What is Samba?

Samba is a SMB file and print server for unix.

SMB is the file sharing protocol built into Windows for Workgroups, Win95, WinNT and OS/2. It comes with most PCs and is tightly integrated with the OS.

Samba takes the view that it is better to make the unix box talk the PCs protocol, than make the PC talk the Unix protocol. It makes for much less hassle.

Samba is developed by a loosely connected group of people on the internet. It is available for free under the GNU Public License.

It is used by tens of thousands of people worldwide.

The SMB protocol

The SMB protocol is like the perl of filesystem protocols. It has a huge range of functions. It is complex, and it has changed a lot over time. It is an X/Open protocol.

In Samba it is based on TCP for file sharing and UDP for browsing. It can also run on top of several other protocols (primarily Netbeui, Decnet and IPX)

SMB is also known as LanManager, PCSA (pathworks) or "Windows networking".

The protocol has some advanced features such as command chaining, and extensive negotiation of options.

So what is SMB like inside?

An example is perhaps the best way to illustrate things. The following is a client connecting to a server, doing a directory listing, copying a file and then disconnecting.

```
UDP-137    NAME REGISTRATION REQUEST
UDP-137    NAME OVERWRITE REQUEST AND DEMAND
UDP-137    NAME QUERY REQUEST
UDP-137    POSITIVE NAME QUERY RESPONSE
TCP-139    SMBnegprot
TCP-139    SMBsesssetupX
TCP-139    SMBtcon
TCP-139    SMBsearch
TCP-139    SMBdskattr
TCP-139    SMBopenX + SMBreadbraw
```

```
TCP-139    SMBclose
TCP-139    SMBtdis
```

All the requests are binary, with a fixed byte order. Amazingly the byte order of the name resolution is the opposite of the SMB commands!

The NBT protocol

NBT is "Netbios over TCP" which is the protocol used to encapsulate SMB over TCP, and also to implement name resolution and registration (using UDP). It is mostly covered by RFCs 1001 and 1002.

Name resolution can be via broadcasts or directly to a WINS server.

The biggest problem is that the namespace is flat. Microsoft are working on a hack to get around this, but it isn't pretty. It uses a NBT name status request to find a Netbios name for a host found using DNS.

The fact that names are registered rather than being statically allocated leads to some potentially tricky security problems.

Security

Samba was written with security in mind. It offers a lot more security options than other file sharing packages.

- supports SMB encrypted passwords or unix passwords
- supports remote authentication
- all filesystem operations as the authenticated uid
- never overrides existing unix security
- carefully checks all packets - the client is always a potential enemy
- tcp-wrappers based hosts-allow/hosts-deny system built in

Portability

Samba is very portable and requires no kernel hacks. It has been ported to more unixes than I ever knew existed. Its also been ported to some non-unix platforms such as OS/2, AmigaOS. Some people even run it on Cray and Convex supercomputers.

One some systems some features are lost. In particular trapdoor systems (like SCO) can cause trouble. Some other portability problems are very annoying. I was amazed to find so many problems with finding the free disk space, quotas, and finding an appropriate broadcast address.

Locking on many unixes is unfortunately very flakey, but Windows apps use a LOT of complex locking. Samba tries to cope by implementing its own mechanisms on top of the fcntl interface.

Configuration

Configuration is pretty easy, and very flexible. Heres a very simple sample:

```
[global]
   log level = 1
   security = user
   workgroup = SVERIGE
   encrypt passwords = yes
   hosts allow = 192.168.2. localhost
   include = /usr/local/samba/lib/smb.conf.%m

[homes]
   browseable = no
```

```
    guest ok = no
    read only = no
    create mask = 0755

[printers]
   guest ok = no
   path = /var/spool/smbprint
   print ok = yes

[cdrom]
    comment = Tridge's CdRom
    path = /mount/cdrom
    read only = yes
    locking = no
    mangled map = (*;1 *) (*.html *.htm)
```

Browsing

One of the fancy "new" features in Samba is browsing. Browsing is the Microsoft way of dynamically advertising machines and services on a network. It is very popular with users.

Browsing uses an election system to choose a "browse master" that maintains a list of available systems and "workgroups". The browse protocol principally uses UDP/138.

The ability of Samba to fully support browsing is one of its key advantages over the commercially available SMB servers for unix.

Domain Controlling

The Microsoft "domain" system is at the heart of the WinNT model of networking. It fills much the same function as NIS does for Sun networks, but is considerably more complex.

Currently Samba supports two key features of domains :- domain logons and logon scripts. Other features of domains such as SAM replication, roving profiles and remote administration are being worked on.

The domain protocols are also one of the least documented parts of the SMB protocol.

Samba resources and support

- the source and docs (and these slides!) and available from ftp://nimbus.anu.edu.au/pub/tridge/samba
- The Samba WWW site is http://samba.canberra.edu.au/pub/samba
- the Samba mailing list
- the news group comp.protocols.smb

There are, however, lots of people who want commercial support. For this reason I started the “Samba support list” which lists companies that offer commercial Samba support. Some of them do quite well out of it. There are currently 24 companies on the list.

The future

There are lots of things I want to add/change in Samba. Here are some of them:

- full domain control and WINS exchange
- proper browsing for multi-homed hosts
- multi-workgroup support
- fax support?
- remote admin?
- unix protocol extensions?
- more true client filesystems?