as Local Master
        Browser or as Domain Master Browser.
  - Each Local Master Browser is maintaining its own Subnet Browse List and synchronizes with the
    Domain Master Browser to get the Browse List of other subnets.
    This is called Browse List propagation.

11- Windows Internet Name Service (WINS)

- WINS is Microsoft's implementation(version) of NetBIOS Name Service.
- They are not related to any Domain or Workgroup. They can serve anyone.
- Names are flat and not hieharchy. eg. hostname can be : fred, harry and Workgroup like USA, KANADA, DEUTSCHLAND etc.
- The WINS is dynamic: Each host must register its Hostname, IP Address, Workgroup to the WINS periodically to announce it's presence in the network.
- WINS requests can cross multiple subnets to access the WINS server.
- The WINS server IP Address is set in each host that wants to use it
- The Active WINS server is the Primary WINS Server. Multiple Secondary WINS servers can co-exist in a network.
- The choice of Primary and Secondary WINS Servers is static and chosen by the network administrator and not done through elections.
- Only NT Workstations and NT Servers can be used as WINS Server.

12 - Windows Network Environment in short:

Abreviation	Meaning	Description
SMB	Server Message Block	Protocol used to perform client/server networking used by: Windows, OS/2, Open VMS, AmigaDOS and Netware.
CIFS	Common Internet File System	
		New name for SMB in future Windows implementations
BIOS	Basic Input/Output System	Operating System's connection to the local devices
NetBIOS	Network BIOS	Interface/protocol to transport data across network
node	Network Connection	Single physical network connection. Usually a host
NetBEUI	NetBIOS Extended User Interface	
		Network Protocol based on NetBIOS to be used for small LAN(<255 nodes) and using a 15 Letters (max) as hostnames.
NBNS	NetBIOS Name Server	Resolves NetBIOS names to IP Address.
		If not present in a network the hosts use the broadcast mechanism to resolve Name to IP address.
		This is depending the node type of each host.

NBT	NetBIOS over TCP/IP	Services offered (ports 137,138,139) to allow NetBIOS protocol to be transported over TCP/IP. It provides:
		   - Name service
		   - Datagram data/messages Transport (UDP)
		   - Sessions data transport (TCP)

---	Windows Workgroup	Group of computers belonging to the same group name
---	Windows Domain	Workgroup having at least one Domain Controller
PDC	Primary Domain Controller	Responsible for authentication of clients for access to shared resources on servers belonging to the same Domain.
BDC	Backup Domain Controller	Kicks-in when the Primary Domain Controller doesn't respond. Many BDC can be used for the same Domain.
SAM	Security Account Manager	Listing method used by PDC and BDC for storing and managing Usernames/Passwords for Authentication.
---	Resource Servers	Hosts that provide resources to be shared with other clients in a network environment.

---	Domain Master Browser	Serves and Maintains list of Resource Servers for an entire Domain. The Domain is normally spreading over more than one subnet. Only NT machines can be Domain Master Browser.
---	Local Master Browser	Serves and Maintains list of Resource Servers for a subnet. Often a Domain is contained within a single subnet. It is chosen by elections. Any Windows Machine can be Local Master Browser. If the Domain spreads over more than one subnet, then only NT Workstation/Server may be Local Master Browser.
WINS	Windows Internet Name Service	Microsoft's Implementation of NetBIOS Name Service(NBNS) - Can be Primary or Secondary - Chosen by system administrator

13 - What Samba can do

File Server	**Yes**
Printer Server	**Yes**
Primary Domain Controller	**Yes** (Authentication only!, Samba 2.1 is Recomended)
Backup Domain Controller	No
Windows 95/98 Authentication	**Yes**
Local Master Browser	**Yes**
Local Backup Browser	No
Domain Master Browser	**Yes**
Primary WINS Server	**Yes**
Secondary WINS Server	No

14 - Programs involved with the Samba Package

smbd	Main Daemon responsible for - sharing resources (File, Print & Browser(for local resources only) - All notifications between client and Samba Server - User Authentication - Resource Locking (File lock for access to same files by multi users) - Data Sharing through SMB Protocol
nmbd	Secondary Daemon responsible for: - Windows Internet Name Server (WINS) - NetBios Name Server (NBNS) - Local Master Browser functionality through elections
smbclient	An FTP-like Unix Client that can be used to connect to Samba Shares
nmblookup	A program that provides NetBIOS over TCP/IP name lookups
lmhosts	Samba NetBIOS Name Service Hosts File. Same location as smb.conf
smbmount	Mounts an 'smb' resouurce to linux. Kernel must support 'smb' filesystem
nmblookup	Uses the WINS to do a NetBIOS Name Lookup
smbspool	Spools a job into a Samba Shared Printer
smbstatus	Display different Samba status info
smbtar	Program to backup shared files
smbpasswd	Management program for Samba Users/Passwords file /etc/smbpasswd
testparm	Checks the validity of smb.conf file
swat	Web Oriented Samba configuration program
addtosmbpass	Script that add a list of usernames into the smbpasswd file
convert_smbpasswd	Script that converts Samba version 1.9.18 into version 2.0.x
rpcclient	Allow to debug the rpc
testprns	Checks the validity of a printer name
findsmb	Finds smbservers in the network

15 - Setting-up minimal settings in /etc/smb.conf
Configuration file (smb.conf) Global Directives

