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**Title:** Samba/iX 2.x: New dimensions to MPE/NT interoperability

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# SAMBA/iX 2.X: NEW DIMENSIONS TO MPE-NT INTEROPERABILITY

## 1 . Abstract

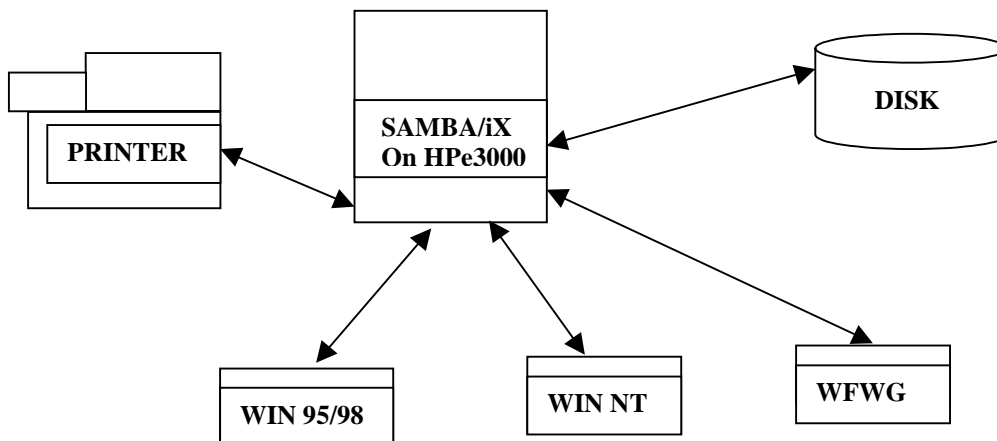
*SAMBA is an aggregation of a complex framework that makes it possible to mount and use Unix servers as Windows shares and hence as file and print servers. It provides for seamless integration of the simplicity and ease of use of Windows with the power and speed of Unix. SAMBA has come a long way since its basic premise of NT/Unix connectivity. Various features have been added ever since that make SAMBA more tightly integrated with NT domains.*

## 2. Description of Samba/iX

Before proceeding to examine the various enhancements that have been added to *Samba/iX* 2.0.3, it would be refreshing to take a look at how **Samba** performs the humongous task of mounting Unix filesystems as Windows drives and shares.

*Samba/iX is the result of porting Samba to MPE/iX under the POSIX environment.* It is a solution for those who wish to access their HP e3000 from the common win95 or windows NT Workstation desktop systems. *Samba/iX* allows full access and functionality between all the popular desktop PC applications and printers both networked and spooled from MPE/iX.

*Samba/iX is a suite of programs, which allows an HP e3000 running MPE/iX to provide services using a Microsoft networking protocol called SMB.* Moreover, this elegant and flexible suite of programs implement a wonderful interoperability feature that allows a MPE/iX host to act as a file/print server for Microsoft WindowsNT, Windows95/98 and Windows for workgroups. See *figure 1*.



*Figure 1: The HP3000 interoperating with the Microsoft platforms.*

## 2.1 The Benefits of using Samba/iX:

There are many benefits in having such an *MPE/iX & Samba/iX* environment. Some of them are listed below:

- *The remote MPE/iX filesystem* appears on **PC** as a drive letter or icon in the “*Network neighborhood*” (depending on the specific OS). With a click of the mouse, it is possible to access the MPE/iX filesystem with a new look and feel. The same familiar look and feel as the desktop applications used everyday.
- *Direct file operations are possible without actually copying them*. Files can be operated on as if they are stored locally.
- *Samba/iX acts as translator* between the different file systems for file attributes and user authentication etc.
- *Samba/iX can support Win95/98 and WinNT systems with the long\_name\_space feature*.
- *Samba/iX provides seamless interoperability* between common desktop operating systems and popular PC applications in your HP e3000 MPE/iX and Microsoft network.

