Transitioning to Solaris™ PC NetLink 1.0

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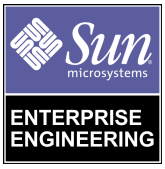

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Transitioning to Solaris™ PC NetLink 1.0

Sun Microsystems™ recently announced Solaris™ PC NetLink 1.0, previously known as the Cascade Project. This product, based on the AT&T Advanced Server for UNIX®, adds functionality that was not previously available on Solaris™ servers using products such as Samba and SunLink PC™ (a.k.a. Syntax TotalNET Advanced Server). Solaris PC NetLink, in addition to offering file and print services, enables Solaris servers to act as Microsoft® Windows NT® Primary Domain Controllers (PDC) or Backup Domain Controllers (BDC). For enterprises with mixed NT and Solaris servers and desktops, Solaris PC NetLink 1.0 offers many new options for utilizing hardware resources and minimizing system administration overhead. A full description of Solaris PC NetLink is beyond the scope of this article. Please see http://www.sun.com/interoperability/netlink/ for more information. In addition to the information available on the Sun website, a BluePrint on the Solaris PC NetLink product is in the process of being written and will be available later this year. Monitor the Sun BluePrint™ webpage (http://www.sun.com/blueprints) to see when it will be available.

In this article, I examine some specific procedures that will help you to evaluate and transition to Solaris PC NetLink 1.0. I assume you are currently using (or are familiar with) other products that enable Windows NT servers to share resources with Solaris servers. There are many reasons to transition to Solaris PC NetLink. Here is a short list of the most compelling reasons:

- True authentication with NT Primary Domain Controller (PDC) or NT Backup Domain Controller (BDC) is provided.
- Support is provided for file and print services, equivalent to NT 4.0 Service Pack 3. This includes support for Access Control Lists (ACLs)
- Support is provided for either UNIX or NT administration models.
- NT administration tools (Server Manager, Event Viewer, User Manager) can be used from other Windows NT machines, or Windows 95/98 machines to administer Solaris PC NetLink.
- Support is available for Windows Internet Name Service (WINS).

Solaris PC NetLink Requirements

Solaris PC NetLink 1.0 is currently supported on Solaris™ (SPARC™ Platform Edition) 2.5.1 and 2.6. Support for Solaris (SPARC Platform Edition) 7 is anticipated in a future release.

The disk space required to install Solaris PC NetLink 1.0 is modest, with 40 Mbytes needed in `/opt` and 15 Mbytes needed in `/var/opt`. In addition to the space necessary to store the Solaris PC NetLink executable, additional space should be allocated for databases Solaris PC NetLink must maintain in `/var/opt`. The largest of these databases usually will be the ACL database found in `/var/opt/lanman/` datafile. A reasonable rule of thumb would be to allocate 100K of disk space for each active user, creating disk files on the Solaris PC NetLink server.

During installation there is no conflict in the file structure when you install Solaris PC NetLink on a Solaris server that is running SunLink PC or Samba. However, before you attempt such an installation, you should disable SunLink PC and Samba since the Solaris PC NetLink installation attempts to start its services and will experience errors if SunLink PC or Samba are running. To disable these services, see TABLE 1 on page 4.

Solaris PC NetLink requires that all clients using its services use the TCP/IP transport protocol. Because all Microsoft operating systems include a TCP/IP stack (which is required to access the Internet), installation of the TCP/IP protocol is rarely considered optional. It is common to see PC clients that use TCP/IP as well as NetBEUI and IPX/SPX protocols.

If you are transitioning from SunLink PC to Solaris PC NetLink, it is possible that only the NetBEUI or IPX/SPX transport protocols are installed on your clients. If this is the case, you need to add the TCP/IP protocol to your particular operating system. On Microsoft Windows 95/98/NT 4.0 machines, this is accomplished with the Network icon in the Control Panel. Please refer to your Operating Systems documentation for complete details. If you are transitioning from a Samba environment, your clients should already have a TCP/IP stack because Samba requires it.