[Global]

```
# workgroup = NT-Domain-Name or Workgroup-Name, eg: REDHAT4
workgroup = WORKGROUP

# server string is the equivalent of the NT Description field
server string = Samba Server

# This option is important for security. It allows you to restrict
# connections to machines which are on your local network. The
# following example restricts access to two C class networks and
# the "loopback" interface. For more examples of the syntax see
# the smb.conf man page

hosts allow = 192.168.10. 192.168.11. 192.168.12. 127.

# If you want to automatically load your printer list rather
# than setting them up individually then you'll need this
# Not needed if each printer is defined separately.
# load printers = yes

# you may wish to override the location of the printcap file
# Usable only if NOT 'printing = cups' below
; printcap name = /etc/printcap
# on SystemV system setting printcap name to lpstat should allow
# you to automatically obtain a printer list from the SystemV spool
# system
# Usable only if NOT 'printing = cups' below
; printcap name = lpstat

# It should not be necessary to specify the print system type unless
# it is non-standard. Currently supported print systems include:
# bsd, sysv, plp, lprng, aix, hpux, qnx, cups
# From version 2.06 the 'cups' is also possible

printing = cups

# Uncomment this if you want a guest account, you must add this to
# /etc/passwd
# otherwise the user "nobody" is used
# This directive can also be used inside a File Share section that
# has 'guest ok' or 'public' set to 'yes'

guest account = nobody

# this tells Samba to use a separate log file for each machine
# that connects
# log file = /usr/local/samba/var/log.%m

# Otherwise the following log file will be used
log file = /var/log/samba

# Amount of debugging information sent to the Samba Log file(above)
# Normally set to 1 set to 7 for debugging. 3 or less is best performance
loglevel = 7

# Put a capping(max size) on the size of the log files (in Kb).
max log size = 50

# Security mode. Most people will want user level security. See
# security_level.txt for details.
# Can be
# 'share' Services have a shared Password
# 'user'  Users have a Unix user account and password in (
# 'server'Users have accounts and Password in another machine that
# authenticate the user for Samba
```

```
# In thi case see the directive 'password server' (below)
# and 'encrypted passwords' (below)

security = user

# Use password server option only with security = server
; password server = <NT-Server-Name>

# You may wish to use password encryption. Please read
# ENCRYPTION.txt, Win95.txt and WinNT.txt in the Samba documentation.
# Do not enable this option unless you have read those documents
# Deafult is set to No
# Windows 95 uses only Plain Text passwords.
# Windows 98 uses Encrypted passwords as default.
# Windows NT uses Encrypted passwords as default.
# ------- Windows 98 --------
# To set the Windows 98 password to Plain text enter the following
# settings in the System registry using the REGEDIT.EXE
# [HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\VxD\VNETSUP]
# "EnablePlainTextPassword"=dword:00000001
# ------- Windows NT --------
# To set the Windows 98 password to Plain text enter the following
# settings in the System registry using the REGEDIT.EXE
# [HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Rdr\Parameters]
# "EnablePlainTextPassword"=dword:00000001

encrypt passwords = yes

# Using the following line enables you to customise your configuration
# on a per machine basis. The %m gets replaced with the netbios name
# of the machine that is connecting
; include = /usr/local/samba/lib/smb.conf.%m

# Most people will find that this option gives better performance.
# See speed.txt and the manual pages for details
socket options = TCP_NODELAY

# Configure Samba to use multiple interfaces
# If you have multiple network interfaces then you must list them
# here. See the man page for details.
interfaces = 192.168.10.166/24 192.168.11.166/24

# Browser Control Options:
# set local master to no if you don't want Samba to become a master
# browser on your network. Otherwise the normal election rules apply
# If you enable the option 'domain master' to yes, this option has no effect
# local master = yes

# OS Level determines the precedence of this server in master browser
# elections. The default value should be reasonable
# WfW and Win 95/98 uses 1, Win NT Client uses 17, Win NT server uses 33
# Setting it to 34 or higher will win the elections on any network.
os level = 34

# Domain Master specifies Samba to be the Domain Master Browser. This
# allows Samba to collate browse lists between subnets. Don't use this
# if you already have a Windows NT domain controller doing this job
# Enable this to 'yes' if this server is set to be a Primary Domain
# Controller
domain master = yes

# Preferred Master causes Samba to force a local browser election on startup
# and gives it a slightly higher chance of winning the election
# if the os level is set accordingly
preferred master = yes

# Use only if you have an NT server on your network that has been
# configured at install time to be a primary domain controller.
# It is now DEPRECATED and should neot be used unless realy needed
; domain controller = <NT-Domain-Controller-SMBName>
```

```
# Enable this if you want Samba to be a domain logon server for
# Windows95 workstations.
# It is mostly needed for profiles download from Samba server
# Normally commented out. Default is set to No
# domain logons = yes


# if you enable domain logons then you may want a per-machine or
# per user logon script
# run a specific logon batch file per workstation (machine)
; logon script = %m.bat
# run a specific logon batch file per username
; logon script = %U.bat


# Where to store roving profiles (only for Win95 and WinNT)
#         %L substitutes for this servers netbios name, %U is username
#         You must uncomment the [Profiles] share below
# See the Variabel substitutions sheet (separate) to understand the %...
; logon path = \\%L\Profiles\%U


# Windows Internet Name Serving Support Section:
# WINS Support - Tells the NMBD component of Samba to enable it's WINS Server
wins support = yes


# WINS Server - Tells the NMBD components of Samba to be a WINS Client
# Note: Samba can be either a WINS Server, or a WINS Client, but NOT both
; wins server = w.x.y.z


# WINS Proxy - Tells Samba to answer name resolution queries on
# behalf of a non WINS capable client, for this to work there must be
# at least one WINS Server on the network. The default is NO.
wins proxy = yes


# DNS Proxy - tells Samba whether or not to try to resolve NetBIOS names
# via DNS nslookups. The built-in default for versions 1.9.17 is yes,
# this has been changed in version 1.9.18 to no.
# dns proxy = no


# Extra parameters from manual installation --Root
# Where the Samba password file reside. Default is /etc/smbpasswd
smb passwd file =/etc/smbpasswd


---------------------------------------------
```

16 - Configuration file (smb.conf) shares definitions

16.1 - User home directories resource access

[homes] is a reserved share name and should be used only for the following purpose.
This section allows to set the access parameters specific to each user's home directory already
created and owned by the user on the Linux Machine where Samba runs.

Typical configuration:
[homes]

```
   comment = Home Directories        ;Title shown under the Resource Icon in Windows
   browseable = no                   ; Do not allow to be displayed to other users
   writable = yes                    ; Allow user to write files and create directories
   read only = no                    ; Same as Read only = no but makes suer it is the case
   printable = no                    ; Do not announce this resource as a Printer
   create mode = 0700                ; set the access rights for the newly created files
   directory mask = 0700             ; set the access rights for the newly created directories
```

16.2 - Network logon settings

Setting up Samba as Primary Domain Controller (Logon Server)

```
[global]
      security = user
      os level = 34
      local master = yes
      prefered master = yes

      domain logons = yes
      domain master = yes
[netlogon]
      comment = The Domain Logon Service
      (Path: doesn't matter where it points to as long as it exists)
      path = /usr/local/samba/logon
      guest ok = yes
      writable = no
      browsable = no
```

\# Un-comment the following and create the netlogon directory for Domain Logons

```
; [netlogon]
;    comment = Network Logon Service
      (Path: doesn't matter where it points to as long as it exists)
;    path = /usr/local/samba/lib/netlogon
;    guest ok = yes
;    writable = no
;    share modes = no
;    browsable = no
```

```
# Un-comment the following to provide a specific roving profile share
# the default is to use the user's home directory
#[Profiles]
#    path = /usr/local/samba/profiles
#    browseable = no
#    guest ok = yes
```

16.3 - Printers Access

16.2.1 - Section that anounce all available printers

```
# NOTE: If you have a BSD-style print system there is no need to
# specifically define each individual printer
[printers]
   comment = All Printers
   path = /var/spool/lpd/samba
   browseable = no
```

```
# Set public = yes to allow user 'guest account' to print
    public = yes
    guest ok = yes
    writable = no
    printable = yes
    load printers = yes
    create mode = 0700
```

16.2.2 - Sections that anounce single printers

```
#---------------- HP Laserjet 6L (PCL) --------------------
# Basic cups Laserjet minimal instructions
[LaserJet]
    printable = yes
    printer = laserjet
    printing = cups
    read only = yes
    guest ok = yes
# The following parameters can also be set.
# The settings shown in <...> are the default settings
#[LaserJet2]
#     printable = < no >
#     printer = Laserjet@server
#     print command = < lpr -r -P%p %s >
#     lpq command = < lpq -P%p >
#     lprm command = < lprm -P%p %j >
#     lppause command = < >
#     lpresume command = < >
#     queuepause command = < /usr/bin/disable %p >
#     queueresume command = < /usr/bin/enable %p >
#     path =  < /var/spool/samba >
#     printing = cups
#     read only = yes
#     guest ok = yes
```

16.4 - Directories/Files Serving directives

```
# This one is useful for people to share files
;[tmp]
;    comment = Temporary file space
;    path = /tmp
;    read only = no
;    public = yes

# A publicly accessible directory, but read only, except for people in
# the "staff" group
;[public]
;    comment = Public Stuff
;    path = /home/samba
;    public = yes
;    writable = yes
;    printable = no
;    write list = @staff
```

```
# Other examples.
#
# A private printer, usable only by fred. Spool data will be placed in fred's
# home directory. Note that fred must have write access to the spool
# directory, wherever it is.
;[fredsprn]
;    comment = Fred's Printer
;    valid users = fred
;    path = /homes/fred
;    printer = freds_printer
;    public = no
;    writable = no
;    printable = yes

# A private directory, usable only by fred. Note that fred requires write
# access to the directory.
;[fredsdir]
;    comment = Fred's Service
;    path = /usr/somewhere/private
;    valid users = fred
;    public = no
;    writable = yes

# a service which has a different directory for each machine that connects
# this allows you to tailor configurations to incoming machines. You could
# also use the %U option to tailor it by user name.
# The %m gets replaced with the machine name that is connecting.
;[pchome]
;   comment = PC Directories
;   path = /usr/pc/%m
;   public = no
;   writable = yes

# A publicly accessible directory, read/write to all users.
# Note that all files created in the directory by users will be owned
# by the default user, so any user with access can delete any other user's
# files. Obviously this directory must be writable by the default user.
# Another user could of course be specified, in which case all files would
# be owned by that user instead.
[public]
   path = /transfer
   public = yes
   only guest = yes
   writable = yes
   printable = no


# The following two entries demonstrate how to share a directory so that two
# users can place files there that will be owned by the specific users.
# In this setup, the directory should be writable by both users and
# should have the sticky bit set on it to prevent abuse.
# Obviously this could be extended to as many users as required.
;[myshare]
;    comment = Mary's and Fred's stuff
;    path = /usr/somewhere/shared
;    valid users = mary fred
;    public = no
;    writable = yes
;    printable = no
;    create mask = 0765


Examples of my system at home

[idefix]
   comment = Idefix
   path = /
   browseable = yes
   guest ok = yes
```

```
   read only = no
   locking = no
   writable = yes

[all-linux]
   comment = Grafix, Proxix, and Obelix
   path = /mnt
   browseable = yes
   guest ok = yes
   read only = no
   locking = no
   writable = yes
```

17 - Linux Password files conversion to Samba format

If the Global setting **encrypt passwords** is set to **'no'** then Samba will use the regular **/etc/passwd** as its password file for authentication.