## 3. The major components of Samba/iX suite:

<b>smbd</b>	<ul style="list-style-type: none"><li>• The SMB server. This handles connections from clients, doing all the file, permission and username authentication.</li></ul>
<b>nmbd</b>	<ul style="list-style-type: none"><li>• The Netbios name server advertises <i>Samba/iX</i> server on the network. It helps clients to locate servers.</li></ul>
<b>smbclient</b>	<ul style="list-style-type: none"><li>• The client program on MPE/iX-host.</li></ul>
<b>smb.conf</b>	<ul style="list-style-type: none"><li>• The <i>Samba/iX</i> runtime configuration file.</li></ul>
<b>smbrun</b>	<ul style="list-style-type: none"><li>• A small 'glue' program to help the server run external programs.</li></ul>
<b>testparms</b>	<ul style="list-style-type: none"><li>• A program to test the <i>Samba/iX</i> configuration file for correctness.</li></ul>
<b>testprns</b>	<ul style="list-style-type: none"><li>• A program to test server access to printers.</li></ul>

*Table 1: The major components*

### 3.1 The major components and what they do:

By this time, we have presented an overview of the *Samba/iX* product. Let us now understand each component and its role in *Samba/iX* for the HP e3000 server.

- **SMBD**: This is the server that can provide most SMB services (the SMB protocol section describes the role of SMB). The HP e3000 running **SMBD** will act as a File and Print server for the clients using the

SMB protocol. This is compatible with the LanManager protocol, and can service LanManager clients. These clients include Windows for Workgroups, Windows 95/98 and Windows NT.

- **NMBD:** This is a server that understands and can reply to netbios name service requests, like those sent by LanManager clients. It also controls browsing (viewing the resources available on a Windows network is called *browsing*). LanManager compatible clients i.e. Win95/WinNT, when they start up, may wish to locate a LanManager server. That is, they wish to know what IP address a specified host is using.

This program simply listens for such requests, and if its own name is specified it will respond with the IP address of the host it is running on. Its "own name" is by default the name of the host it is running on.

- **SMBCLIENT:** The **SMBCLIENT** is a client that can 'talk' to an SMB server. When you run this program on HP e3000, it will be acting as a client!  
It is a command line program and offers an interface similar to that of the *ftp* program. Operations include things like 'getting' files from the server to the local machine, 'putting' files from the local machine to the server, retrieving directory information from the server etc.
- **SMB.CONF:** The **SMB.CONF** file is a configuration file of the *Samba/iX* suite, which contains runtime configuration information for both **SMBD** and **NMBD**. This file consists of sections and parameters. Each section in the configuration file corresponds to a service. The special sections are [global], [homes] and [printers]. The [global] section is used to set global configuration options that apply to the server as a whole. The [home] section is designed to grant access to all user's home directories and the entries in [printers] section correspond to the print services of the *Samba/iX* server.
- **SMBRUN:** The **SMBRUN** is a very small 'glue' program, which runs shell commands for the **smbd** daemon. This program is necessary to allow some operating systems to run external programs as non-root.
- **TESTPARGM:** This is a very simple test program to check **SMB.CONF** configuration file for internal correctness. If this program reports no problems, you can use the configuration file with confidence that **smbd** will successfully load the configuration file.
- **TESTPRNS:** This program is also a part of the suite. This tools checks whether the printer name is valid for the services provided by **SMBD**.

## **4. Samba/iX 2.0.3 - New features and enhancements**

*Samba/iX* 2.0.3 comes with a host of improvements and enhancements that redefine the limits of NT/MPE interoperability. Apart from the fixes and patches that accompany any new version, *Samba/iX* 2.0.3 incorporates changes that bring long awaited and much needed functionality.

### **4.1 SWAT - Samba Web Administration Tool**

SWAT is a tool that permits the administrator to remotely configure the smb.conf file with the convenience of a web browser. To provide this service, the *Samba* server 'smbd' acts as mini (scaled down) web browser and services requests that come from web browsers. SWAT is very user friendly and provides a good interface. Various parameters, share security and other features can be configured from a browser front end. It gives the flexibility of dynamically altering the configuration file to reflect changes in needs with respect to shares and printers.