Solaris Services that use NetBIOS over TCP/IP

Solaris PC NetLink supports network protocols by way of NetBIOS running on top of the TCP/IP layer. You should not confuse this with NetBEUI (NetBIOS Extended User Interface) which is a non-routable transport protocol. The NetBIOS layer is based on the RFC1001/RFC1002 NetBIOS protocol and is a standard networking protocol used primarily by PCs. This version of NetBIOS is sometimes referred to as RFCNB, for RFC NetBIOS. It is one layer below the SMB (Server Message Block) protocol used by Windows NT and Solaris PC NetLink networking, and one layer above the TCP/IP transport protocol.

PC clients running Microsoft operating systems also support the NetBEUI and IPX/SPX protocols. These products can co-exist on PC clients with NetBIOS running on top of TCP/IP. However, delays may be introduced since different paths may have to be followed to resolve server names.

On a Solaris server running Solaris PC NetLink, the NetBIOS protocol is implemented in kernel space using the standard STREAMS framework. Unlike SunLink PC and Samba, where the NetBIOS support is implemented within the same user processes that support the SMB protocol, the NetBIOS layer in Solaris PC NetLink is implemented as a multi-threaded kernel driver that is installed via a separate package during the Solaris PC NetLink installation. This driver is loaded and unloaded independently by the `/etc/init.d/netbios` script.

The NetBIOS layer attaches to specific TCP/IP sockets on the system and also responds to specific broadcasts to support NetBIOS naming requests. For this reason, only one NetBIOS layer can be active on a server at any given time. Neither SunLink PC nor Samba can support active NetBIOS functionality while the Solaris PC NetLink server is running.

Since there are potential conflicts on the NetBIOS level, you might think the best or safest way to avoid problems is to fully uninstall (`pkgrm(1M)`) the specific packages, and to install (`pkgadd(1M)`) and configure the new environment. Generally, however, this is not a time efficient approach. If you need to switch back to the previous environment because of unforeseen problems—such as user account conflicts between NIS and the Windows NT domain—you will need to switch back as quickly as possible without loosing valuable configuration information or wasting time in the installation process.

Supporting Solaris PC NetLink and SunLink PC on the Same Server

SunLink PC and Syntax TotalNet enable you to turn off the NetBIOS layer so that you can support Appletalk and other non-NetBIOS related protocols. Simultaneous use of Solaris PC NetLink and these products is possible and has been known to work, but there is a very important caveat. Solaris PC NetLink, SunLink PC, and Samba support protocols for locking and sharing of files and records through privately controlled databases and structures. These structures and databases are not shared between the Solaris PC NetLink and the other environments. This can cause problems if files are shared between these environments.

For example, suppose a user on an Apple system attempts to access a file on a Solaris server running SunLink PC, and another user on a Windows 95 system attempts to access the same file simultaneously by way of Solaris PC NetLink running on the same server or via NFS™ on another server. The file sharing and locking protocols normally available to support the coordination within one

environment will not work across both environments. While this event may be unlikely in most user communities, it is a possibility and can make it impossible to fully support both products on the same server at the same time (given the current architecture of these products). For this reason, Sun does not support these mixed configurations. If you do find it necessary to use SunLink PC (with NetBIOS over TCP/IP turned off) at the same time as Solaris PC NetLink on the same server, and you experience a problem, it is best to disable the side that is not demonstrating a problem and see if the problem disappears. If the problem is solved in this manner, it is likely that the interaction between the two products is causing the problem. On the other hand, if you can duplicate the problem in this context, you have a legitimate issue that Sun can support.

Supporting Solaris PC NetLink and Samba on the Same Server

Samba is a popular GNU-licensed free software product that supports SMB via NetBIOS over TCP/IP. Sun does not officially support Samba. Like Solaris PC NetLink, Samba supports no other transport protocols other than TCP/IP. There is no way for the Solaris PC NetLink 1.0 software and Samba to run on the same system at the same time because they will both attempt to establish a NetBIOS layer for the system. They can however be installed on the same system as long as only one of these products actively supports users at any given time.

Supporting Solaris PC NetLink, SunLink PC, and Samba on the Same Server

If you are in the process of moving files from Samba or SunLink PC to Solaris PC NetLink, it may be necessary to switch back and forth quickly between one environment and another for a variety of reasons. While all three environments can NOT be running and supporting NetBIOS over TCP/IP at the same time, they can be installed on the same server. Commands can be used to disable and enable the desired products while Solaris software is running.