The following instructions are only for the setting **encrypt passwords** is set to '**yes**'

17.1 - Converting the /etc/passwd to Samba format

1 - To transfer the user's list from /etc/passwd to /etc/smbpasswd then Issue the command:
```
cat /etc/passwd | mksmbpasswd.sh > /etc/smbpasswd
```
This above command will only transfer the user's list and not the passwords

2 - Enter the Encrypted password one by one for each user into the /etc/smbpasswd with the following command:
```
smbpasswd -U <username>
```

17.2 - Entering new users as Samba users:

1 - To create a home directory fo a new user we must enter the user as regular Linux user with the command: `useradd -m <username>`
2 - Change its password as well with the command: `passwd <username>`
3 - Enter the password into Samba system with the command: `smbpaswd -a <username>`

Note: To Disable a user for Samba, issued the command: `smbpaswd -d <username>`
To re-Enable a disabled user for Samba issue the command: `smbpaswd -e <username>`

17.3 - Configure Windows 98 for user's account

- Workgroup (in 'Identification' tab under Network)
- Machine Name (in 'Identification' tab under Network)
- User name (name given at login)
- Change the password type in registry if needed

18 - Start / Stop Samba

SuSE has provided a link from /usr/sbin directory called **rcsmb** to help controlling Samba.

To start Samba: `rcsmb start`

To stop Samba: `rcsmb stop`

To restart Samba: `rcsmb restart` or `rcsmb reload`

To get the status of Samba: `rcsmb status`

19 - SWAT - Samba Web Administration Tool

19.1 - SYNOPSIS
```
swat [-s smb config file] [-a]
```

19.2 - DESCRIPTION

This program is part of the Samba suite.
swat allows a Samba administrator to configure the complex smb.conf file via a Web browser.
In addition, a swat configuration page has help links to all the configurable options in the smb.conf file
allowing an administrator to easily look up the effects of any change.

swat is run from **inetd**

19.3 - Swat command line Options

`-s <smb_config_file>`	The default configuration file path is determined at compile time. The file specified contains the configuration details required by the smbd server. This is the file that swat will modify. The information in this file includes server-specific information such as what printcap file to use, as well as descriptions of all the services that the server is to provide. See smb.conf (5) for more information.
`-a`	This option disables authentication and puts swat in demo mode. In that mode anyone will be able to modify the smb.conf file. Do NOT enable this option on a production server.

19.4 - Installation SWAT

After you compile SWAT you need to run "make install" to install the swat binary and the various help
files and images.

A default install would put these in:

> /usr/local/samba/bin/swat
> /usr/local/samba/swat/images/*
> /usr/local/samba/swat/help/*

19.5 - INETD installation for SWAT

You need to edit your **/etc/inetd.conf** and **/etc/services** to enable SWAT to be launched via inetd.

19.5.1 - In **/etc/services** you need to add a line like this:

```
swat 901/tcp
```

> Note for NIS/YP users:
> You may need to rebuild the NIS service maps rather than alter your local **/etc/services**

The choice of port number isn't really important except that it should be less than 1024 and not currently
used (using a number above 1024 presents an obscure security hole depending on the implementation
details of your inetd daemon).

19.5.2 - In **/etc/inetd.conf** you should add a line like this:

```
swat stream tcp nowait.400 root /usr/local/samba/bin/swat swat
```

Once you have edited /etc/services and /etc/inetd.conf you need to send a HUP signal to inetd.
To do this use "kill -1 PID" where PID is the process ID of the inetd daemon.

Or for SuSE distribution, issue the command
```
            rcinetd restart
```

19.6 - Launching SWAT

To launch swat just run your favorite web browser and point it at`http://localhost:901/`

Note that you can attach to swat from any IP connected machine but connecting from a remote machine
leaves your connection open to password sniffing as passwords will be
sent in the clear over the wire.

19.7 - Files Involved

`/etc/inetd.conf`
This file must contain suitable startup information for the meta-daemon.

`/etc/services`
This file must contain a mapping of service name (e.g., swat) to service port (e.g., 901) and protocol type
(e.g., tcp).

For downloaded version of Samba:
`/usr/local/samba/lib/smb.conf`
This is the default location of the smb.conf server configuration file that swat edits.
Other common places that systems install this file are /usr/samba/lib/smb.conf and /etc/smb.conf.

For SuSE distribution, Samba configuration file is at:
`/etc/smb.conf`

19.8 - WARNINGS

swat will rewrite your smb.conf file.

It will rearrange the entries and **delete all comments, "include=" and "copy=" options.**

If you have a carefully crafted smb.conf then **back it up** or don't use swat!

20 - Help on Samba

The Help files of Samba in SuSE distribution are found in
/usr/doc/packages/samba/   directory

The Html help files are in :
/usr/doc/packages/samba/htmldocs/   directory

The help on configuring Samba (smb.conf) is
/usr/doc/packages/samba/htmldocs/smb.conf.5.html

Other html files are present to help use the extra programs provided with Samba.

21 - Connecting Linux to Samba via - smbclient-

smbclient //<SambaServerName>/<DirShare> -U<username>%<password>

This should get connected and the following prompt should appear:
smb:\>
Samba is ready to receive the following commands(same as FTP commands):

```
? <command>                          Display help on command, ot list of possible commands
help [<command>]                     Display help on command, ot list of possible commands
! [<command>]                        Runs the command or places the user in a shell
dir [<filename>]                     List Remote Current Directory content
ls [<filename>]                      List Remote Current Directory content
cd </path>                           Change remote(server) directory
lcd </path>                          Change the local (client) directory
get <remotefile> [<localfile>]       Transfers the file from server(remote) to client (local)
put <localfile> [<remotefile>]       Transfers the file from client(local) to server (remote)
mget <matching pathern>              Gets all file that matchs the pathern
mput <matching pathern>              Puts all file that matchs the pathern
prompt                               Toggles prompting(asking) (on/off)for mget and mput
lowercase ON | OFF                   If ON Converts filenames to lowercase for mget and get
del <filename>                       Delete the remote file on server
md <directory>                       Create directory on server
mkdir <directory>                    Create directory on server
rd <directory>                       Delete the directory on server
rmdir <directory>                    Delete the directory on server
setmode <Filename> [+|-]rsha         Sets the DOS fielsystem attribute bits,
                                     using unix-like modes.
                                     r = read-only, s = system, h = hidden, a = archive
```

Tips for connecting to a Windows or Samba resources:
     Find the advertized SMB servers (Windows and samba server list)
     > smbclient -U% -L Localhost

     List the shares on a specific SMB server:
     > smbclient -U% -L *<Server name from result above>* -I *<Server IP Address>*