#### **How to invoke SWAT**

SWAT can be invoked by starting your favorite web browser with the following arguments in the go to field: http://sambaservername: 901/. Here 901 is the port at which SWAT operates.

#### **How to use SWAT**

SWAT interface is very easy to use. Just point and click on any of the options on the front-page banner. The following are the brief descriptions of what each link in the banner stands for:

**Home** - The Samba help and documentation page.

**Globals** - Link to global variable and configuration options.

**Shares** - This lets you select the available shares for configuration or lets you create/delete shares from the record.

**Printers** - This link makes it possible to choose existing printers from the printers section of smb.conf file and change the configuration for each one of them.

**Status** - The status of the server can be polled by clicking on this link. smbd and nmbd running status can be checked. Also information on active connections, active shares and active files that are open can be retrieved, allowing easy monitoring of server usage.

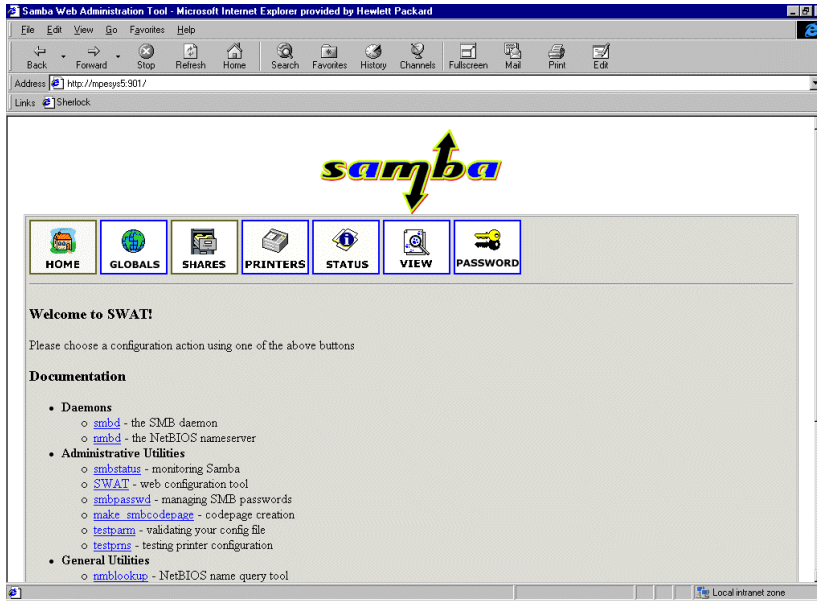
**View** - Gives an abbreviated view of the smb.conf file. A full view is also can also be obtained by clicking on the "Full View" button.

**Password** - A tool for Server and client/server password management.

The name of the binary is SWAT and its location is /SAMBA/SMB20/bin/swat. Before SWAT can be run, entries in the following files need to be updated first: INETDCNF.NET.SYS and SERVICES.NET.SYS.

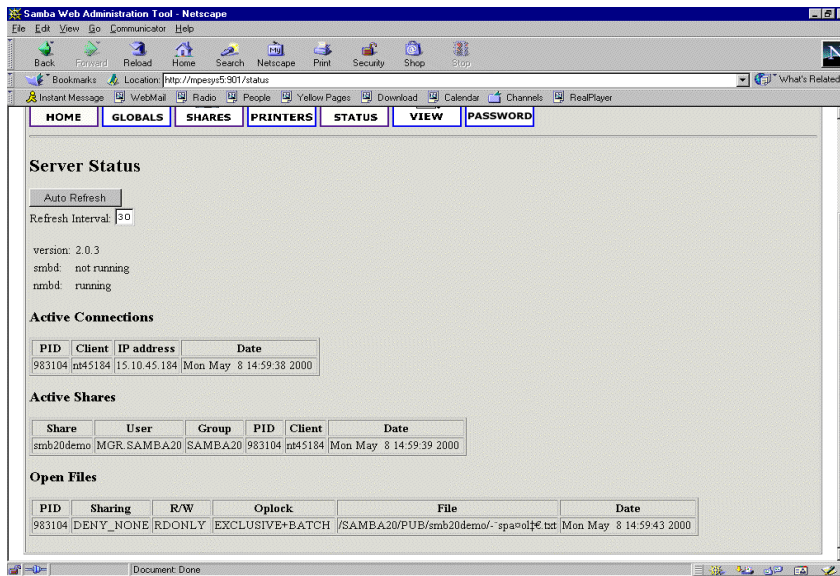
The following screen shot shows the opening screen of SWAT along with the various options that come with it (*see Fig 2*).





