

Using NDIS Drivers on VINES Workstations

LAN Services Tutorial #8

Background

In order for VINES software to communicate with the network through a network interface card, the VINES workstation must have the appropriate network card *driver* installed and configured. *Native VINES drivers* are tailored to the VINES communication environment for a specific type of network interface card. For example, 3C503BAN.COM is the native VINES driver for the EtherLink II. But if VINES has no native driver for your network interface card, or if you want to run VINES and another protocol through the same card, you'll need to use the network driver interface standard (NDIS) driver.

Using NDIS involves configuring several distinct components; this overview includes step-by-step instructions for installing NDIS Ethernet drivers on a DOS workstation.

NDIS is a standard specification supported by many network card and network operating system vendors. It provides a generic intermediary through which high-level protocols, such as VINES, can communicate with the specific low-level protocols of various network interface cards. You'll need to use the NDIS drivers if you want to:

- Use a network card that doesn't have a VINES native driver; for example, the 3C507 (under VINES 5.00) or the Xircom portable Ethernet adapter;
- Run version 2.0 of the OS/2 operating system on a VINES client workstation (for Lotus Notes or SQL Server, for example). VINES only supports NDIS drivers for OS/2 2.0, that is, there are no native VINES drivers currently for OS/2 2.0.

Another reason for interest in NDIS is that Banyan won't be developing native VINES drivers in future releases of VINES: Banyan will work with network card vendors to certify their products for use with Banyan's NDIS drivers, but won't spend time coding drivers on a card-by-card basis.

Improvements to VINES NDIS

Banyan first included NDIS support with VINES 4.00(6). At that time, only DOS clients were supported; client support for OS/2 1.0 was added with VINES 4.10. With VINES 5.5 (and VINES 4.11(6) when patched with the 4.11-5-FW-1 patch), Banyan changes its NDIS implementation slightly and adds a second NDIS Ethernet driver -- an NDIS Ethernet socket/datalink interface -- that allows VINES workstations to use PC/TCP's EBANYAN kernel with NDIS drivers.

The changes to the basic NDIS Ethernet driver affect the manner in which the drivers are loaded with the BAN command; differences between 4.11 and 5.0 NDIS and 5.5 and patched-4.11 NDIS are pointed out in the steps below as needed. Versions of the VINES NDIS drivers are available for token-ring and Ethernet; in VINES 5.5, NDIS support for ARCNET is also available, although this is of limited interest to PG&E.

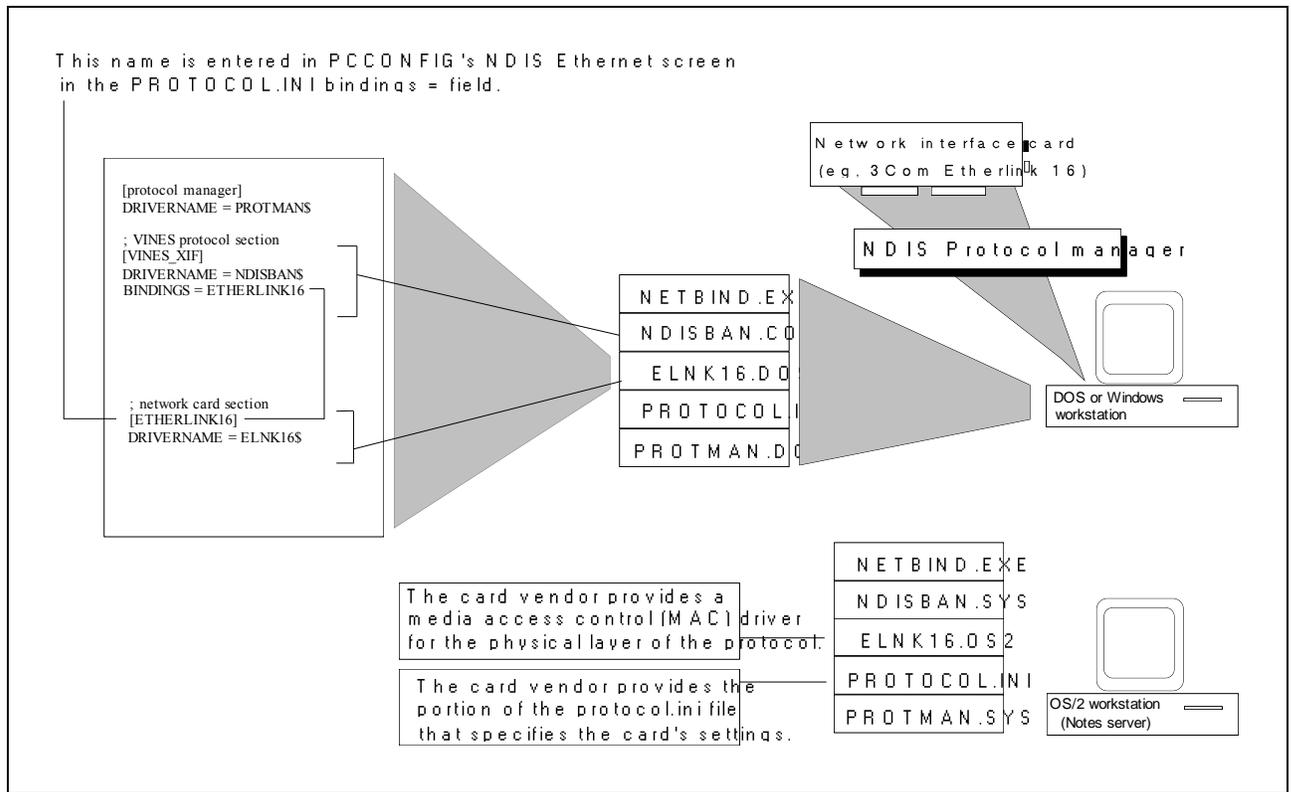
If you are already using NDIS and have applied patch 4.11-FW-1 to a VINES 4.11(6) server, you can upgrade to the new NDIS Ethernet by NewRevving the workstation and copying the NDISBAN.COM or NDDGBAN.COM file from the z:\pcinit subdirectory. Since part of the NDIS functionality in these versions has been split into its separate components, you'll also have

to modify your autoexec.bat file to manually bind the protocols. See "Using NDIS" for sample autoexec.bat files.