22 - Mounting Windows or Samba to a Linux Directory via - smbmount-

> smbmount //remotehost/share   /mountpoint -o options
e.g:
**> smbmount //192.168.10.200/transfer   /mnt/remotesmb \\
        -o   username=charlie \\
              password=jolly2fp \\
              workgroup=WORKGROUP**

Appendix -A - Samba installieren

Samba - Linux als Server für Windows
Paket samba aus der Serie »n« von SuSE CD 1 installieren

Yast: Administration des Systems - Konfigurationsdatei ändern
»START_SMB« auf »yes« setzen

Die Datei /etc/smb.conf editieren

[global]
workgroup = WORKGROUP
(WORKGROUP is the default workgroup name under Windows,
but could be any other name)
guest account = nobody
keep alive = 30
os level = 2
security = user
encrypt passwords = yes
printing = bsd
printcap name = /etc/printcap
load printers = yes
socket options = TCP_NODELAY
map to guest = Bad User
interfaces = ip of your host / 255.255.255.0

[usr_disk]
(this is not a necessary section, but just an example
of a public directory)
comment = Public Stuff
public = yes
path = /usr_disk
writeable = yes
printable = no

[homes]
comment = Homes Directories
browseable = no
read only = no
create mode = 0744
path = /private/%U
directory mask = 0744

[printers]
comment = All Printers
browseable = no
printable = yes
public = no
read only = yes
create mode = 0700
directory = /tmp

[cdrom] (gives all users access to the Server's CD drive)
comment = Linux CD-Rom
path = /cdrom
read only = yes
locking= no

Stop SAMBA Server with /sbin/init.d/smb stop

Start SAMBA Server with /sbin/init.d/smb start

Enter Username & Password for client (same as on Windows):
```
smbpasswd -ea <username>
```
password

Install Client (Windows 98 for ex.)

Installation of a Windows Client with SAMBA
Open: Start -> Settings -> Control Panel -> Network

Configuration
TCP/IP ...Ethernet Adapter...
Properties -> IP Address
Specify an IP adress
IP Address: 192.168.x.x
SUBNET MASK: 255.255.255.0

Identification
Computer name:
Workgroup: WORKGROUP (same as in smb.conf)

reboot

Open Network Neighborhood (icon on desktop)
you should now see your Linux host!!!
open it too, you should see your linux home directory
and all the linux printer drivers (ascii, lp2, raw)

Install a printer driver:
open: Start -> Settings -> Printers -> Add Printer
How is this printer attached to your computer?
Network printer

Network path or queue name
\\ host name \ printer queue (use Browse)

ex: \\SIRIUS\raw (if you install a PostScript® printer driver)
\\SIRIUS\lp2 (if you install a regular or PCL printer driver)
continue to install normally your driver

                        you should be able now to print !!!

Appendix -B - Samba 2.0.6 "smb.conf" Default parameters

The following list of [global] parameterscan be obtained with the command
> **testparm smb.conf**

```
    add user script =
    admin users =
    allow trusted domains = Yes
    alternate permissions = No
    announce as = NT
    announce version = 4.2
    available = Yes
    bind interfaces only = No
    blocking locks = Yes
    browseable = Yes
    browse list = Yes
    case sensitive = No
    change notify timeout = 60
    character set =
    client code page = 850
    coding system =
    comment =
    config file =
    copy =
    create mask = 0744
    deadtime = 0
    debug hires timestamp = No
    debug pid = No
    debug uid = No
    default case = lower
    default service =
    delete readonly = No
    delete user script =
    delete veto files = No
    dfree command =
    directory mask = 0755
    directory security mask = -1
    dns proxy = Yes
    domain admin group =
    domain admin users =
    domain groups =
    domain guest group =
    domain guest users =
    domain logons = No
    domain master = No
    dont descend =
    dos filetime resolution = No
    dos filetimes = No
    encrypt passwords = No
    exec =
    fake directory create times = No
    fake oplocks = No
    follow symlinks = Yes
    force create mode = 00
    force directory mode = 00
    force directory security mode = -1
    force group =
    force security mode = -1
    force user =
    fstype = NTFS
    getwd cache = Yes
    guest account = nobody
    guest ok = No
    guest only = No
    hide dot files = Yes
    hide files =
    homedir map =
    hosts allow =
    hosts deny =
    hosts equiv =
    include =
    interfaces =
    invalid users =
    keepalive = 300
    kernel oplocks = Yes
    level2 oplocks = No
    lm announce = Auto
```

```
lm interval = 60
load printers = Yes
local master = Yes
lock dir = /usr/local/samba/var/locks
locking = Yes
log file =
log level = 2
logon drive =
logon home = \\%N\%U
logon path = \\%N\%U\profile
logon script =
lppause command =
lpq cache time = 10
lpq command = lpq -P%p
lpresume command =
lprm command = lprm -P%p %j
machine password timeout = 604800
magic output =
magic script =
mangle case = No
mangled map =
mangled names = Yes
mangled stack = 50
mangling char = ~
map archive = Yes
map hidden = No
map system = No
map to guest = Never
max connections = 0
max disk size = 0
max log size = 5000
max mux = 50
max open files = 10000
max packet = 65535
max ttl = 259200
max wins ttl = 518400
max xmit = 65535
message command =
min passwd length = 5
min print space = 0
min wins ttl = 21600
name resolve order = lmhosts host wins bcast
netbios aliases =
netbios name =
NIS homedir = No
nt acl support = Yes
nt pipe support = Yes
nt smb support = Yes
null passwords = No
ole locking compatibility = Yes
only user = No
oplock break wait time = 10
oplock contention limit = 2
oplocks = Yes
os level = 20
panic action =
passwd chat = *new*password* %n\n *new*password* %n\n *changed*
passwd chat debug = No
passwd program = /bin/passwd
password level = 0
password server =
path =
postexec =
postscript = No
preexec close = No
preferred master = No
preload =
preserve case = Yes
printcap name = /etc/printcap
print command = lpr -r -P%p %s
printer driver = NULL
printer driver file = /usr/local/samba/lib/printers.def
printer driver location =
printer name =
printing = bsd
print ok = No
protocol = NT1
queuepause command =
```

```
queueresume command =
read bmpx = No
read list =
read only = Yes
read prediction = No
read raw = Yes
read size = 16384
remote announce =
remote browse sync =
restrict anonymous = No
revalidate = No
root directory = /
root postexec =
root preexec =
root preexec close = No
security = USER
security mask = -1
server string = Samba 2.0.6
set directory = No
shared mem size = 1048576
share modes = Yes
short preserve case = Yes
smb passwd file = /usr/local/samba/private/smbpasswd
smbrun = /usr/local/samba/bin/smbrun
socket address = 0.0.0.0
socket options = TCP_NODELAY
stat cache = Yes
stat cache size = 50
status = Yes
strict locking = No
strict sync = No
strip dot = No
sync always = No
syslog = 1
syslog only = No
time offset = 0
time server = No
timestamp logs = Yes
unix password sync = No
unix realname = No
update encrypted = No
use rhosts = No
username =
username level = 0
username map =
valid chars =
valid users =
veto files =
veto oplock files =
volume =
wide links = Yes
wins hook =
wins proxy = No
wins server =
wins support = No
workgroup =
write list =
write raw = Yes
```

Appendix -C - Troubleshooting Samba

1 - Checking parameters in smb.conf
```
cd /etc
testparm smb.conf
```

2 - Check presence of Samba machine network
> `Ping` each other to see if the network respond
> note: If names are used then Name and IP entries must be present in DNS or in:
> > **/etc/hosts** or **\windows\lmhosts** in windows

3 - From Linus isssue the command:
> ```
> smbclient -L <SambaServerName or IPAddr.>
> ```
> Gives long unimportant list and last the available shares on the Samba Server
> 3.b If Connection refused then check that the 'netbios-ssn' is in
> > LISTEN mode with the command:
> > ```
> > netstat -a
> > ```

4 - Check the name to IP resolution of Samba itself on the server.
> ```
> nmblookup -B <SambaServerName> __SAMBA__
> ```