*Fig 2: Opening screen of SWAT.*

SWAT can show the active shares that are used and connections that are open along with the files that are open by the client. This information is very useful to the system administrator to monitor the usage of shares and other sharable resources. A screen shot shown below depicts how such information is displayed (*see Fig 3*).



*Fig 3: Server status along with shares and connection information.*

## **4.2 User selectable name resolution order**

The resolution of NetBIOS names into IP addresses can be done in several different ways (broadcast, lmhosts, DNS lookup, WINS). In the *Samba/iX* version 2.0.3, it is a new parameter that allows administrators to select the methods of name resolution, and the order in which such methods are applied.

*Default:* name resolve order = lmhosts host wins bcst

*Example:* name resolve order = lmhosts bcst host

This will cause the local lmhosts file to be examined first, followed by a broadcast attempt, followed by a normal system hostname lookup.

## **4.3 Improved share mode handling**

The handling of share modes has been greatly improved in this new version of *Samba* 2.0.3. The confidence level on share mode handling in *Samba* is now much higher than it was previously.

## **4.4 Western European language support**

*Samba/iX* 2.0.3 supports Western European languages in filenames. This means that Western European versions of NT/95/98 should be able to create and view files with filenames in those languages. Currently codepage 850 and 437 are supported (ISO 8559-1).

### ***What are codepages by the way?***

The meaning of the term "codepage" has evolved over time. Only one definition concerns us now: In Windows 95 and NT, a codepage is a list of selected character codes in a certain order. Codepages are usually defined to support specific languages or groups of languages that share common writing systems. For example, codepage 1253 provides character codes required in the Greek writing system.

The order of the character codes in a codepage allows the system to provide the appropriate character code to an application when a user presses a key on the keyboard. When a new codepage is loaded, different character codes are provided to the application.

In Windows 95, codepages can be changed on-the-fly by the user, without changing the default language system in use. An application can determine which codepages a specific font supports and can then present language options to the user.

## **4.5 New MPE valid characters**

With MPE/iX 6.0 a few extra characters gained legal status and these are duly supported in *Samba/iX* 2.0.3. These characters are:

~, \\, \$, %, ^, \*, +, |, {, }, :

These characters can now be used in the filenames. With *Samba/iX* 2.0.3, mapdiffs utility is also provided. Mapdiffs is discussed next. Also, mpe2dos() and dos2mpe() routines have been enhanced to include these characters and to give support to Western European Languages.

### ***Mapdiffs utility:***

The "mapdiffs" utility is used to check a given list of file or directory names for the name mapping differences between the Samba/iX 0.7c version and new version of Samba 2.0.3.

#### *How to use mapdiffs:*

When you install this new version of Samba/iX, one must check the MPE side file and directory names whether some of them have to be adjusted to the changed mapping methods.

The "mapdiffs" utility (under /SAMBA/PUB/lib) is provided to check a given list of file or directory names for the name mapping differences between the Samba/iX version 0.7c and the new version of Samba/iX 2.0.3. The renaming has to be done by hand.

The "mapdiffs" utility displays mapping test results, but the renaming has to be done by hand.

*Usage:* find <fileset> | mapdiffs <option>

where option 7cPC shows differences between 0.7c and PC side  
7jPC shows differences between 0.7j and PC side  
7c7j shows differences between 0.7c and 0.7j  
7j7c shows differences between 0.7j and 0.7c

The resulting output can be used to judge filename conversion need.