The following table shows the commands to individually turn on and off each of the products without rebooting, uninstalling, or reinstalling software. Note that you should never switch between these environments on a production system serving real users. This information is provided to help you solve problems while you develop procedures to transition from the older environments to Solaris PC NetLink.

TABLE 1 Disabling and Enabling Solaris PC NetLink, SunLink PC, and Samba

Environment	To turn the environment off	To turn the environment on
	su	su
Solaris PC NetLink	/opt/lanman/bin/net stop server /etc/init.d/netbios stop	/etc/init.d/netbios start /opt/lanman/bin/net start server

SunLink PC or Syntax Totalnet 5.1, 5.2, 5.3	su /opt/totalnet/sbin/tnshut	su /opt/totalnet/sbin/tnstart
Samba	su /usr/local/samba/bin/killsamba (see script below)	su /usr/local/samba/bin/smbd -D /usr/local/samba/bin/nmbd -D

The `killsamba` script is shown below:

```
#!/bin/sh -x
list=`ps -ef | grep smbd | grep -v grep | nawk '{print $2}'`
kill $list
list=`ps -ef | grep nmbd | grep -v grep | nawk '{print $2}'`
kill $list
```

Startup Scripts

Solaris PC NetLink, SunLink PC, and Samba may attempt to add scripts to the `/etc/init.d` directory when they are installed. These scripts initialize and start the particular product at system boot time. Only one of these scripts should remain in `/etc/init.d` to assure that only one NetBIOS environment starts at boot time.

For Samba, the script is typically called `/etc/init.d/samba`. For SunLink PC, the script is `/etc/init.d/TAS`. For Solaris PC NetLink, the script to start the NetBIOS interface is `/etc/init.d/netbios`, and the script to start the Solaris PC NetLink server is `/etc/init.d/ms_srv`.

Determining which SMB Service is Running on a Server

When you attempt to diagnose a problem on an SMB server, it may be difficult to determine what server you need to work with and what software is supporting the SMB protocol. Usually, you can determine the server by using the Network Neighborhood icon on the Windows 95/98/NT desktop. In the Network Neighborhood window, select the File menu and choose Properties. The Comment field usually indicates the system type. If Solaris PC NetLink is running, “PC NetLink” appears at the beginning of the Comment field. If Samba is running, the Samba version is displayed, and so forth.

If you are logged onto the server, the best way to determine which environment is running is to use the `ps(1M)` command. For Solaris PC NetLink, look for any process that starts with `lmx`. For Samba, look for `smbd` processes. For Solaris PC NetLink, look for `totalnet`*xxx* processes. For example to see if Solaris PC NetLink is running, use this command:

```
# ps -ef | grep lmx
```

I hope the information provided here helps you to evaluate and transition to Solaris PC NetLink as quickly as possible.

Additional Resources

For more detailed information on Solaris PC NetLink, please refer to the "Solaris™ PC NetLink: Performance, Scalability and Deployment" BluePrint. This book is scheduled for publication by Prentice Hall in the fall of 1999 and will be available through `http://www.sun.com/books`, amazon.com, fatbrain.com or Barnes & Noble bookstores.

For information about NetBIOS running on top of TCP/IP, see `http://www.cis.ohio-state.edu/htbin/rfc/rfc1001.html` and `http://www.cis.ohio-state.edu/htbin/rfc/rfc1002.html`.

The Samba Web site provides a wealth of information on Samba and many PC interoperability issues. See `http://www.samba.org`.

For information about Syntax TotalNet, see `http://www.syntax.com`.

Author's Bio: Don DeVitt

Don has been on the development teams of almost every software and hardware PC interoperability product Sun Microsystems has produced over the last 13 years. Don is currently a PC Interoperability specialist within the Enterprise Engineering group and is a member of the Solaris PC NetLink engineering team where he has focused on performance related issues. Don DeVitt started his career as an electrical engineer and has worked in the Automated Test industry (Teradyne Inc.), and PC operating system market (Digital Research from CP/M fame) before coming to Sun.