5 - Check the name to IP resolution of a client.
> (Mostly doesn't work properly for the moment.....!!!!!)
> ```
> nmblookup -B <clientname> '*'
> ```

6 - Checking the presence of SMB hosts on the network
> ```
> nmblookup -d 2 '*'
> ```

7 - Connect as client on the Samba Server directory shares
> ```
> smbclient //<SambaServerName>/<DirShare> -U<username>%<password>
> ```

> This should get connected and the following prompt should appear:
> ```
> smb:\>
> ```

> See section 222 for list of availabel command of smbclient

7 - Connect as client on the Samba Server Printer shares
```
smbclient //<SambaServerName>/<PrinterShare> -U<username>%<password>
```

This should get connected and the following prompt should appear:
> ```
> smb:\>
> ```
> > Samba is ready to receive the following commands:

```
print <filename>          Prints the file to the printer
printmode text|graphics   Sets the printing mode to plain text or native printer binary
queue                     Display the current queue for the current printer share
```

8 - Checking the advertized services and workgroup on the server:
> ```
> nmblookup -S <servername>
> ```

------------------------**On Windows Machine**----------------------------

9 - Check the SMB Shares listing of the server

```
net view \\<SambaServerName>
```

10 - To MAP a DOS drive to a Samba shares resource(directory)

```
net use <DOSDrive>: \\<servername>\<ShareDir>
```

e.g.
```
net use F: \\SERVER\MYDIR
```

Windows Explorer will then show the netwotk MYDIR directory as mapped to F: drive

11 - EXTRA INFO from NetBIOS Environment

Show the list of available names and groups and their services offered
See section 4 and 5 fot details of results

```
NBTSTAT -a servername
```

Appendix - D - DIAGNOSING YOUR SAMBA SERVER

```
!==
!== DIAGNOSIS.txt for Samba release 2.0.5a 22 Jul 1999
!==
Contributor:              Andrew Tridgell
Updated:                  October 14, 1997

Subject:                  DIAGNOSING YOUR SAMBA SERVER
=====================================================================
```

This file contains a list of tests you can perform to validate your
Samba server. It also tells you what the likely cause of the problem
is if it fails any one of these steps. If it passes all these tests
then it is probably working fine.

You should do ALL the tests, in the order shown. I have tried to
carefully choose them so later tests only use capabilities verified in
the earlier tests.

I would welcome additions to this set of tests. Please mail them to
samba-bugs@samba.org

If you send me an email saying "it doesn't work" and you have not
followed this test procedure then you should not be surprised if I
ignore your email.

ASSUMPTIONS

In all of the tests I assume you have a Samba server called BIGSERVER
and a PC called ACLIENT. I also assume the PC is running windows for
workgroups with a recent copy of the microsoft tcp/ip stack. Alternatively,
your PC may be running Windows 95 or Windows NT (Workstation or Server).

The procedure is similar for other types of clients.

I also assume you know the name of an available share in your
smb.conf. I will assume this share is called "tmp". You can add a
"tmp" share like by adding the following to smb.conf:

```
[tmp]
 comment = temporary files
 path = /tmp
 read only = yes
```

THESE TESTS ASSUME VERSION 1.9.16 OR LATER OF THE SAMBA SUITE. SOME
COMMANDS SHOWN DID NOT EXIST IN EARLIER VERSIONS

Please pay attention to the error messages you receive. If any error message
reports that your server is being unfriendly you should first check that you
IP name resolution is correctly set up. eg: Make sure your /etc/resolv.conf
file points to name servers that really do exist.

Also, if you do not have DNS server access for name resolution please check
that the settings for your smb.conf file results in "dns proxy = no". The
best way to check this is with "testparm smb.conf"

TEST 1:

In the directory in which you store your smb.conf file, run the command
"testparm smb.conf". If it reports any errors then your smb.conf
configuration file is faulty.

Note: Your smb.conf file may be located in: /etc
                          Or in: /usr/local/samba/lib
TEST 2:
----

run the command "ping BIGSERVER" from the PC and "ping ACLIENT" from
the unix box. If you don't get a valid response then your TCP/IP
software is not correctly installed.

Note that you will need to start a "dos prompt" window on the PC to
run ping.

If you get a message saying "host not found" or similar then your DNS
software or /etc/hosts file is not correctly setup. It is possible to
run samba without DNS entries for the server and client, but I assume
you do have correct entries for the remainder of these tests.

Another reason why ping might fail is if your host is running firewall
software. You will need to relax the rules to let in the workstation
in question, perhaps by allowing access from another subnet (on Linux
this is done via the ipfwadm program.)

TEST 3:

Run the command "smbclient -L BIGSERVER" on the unix box. You
should get a list of available shares back.

If you get a error message containing the string "Bad password" then
you probably have either an incorrect "hosts allow", "hosts deny" or
"valid users" line in your smb.conf, or your guest account is not
valid. Check what your guest account is using "testparm" and
temporarily remove any "hosts allow", "hosts deny", "valid users" or
"invalid users" lines.

If you get a "connection refused" response then the smbd server could
not be running. If you installed it in inetd.conf then you probably edited
that file incorrectly. If you installed it as a daemon then check that
it is running, and check that the netbios-ssn port is in a LISTEN
state using "netstat -a".

If you get a "session request failed" then the server refused the
connection. If it says "Your server software is being unfriendly" then
its probably because you have invalid command line parameters to smbd,
or a similar fatal problem with the initial startup of smbd. Also
check your config file (smb.conf) for syntax errors with "testparm"
and that the various directories where samba keeps its log and lock
files exist.

There are a number of reasons for which smbd may refuse or decline
a session request. The most common of these involve one or more of
the following smb.conf file entries:
                          hosts deny = ALL
                          hosts allow = xxx.xxx.xxx.xxx/yy
                          bind interfaces only = Yes

In the above, no allowance has been made for any session requests that
will automatically translate to the loopback adaptor address 127.0.0.1.
To solve this problem change these lines to:
                          hosts deny = ALL
                          hosts allow = xxx.xxx.xxx.xxx/yy 127.
Do NOT use the "bind interfaces only" parameter where you may wish to
use the samba password change facility, or where smbclient may need to
access local service for name resolution or for local resource
connections. (Note: the "bind interfaces only" parameter deficiency
where it will not allow connections to the loopback address will be
fixed soon).

Another common cause of these two errors is having something already running
on port 139, such as Samba (ie: smbd is running from inetd already) or
something like Digital's Pathworks. Check your inetd.conf file before trying to
start smbd as a daemon, it can avoid a lot of frustration!

And yet another possible cause for failure of TEST 3 is when the subnet mask
and / or broadcast address settings are incorrect. Please check that the network
interface IP Address / Broadcast Address / Subnet Mask settings are correct and
that Samba has correctly noted these in the log.nmb file.

TEST 4:

Run the command "nmblookup -B BIGSERVER __SAMBA__". You should get the
IP address of your Samba server back.

If you don't then nmbd is incorrectly installed. Check your inetd.conf
if you run it from there, or that the daemon is running and listening
to udp port 137.

One common problem is that many inetd implementations can't take many

parameters on the command line. If this is the case then create a
one-line script that contains the right parameters and run that from
inetd.

TEST 5:
----

run the command "nmblookup -B ACLIENT '*'"

You should get the PCs IP address back. If you don't then the client
software on the PC isn't installed correctly, or isn't started, or you
got the name of the PC wrong.

TEST 6:

Run the command "nmblookup -d 2 '*'"

This time we are trying the same as the previous test but are trying
it via a broadcast to the default broadcast address. A number of
Netbios/TCPIP hosts on the network should respond, although Samba may
not catch all of the responses in the short time it listens. You
should see "got a positive name query response" messages from several
hosts.

If this doesn't give a similar result to the previous test then
nmblookup isn't correctly getting your broadcast address through its
automatic mechanism. In this case you should experiment use the
"interfaces" option in smb.conf to manually configure your IP
address, broadcast and netmask.