#### *Example:*

```
Shell/iX> find /SAMBA/SHR/public | mapdiffs 7c7j
7c: /SAMBA/SHR/public/New_20_Folder/my_24_file.java
7j: /SAMBA/SHR/public/New_20_Folder/my$file.java
```

*Note:* The file should be renamed before starting the new Samba 2.0.3

## **4.6 How do dos2mpe() and mpe2dos() work?**

MPE's filenames in POSIX are not the same that Windows 95/98/NT can support and hence there is a need to write routines that map those Windows filename characters that cannot be supported on MPE. An important feature of such a mechanism is that the special characters that are not supported are taken and converted to its hex equivalent by first taking its ASCII value and then dividing by 16. To this hex value, an '\_' is appended as a prefix and suffix and this combination of '\_XX\_' replaces the intended character in the MPE filename (XX -> hex equivalent).

## **4.7 The default security mode**

In previous versions of *Samba/iX*, the default security mode was "security = share". In this version, this has been altered to make "security = user" as default. The user needs to note that the config file needs to be adjusted to avoid unexpected changes in behavior.

## **5. Using Samba/iX 2.0.3:**

This section includes information about using *Samba/iX*. It also contains information such as setting up the *Samba/iX* server, installation and making *Samba/iX* ready to use with clients.

The previous version of *Samba/iX* on 6.0 is based on *Samba 1.9.16p9* and the port uses the **LIBBSD** package (libraries and include files) available on Jazz (<http://jazz.external.hp.com>). This is to resolve BSD style routines that are not part of POSIX to successfully compile with HP C/iX (c89 under the Posix shell).

The new version of *Samba/iX* 2.0.3 is now self-configuring using GNU autoconf tool. It removes the needs for people to configure the makefiles manually as was needed in previous versions.

### **5.1 Samba/iX 2.0.3 installation:**

#### **How to install and setup:**

The *Samba/iX* version 2.0.3 is released as a patch on *MPE/iX* 6.0. When you install the patch for *Samba/iX* 2.0.3, the software resides inside the SAMBA account in HFS directories under /SAMBA/SMB20. The previous version of *Samba/iX 1.9.16p9* still exists inside the SAMBA account in HFS directories under /SAMBA/PUB. You can only run one version of *Samba/iX* server at one time. If you choose to run the version of *Samba/iX* 2.0.3, Please use the following steps to start the *Samba/iX* server after you install the patch:

1. Logon as MANAGER.SYS and create a symbolic link to make /SAMBA/SMB20 link to /usr/local/samba  
: PURGELINK /usr/local/samba  
: NEWLINK /usr/local/samba, /SAMBA/SMB20
2. Logon as MGR.SAMBA to examine or adjust configuration files. Modify the entries in the configuration files to suit your *Samba/iX* environment.
3. Check your configuration file(s) with TESTPARM utility
4. Start your SMBD listener and NMBD server
5. Using the jobs supplied as JSMB20.SAMBA.SYS and JNMB20.SAMBA.SYS, you can stream them explicitly.
6. Use SHOWJOB and possibly SHOWPROC to see if the jobs stay alive.

**Note 1:** If you are using INETD to launch SMBD and NMBD then add two new entries to the /etc/services and /etc/inetd.conf (which are symbolic links to SERVICE.NET.SYS and INETDCNF.NET.SYS configuration files). The entries in these file should be as given below.

/etc/services:

```
nmbp 137/udp
smbp 139/tcp
```

/etc/inetd.conf:

```
nmbp dgram udp wait MGR.SAMBA /SYS/SAMBA/NMBD20 nmbd
smbp stream tcp nowait MGR.SAMBA /SYS/SAMBA/SMBD20 smbd
```

Then start INETD by streaming JINETD.NET.SYS or use INETD.NET.SYS -c (if your INETD job was already running).

**Note:** Before starting to use *Samba/iX* server or client components you should have setup the TCP/IP networking on your 3000 as well as your PC properly.