If your PC and server aren't on the same subnet then you will need to
use the -B option to set the broadcast address to the that of the PCs
subnet.

This test will probably fail if your subnet mask and broadcast address are
not correct. (Refer to TEST 3 notes above).

TEST 7:

Run the command "smbclient '\\BIGSERVER\TMP'". You should then be
prompted for a password. You should use the password of the account
you are logged into the unix box with. If you want to test with
another account then add the -U <accountname> option to the end of
the command line. eg: smbclient //bigserver/tmp -Ujohndoe

Note: It is possible to specify the password along with the username
as follows:
    smbclient //bigserver/tmp -Ujohndoe%secret

Once you enter the password you should get the "smb>" prompt. If you
don't then look at the error message. If it says "invalid network
name" then the service "tmp" is not correctly setup in your smb.conf.

If it says "bad password" then the likely causes are:

- you have shadow passords (or some other password system) but didn't
compile in support for them in smbd
- your "valid users" configuration is incorrect
- you have a mixed case password and you haven't enabled the "password
level" option at a high enough level
- the "path =" line in smb.conf is incorrect. Check it with testparm
- you enabled password encryption but didn't create the SMB encrypted
password file

Once connected you should be able to use the commands "dir" "get"
"put" etc. Type "help <command>" for instructions. You should
especially check that the amount of free disk space shown is correct
when you type "dir".

TEST 8:

On the PC type the command "net view \\BIGSERVER". You will need to do
this from within a "dos prompt" window. You should get back a list of
available shares on the server.

If you get a "network name not found" or similar error then netbios
name resolution is not working. This is usually caused by a problem in
nmbd. To overcome it you could do one of the following (you only need
to choose one of them):

- fixup the nmbd installation
- add the IP address of BIGSERVER to the "wins server" box in the
advanced tcp/ip setup on the PC.
- enable windows name resolution via DNS in the advanced section of
the tcp/ip setup
- add BIGSERVER to your lmhosts file on the PC.

If you get a "invalid network name" or "bad password error" then the
same fixes apply as they did for the "smbclient -L" test above. In
particular, make sure your "hosts allow" line is correct (see the man
pages)

Also, do not overlook that fact that when the workstation requests the
connection to the samba server it will attempt to connect using the
name with which you logged onto your Windows machine. You need to make
sure that an account exists on your Samba server with that exact same
name and password.

If you get "specified computer is not receiving requests" or similar
it probably means that the host is not contactable via tcp services.
Check to see if the host is running tcp wrappers, and if so add an entry in
the hosts.allow file for your client (or subnet, etc.)

TEST 9:

Run the command "net use x: \\BIGSERVER\TMP". You should be prompted
for a password then you should get a "command completed successfully"
message. If not then your PC software is incorrectly installed or your
smb.conf is incorrect. make sure your "hosts allow" and other config
lines in smb.conf are correct.

It's also possible that the server can't work out what user name to
connect you as. To see if this is the problem add the line "user =
USERNAME" to the [tmp] section of smb.conf where "USERNAME" is the
username corresponding to the password you typed. If you find this
fixes things you may need the username mapping option.

TEST 10:

From file manager try to browse the server. Your samba server should
appear in the browse list of your local workgroup (or the one you
specified in smb.conf). You should be able to double click on the name
of the server and get a list of shares. If you get a "invalid
password" error when you do then you are probably running WinNT and it
is refusing to browse a server that has no encrypted password
capability and is in user level security mode. In this case either set
"security = server" AND "password server = Windows_NT_Machine" in your
smb.conf file, or enable encrypted passwords AFTER compiling in support
for encrypted passwords (refer to the Makefile).

Still having troubles?

Try the mailing list or newsgroup, or use the tcpdump-smb utility to
sniff the problem. The official samba mailing list can be reached at
samba@samba.org. To find out more about samba and how to
subscribe to the mailing list check out the samba web page at
                http://samba.org/samba

Also look at the other docs in the Samba package!

Appendix -E - Definition of NetBIOS Protocol and Name

```
!==
!== NetBIOS.txt for Samba release 2.0.5a ----- 22 Jul 1999
!==
Contributor:    lkcl - samba-bugs@arvidsjaur.anu.edu.au
                Copyright 1997  Luke Kenneth Casson Leighton
Date:           March 1997
Status:         Current
Updated:        12jun97

Subject:                        Definition of NetBIOS Protocol and Name Resolution
Modes
==============================================================================
```

```
=======
NETBIOS
=======
```

NetBIOS runs over the following tranports: TCP/IP; NetBEUI and IPX/SPX.
Samba only uses NetBIOS over TCP/IP. For details on the TCP/IP NetBIOS
Session Service NetBIOS Datagram Service, and NetBIOS Names, see
rfc1001.txt and rfc1002.txt.

NetBEUI is a raw NetBIOS frame protocol implementation that allows NetBIOS
datagrams to be sent out over the 'wire' embedded within LLC frames.
NetBEUI is not required when using NetBIOS over TCP/IP protocols and it
is preferable NOT to install NetBEUI if it can be avoided.

IPX/SPX is also not required when using NetBIOS over TCP/IP, and it is
preferable NOT to install the IPX/SPX transport unless you are using Novell
servers. At the very least, it is recommended that you do not install
'NetBIOS over IPX/SPX'.

[When installing Windows 95, you will find that NetBEUI and IPX/SPX are
installed as the default protocols. This is because they are the simplest
to manage: no Windows 95 user-configuration is required].

NetBIOS applications (such as samba) offer their services (for example,
SMB file and print sharing) on a NetBIOS name. They must claim this name
on the network before doing so. The NetBIOS session service will then
accept connections on the application's behalf (on the NetBIOS name
claimed by the application). A NetBIOS session between the application
and the client can then commence.

NetBIOS names consist of 15 characters plus a 'type' character. This is
similar, in concept, to an IP address and a TCP port number, respectively.
A NetBIOS-aware application on a host will offer different services under
different NetBIOS name types, just as a host will offer different TCP/IP
services on different port numbers.

NetBIOS names must be claimed on a network, and must be defended. The use
of NetBIOS names is most suitable on a single subnet; a Local Area Network
or a Wide Area Network.

NetBIOS names are either UNIQUE or GROUP. Only one application can claim a
UNIQUE NetBIOS name on a network.
There are two kinds of NetBIOS Name resolution: Broadcast and Point-to-Point.

```
=================
BROADCAST NetBIOS
=================
```

Clients can claim names, and therefore offer services on successfully claimed
names, on their broadcast-isolated subnet. One way to get NetBIOS services
(such as browsing: see ftp.microsoft.com/drg/developr/CIFS/browdiff.txt; and
SMB file/print sharing: see cifs4.txt) working on a LAN or WAN is to make
your routers forward all broadcast packets from TCP/IP ports 137, 138 and 139.

This, however, is not recommended. If you have a large LAN or WAN, you will
find that some of your hosts spend 95 percent of their time dealing with
broadcast traffic. [If you have IPX/SPX on your LAN or WAN, you will find
that this is already happening: a packet analyzer will show, roughly
every twelve minutes, great swathes of broadcast traffic!].
```
============
NBNS NetBIOS
============
```

rfc1001.txt describes, amongst other things, the implementation and use
of, a 'NetBIOS Name Service'. NT/AS offers 'Windows Internet Name Service'
which is fully rfc1001/2 compliant, but has had to take specific action
with certain NetBIOS names in order to make it useful. (for example, it
deals with the registration of <1c> <1d> <1e> names all in different ways.
I recommend the reading of the Microsoft WINS Server Help files for full
details).

Samba also offers WINS server capabilities. Samba does not interact
with NT/AS (WINS replication), so if you have a mixed NT server and
Samba server environment, it is recommended that you use the NT server's
WINS capabilities, instead of samba's WINS server capabilities.

The use of a WINS server cuts down on broadcast network traffic for
NetBIOS name resolution. It has the effect of pulling all the broadcast
isolated subnets together into a single NetBIOS scope, across your LAN
or WAN, while avoiding the use of TCP/IP broadcast packets.

When you have a WINS server on your LAN, WINS clients will be able to
contact the WINS server to resolve NetBIOS names. Note that only those
WINS clients that have registered with the same WINS server will be
visible. The WINS server _can_ have static NetBIOS entries added to its
database (usually for security reasons you might want to consider putting
your domain controllers or other important servers as static entries,
but you should not rely on this as your sole means of security), but for
the most part, NetBIOS names are registered dynamically.

[It is important to mention that samba's browsing capabilities (as a WINS
client) must have access to a WINS server. if you are using samba also
as a WINS server, then it will have a direct short-cut into the WINS
database.

This provides some confusion for lots of people, and is worth mentioning
here: a Browse Server is NOT a WINS Server, even if these services are
implemented in the same application. A Browse Server _needs_ a WINS server
because a Browse Server is a WINS client, which is _not_ the same thing].

Clients can claim names, and therefore offer services on successfully claimed
names, on their broadcast-isolated subnet. One way to get NetBIOS services
(such as browsing: see ftp.microsoft.com/drg/developr/CIFS/browdiff.txt; and
SMB file/print sharing: see cifs6.txt) working on a LAN or WAN is to make
your routers forward all broadcast packets from TCP/IP ports 137, 138 and 139.
You will find, however, if you do this on a large LAN or a WAN, that your
network is completely swamped by NetBIOS and browsing packets, which is why
WINS was developed to minimise the necessity of broadcast traffic.

WINS Clients therefore claim names from the WINS server. If the WINS
server allows them to register a name, the client's NetBIOS session service
can then offer services on this name. Other WINS clients will then
contact the WINS server to resolve a NetBIOS name.

```
======================
```
Samba WINS Capabilities
```
======================
```

To configure samba as a WINS server, you must add "wins support = yes" to
the [global] section of your smb.conf file. This will enable WINS server
capabilities in nmbd.

To configure samba as a WINS client, you must add "wins server = x.x.x.x"
to the [global] section of your smb.conf file, where x.x.x.x is the TCP/IP
address of your WINS server. The browsing capabilities in nmbd will then
register (and resolve) WAN-wide NetBIOS names with this WINS server.

Note that if samba has "wins support = yes", then the browsing capabilities
will _not_ use the "wins server" option to resolve NetBIOS names: it will
go directly to the internal WINS database for NetBIOS name resolution. It
is therefore invalid to have both "wins support = yes" and
"wins server = x.x.x.x". Note, in particular, that if you configure the
"wins server" parameter to be the ip address of your samba server itself
(as might one intuitively think), that you will run into difficulties.
Do not use both parameters!

Appendix - F - Variable Substitutions in smb.conf

Many of the strings that are settable in the config file can take substitutions.
For example the option "path = /tmp/%u" would be interpreted as "path =/tmp/john"
if the user connected with the username john.

These substitutions are mostly noted in the descriptions below, but there are
some general substitutions which apply whenever they might be
relevant. These are:

%S = the name of the current service, if any.

%P = the root directory of the current service, if any.

%u = user name of the current service, if any.

%g = primary group name of %u.

%U = session user name (the user name that the client wanted,
not necessarily the same as the one they got).

%G = primary group name of %U.

%H = the home directory of the user given by %u.

%v = the Samba version.

%h = the internet hostname that Samba is running on.

%m = the NetBIOS name of the client machine (very useful).

%L = the NetBIOS name of the server.This allows you to change your
config based on what the client calls you. Your server can have
a "dual personality".

%M = the internet name of the client machine.

%N = the name of your NIS home directory server.This is obtained
from your NIS auto.map entry. If you have not compiled Samba
with the --with-automount option then this value will be the
same as %L.

%p = the path of the service's home directory, obtained from your
NIS auto.map entry. The NIS auto.map entry is split up as "%N:%
p".

%R = the selected protocol level after protocol negotiation. It can
be one of CORE, COREPLUS, LANMAN1, LANMAN2 or NT1.

%d = The process id of the current server process.

%a = the architecture of the remote machine.Only some are
recognized, and those may not be 100% reliable. It currently
recognizes Samba,WfWg, WinNT and Win95. Anything else will be
known as "UNKNOWN". If it gets it wrong then sending a level 3
log to samba-bugs@samba.org should allow it to be fixed.

%I = The IP address of the client machine.

%T = the current date and time.

Appendix - G - Examples of Windows Domains
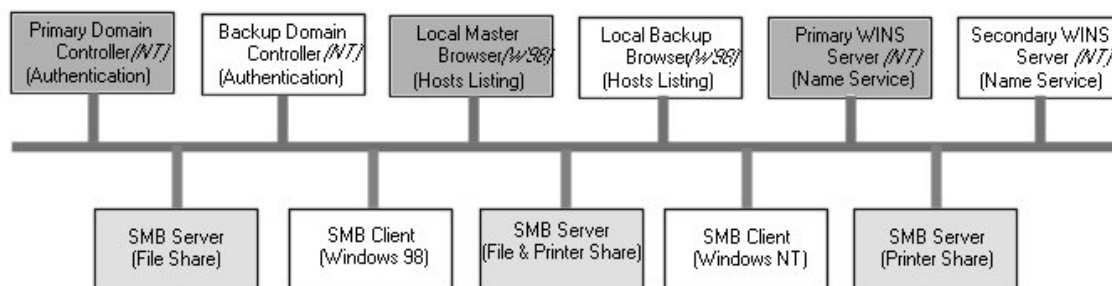
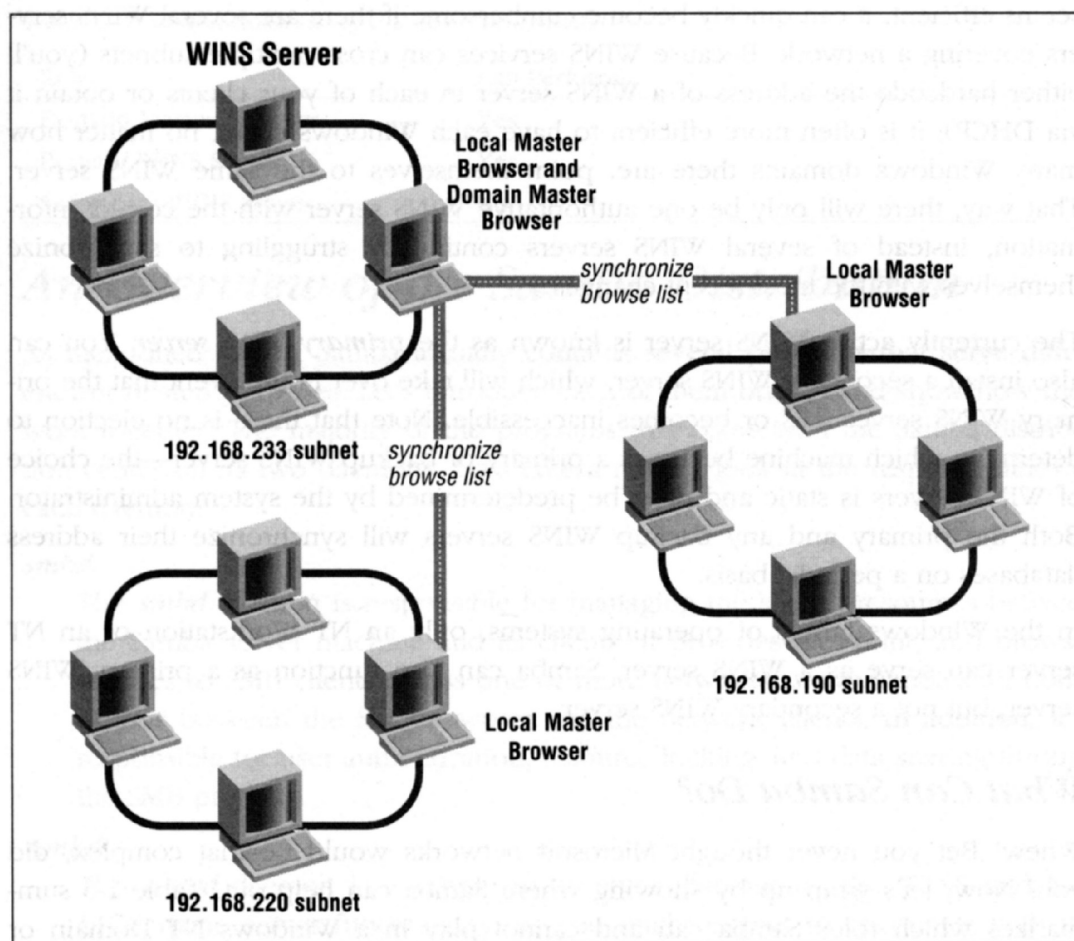

Example of a Workgroup that spans over more than one subnet

Figure 1-14. A workgroup that spans more than one subnet

Appendix - H -Short introduction to Samba

1 - Installation: Via yast - serie 'n' , Package: samba.