## **5.2 Initial tests and diagnostics of Samba/iX 2.0.3 server:**

Please make sure that you have the shares 'tmp' and 'sambadoc' available on your server. You can use them as sample shares while diagnosing the server. Just look for these entries in the smb.conf to check if they are entered with the right parameters.

- a. Execute **nmblookup -B <CLIENTPC> \*** to see something like 138.26.24.22 \*. This is done to check if the software on the PC is installed properly.
- b. Execute **smbclient** to see if the 3000 can successfully reach itself. Use smbclient for sending a WinPop message to some server say a win95 machine.

**\$smbclient -L <Sambaixserver>** should display a list of available shares (services) that matches your config file(s) and -if NMBD is running- a list of workgroups and related computers that NMBD could find on your network/subnet.

**\$smbclient \\<Sambaixserver>\tmp-N -c dir** should connect to the tmp share on your 3000 (if you did not remove it from the sample config file) using -N to suppress password prompt and effectively become guest user and display the contents of the associated directory (by passing dir command via -c option). Notice the double backslashes that are needed because the backslash character has a special meaning (escape characters) to the Shell.

Also notice the use of the -c option to avoid entering the interactive mode of **SMBCLIENT** as it currently has problems reading from the keyboard while waiting for a socket at the same time (**select()** limitation).

- c. Now it is time to start reaching the HP3000 from a **PC** using **DOS** commands and **Windows**. You have to make sure that your **PC** is able to translate a given node name to the matching IP address.

Try connecting to a network drive (Network Connections item in the Disk menu) by explicitly entering the share name like `\\<Sambaixserver>\sambadoc` by locating the workgroup, computer and share in the browse list of the same window. This will only work if NMBD is running properly.

Now look for the print share names in the available shares on your PC. Try to copy a file to the print share by issuing `C:\> COPY <filename> \\<Sambaixserver>\<printsharename>`. Check for the print related entries in `printcap` and `smb.conf` for their correctness if there is any problem.

The steps for Windows or NT are similar. It is just that the Windows Explorer and/or the Network Neighborhood will be involved.

In case of problems, get hints by looking into the Samba log files `log.smb` and `log.nmb` in the `/usr/local/samba/var` or `/SAMBA/SMB20/var` directory (which are just two different names for the same place). You can have control over the amount of log messages with the "debug level" directive inside the configuration file.

## **6. Roadmap for Samba**

The roadmap for Samba is that it is moving towards tighter integration with Windows especially Windows 2000. The roadmap for Samba is brought forward by `samba.org` regularly and provides insight as to the direction that Samba is headed for the Unix market as such. It sets expectations as to what decision makers could do in the near future to manage heterogeneous environments and cut costs.

The Samba release 2.0.0 is called the "Domain Client Release" and the subsequent releases are expected to have the following functionality:

- 2.0.x - "NT Security update" - Allowing Windows NT Clients to manipulate file security and ownership using native tools.
- 2.0.xx - "Thin Server" mode, allowing a Samba server to be inserted into a network with no UNIX setup required: some management capabilities for Samba using native NT tools, provision of command-line equivalents to native NT tools.
- 2.X - "Domain Controller" - able to serve as a Windows NT PDC.
- X.XX - "Full Domain Integration" - allowing both PDC and BDC modes.

## **7. References**

1. <http://jazz.external.hp.com> - This gives more information about Samba implementation on MPE/iX, contains articles, manuals, source code, binaries and other pointers.
2. <http://www.samba.org> - This is the most authoritative source of information on Samba, contains information for newcomers to Samba along with source and binaries for many flavors of Unix. It also contains technical documentation and pointers on SMB protocol, CIFS and other allied areas.
3. <http://www.sambaix.com> - This is Michael Gueterman's site on Samba/iX is also a good source of information.
4. The book *Samba, Integrating UNIX and Windows* by **John D. Blair** contains 'how to' details of using Samba. It is a recommended reading in Samba community.