2 - Auto-start at Boot-up: Via yast Parameter: **START_SMB = yes** in /etc/rc.config

3 - Manual start/stop of Samba: **rcsmb** {**start**|**stop**|**restart**|**reload**|**status**}

4 - See below: **Appendix -I-Typical samba configuration of /etc/smb.conf**

   - Testing samba comfiguration and listing all the default configurations:

```
testparm > /etc/smb.conf.all ; less /etc/smb.conf.all
```

   - To get help on parameters:

`/usr/share/doc/packages/samba/htmldocs/smb.conf.5.html`   **(From SuSE 7.0 on)**

`/usr/share/samba/swat/help/smb.conf.5.html`   **(From SuSE 8.0 on)**

   Note: The Sharenames should be without space and no longer than 13 chars.

5 - Create the users that will access the samba services and the appropriate directories:

   useradd -m *username* **; passwd** *username*

   smbpasswd -a *username* (not needed if ClearTextPassword is set in windows clients)

6 - Testing with smbclient:

```
smbclient -L LocalIPNumber
```

eg: **smbclient -L 192.168.70.23**   (local host IP or `localhost`)

   At word **Password:** just press <Enter> to get the listing of local samba shared resources.

7 - **smbclient //***ServerNetbiosName or IP***/***ResourceName*   **-U** *UserName*

   eg. **smbclient //laptop/fred-harry -U fred**

      The password from fred will be asked, and then use the typical ftp like commands.

      (eg. get, put, ls, pwd, etc)

8 - **smbmount //***ServerNetbiosName* or *IP***/***ShareName*   */MountPoint*

   -o username=*username***,password=***password***,workgroup=***workgroup*

eg.

`smbmount //laptop/public /mnt -o username=john,password=hallo,workgroup=ms01`

   If successful then no error messages will appear. Check the mounting with.

```
ls /mnt
```

Note received in SuSE 7.1 and 7.2: The syntax of `smbmount` has changed! `smbmount` can not be called directly anymore. It will be called by a shell script `/sbin/mount.smbfs`, which will be called by `mount`. A sample call to smbfs:

mount -t smbfs -o username=*uname***,password=***passwd* **//***smbserv***/***share* **/***destination*

9 - Extra programs used in Linux to connect to Windows or Samba shares:

   Kruiser in serie '**kpa**' - Very good for NetBIOS connections but exist no more in 7.x

   xsmbrowser - From www.samba.org. needs **expect** package from series **'tcl'**

   konqueror - Delivered with KDE-2....quite slow at displaying shares and contents

   LinNeighborhood - 'xap' Very good : **Note**: Must add a Master Browser as `localhost`

10 - **Log files** are in: **/var/log/log.smb** and **/var/log/log.nmb**

11 - Using **swat**:

   - Enable the line "swat" in `/etc/inetd.conf`   - Take the # out before the line

   - Restart the inetd daemon - **rcinetd restart**

   - **http://localhost:901** and use name = **root** and *root password*

12 - Using **webmin**: get the latest version of webmin(www.webmin.com) (.rpm) and install it.

   - **http://localhost:10000** and use name = **root** and *root password*

13 - Other means of transfering data:

   FTP, **NFS, mcserv** + (**mc**), **scp, rsync** (from **ssh** in '**sec**' series)

   pscp from Putty (Win prgm)

Appendix - I - Typical Configuration of smb.conf

```
;
; /etc/smb.conf
;
; Copyright (c) 1999 SuSE GmbH Nuernberg, Germany.
;
[global]
   workgroup = WORKGROUP
   guest account = nobody
   keep alive = 30
   os level = 2
   kernel oplocks = false
   security = user

; Uncomment the following, if you want to use an existing NT-Server to authenticate users, but don't
; forget that you also have to create them locally!!!
;  security = server
;  password server = 192.168.1.10

encrypt passwords = yes
null passwords = yes

printing = cups
;   printcap name = /etc/printcap
load printers = yes

socket options = TCP_NODELAY

map to guest = Bad User

; Uncomment this, if you want to integrate your server into an existing net
; e.g. with NT-WS to prevent nettraffic.
local master = no

; Please uncomment the following entry and replace the ip number and netmask with the correct numbers
for your ethernet interface.

interfaces = eth0 eth0:1 eth0:2
socket address = 192.168.10.1
socket address = 192.168.20.1
socket address = 192.168.30.1

; If you want Samba to act as a wins server, please set 'wins support = yes'
wins support = no

; If you want Samba to use an existing wins server, please uncomment the following line and replace
; the dummy with the wins server's ip number.
;   wins server = 192.168.1.1

; Do you wan't samba to act as a logon-server for your windows 95/98 clients, so uncomment the
; following:
;   logon script =%U.bat
;   domain logons = yes
;   domain master = yes
; [netlogon]
;   path = /netlogon
```

#------------------------------ **Shares** -----------------------------------
A dynamicly assigned directory to each user.   Note: Here the **/home/<user>/data** MUST exist
[homes]
   comment = Heimatverzeichnis
   path = /home/%U/data
   browseable = no
   read only = no
   create mode = 0750

   [cdrom]
   comment = Linux CD-ROM
   path = /cdrom
   read only = yes
   locking = no
   public = yes

[printers]
   comment = All Printers
   browseable = no
   printable = yes
   public = yes
   read only = yes
   create mode = 0700
   directory = /tmp

To do in system:
(as root user)
```
useradd -m <user>
smbpasswd -ae <user>
mkdir /home/<user>/data
chown <user>.users /home/<user>/data
chmod 755 /home/<user>/data
```

A fully readable and writeable directory accessible for all valid users.

[transfer]
   path = /transfer
   public = yes
   printable = no
   writeable = yes
   create mode = 0777

To do in system:
(as root user)
```
mkdir /transfer
chmod 777 /transfer
```

A **read only** directory accessible for all valid users.

[install]
   comment = Installation Directory
   path = /install
   public = yes
   read only = yes
   locking = no

To do in system:
(as root user)
```
mkdir /install
chmod 755 /install
```

A readable/writable directory only accessible from as user**fred** and **harry**: It is actually owned by fred but also accessible and writable from harry. Fred and Harry users must be part of a group that is not the regular user's group.   eg. group **extra**

[fredsco]
   comment = common for Fred and Harry
   path = /common/fred
   valid users = fred harry
   public = no
   writeable =yes

```
groupadd extra
useradd -m -g extra fred
useradd -m -g extra harry
smbpasswd -ae fred
smbpasswd -ae harry

mkdir /home/fred/data
mkdir /home/harry/data
chown fred.extra /home/fred/data
chown harry.extra /home/harry/data

mkdir -p /common/fred
chmod 755 /common
chmod 770 /common/fred
chown fred.extra /common/fred
```

To do in system: ---------------------->
(as root user)