How NDIS Works

The key components of the NDIS scheme are the Protocol Manager; the VINES NDIS driver; and the network interface card NDIS driver. The protocol manager functions between the media access control (MAC) sublayer and the link level control (LLC) sublayer of the second layer of the OSI seven-layer stack, the data-link layer. (The data-link layer, which controls access to the physical medium; is composed of two sublayers: the MAC sublayer deals with the connection to the physical medium, while the LLC sublayer controls logical connections over the medium.)

The VINES NDIS driver adheres to the Microsoft NDIS specification revision 2.0 and revision 1.0 of the Protocol Manager; the network card vendor's NDIS driver must conform to these revision levels.



Banyan-provided software components include:

- | | | |
|------------------|-------------------|--|
| DOS workstations | OS/2 workstations | |
| NDISBAN.COM | NDISBAN.SYS | The VINES NDIS driver for Ethernet. |
| NDISBAN.OVL | | Used by the VINES NDIS driver. |
| NETBIND.EXE | | Starts the NDIS interface and binds the high-level protocols to the low-level protocols. |
| ARSWAIT.EXE | | Waits for VINES address resolution after NETBIND executes. |
| PROTMAN.DOS | PROTMAN.OS2 | Protocol manager software licensed from Microsoft Corporation (the OS/2 version comes from IBM). |

The network card vendor provides:

DOS workstations

OS/2 workstations

ELINK16.DOS

ELINK16.SYS

The network card vendor's NDIS driver. Drivers for DOS workstations usually have an extension of .DOS; drivers for OS/2 usually have an extension of .SYS. The examples are for the EtherLink16 (3Com507).

PROTOCOL.INI

PROTOCOL.INI

Contains configuration information used by the Protocol Manager. The network card vendor's installation disk should contain at least the network card portion of this file with settings for resources, such as interrupt level, if these settings are needed in the PROTOCOL.INI file.

- The Protocol Manager loads and reads the contents of the PROTOCOL.INI into memory.
- The network card's NDIS driver loads, registers with the Protocol Manager, and obtains its configuration information from the Protocol Manager.
- The VINES NDIS driver loads, registers with the Protocol Manager, and obtains its configuration information.
- The Protocol Manager is instructed to bind the VINES and the network card drivers together.

Installing NDIS Drivers on a DOS Workstation

To install and configure NDIS drivers, you'll need to download the VINES NDIS driver and related files using PCCOPY; copy the files to the workstation; and configure the card's resources in PCCONFIG. In addition, you may need to edit the PROTOCOL.INI. Finally, you'll need to modify the workstation's autoexec.bat file to load the NDIS driver.

The PROTOCOL.INI and network card NDIS driver files can be found on a configuration diskette from the network card vendor; all other NDIS-related files are from Banyan. (Be sure to use the PROTMAN.DOS downloaded by PCCOPY and not any other version). The network card vendor's files may be buried deep in subdirectories on the network card installation diskette; for example, the PROTOCOL.INI and NDIS driver for the 3Com509 were found in the following subdirectory:

```
A:\MSLANMAN.DOS\DRIVERS\ETHERNET\ELNK3>
```

1. Configure the network card's resources as instructed by the network card vendor; install the card in the workstation; and test the card's functionality using the vendor's diagnostic utility.
2. From an existing workstation on the VINES LAN, run PCCOPY. The PCCOPY --Network Diskette Builder menu displays.
3. Select Copy PC Configuration Software and/or LAN Driver and press <Enter>.

4. Select PCCONFIG (PC Configuration) and press <Enter>, and then page down through the alphabetized list of VINES native drivers until you find the NDIS Ethernet.
 - Select NDIS Ethernet if you want to use the standard NDIS Ethernet driver; for example, to use with a network card that doesn't have a VINES native driver.
 - Select NDIS Ethernet with Socket/Datalink Interface if you want to use both VINES and PC/TCP with a network card that doesn't have a VINES native driver. (This selection is only available with the 4.11-FW-1 patch, or under VINES 5.5.)
5. Press <Enter> at your selection, then press <F10>. You'll then be prompted to select a redirector.
6. Select the appropriate redirector and press <F10> again. The PCCONFIG utility, the VINES NDIS-related files, and the redirector will be copied to the diskette. Take this diskette to the workstation that you want to configure with NDIS drivers.

At the NDIS-to-be workstation:

7. Create a subdirectory for Banyan software if one doesn't already exist in the root directory of the disk:


```
\BANYAN
```
8. Copy all the files from the diskette to the workstation's Banyan subdirectory.
9. Copy the vendor's PROTOCOL.INI file and NDIS driver to the workstation's Banyan subdirectory.
10. Open the CONFIG.SYS file using a text editor and add the following two lines to load the Protocol Manager and the VINES NDIS driver in the upper memory area. (If you aren't using DOS 5's emm386.exe or another memory manager, use DEVICE = statements instead.)

```
DEVICEHIGH=BANYAN\PROTMAN.DOS /i:c:\banyan
DEVICEHIGH=BANYAN\<NDIS driver filename.ext>
```

The /i: switch points the Protocol Manager to the location of the PROTOCOL.INI; if the directory isn't specified, the Protocol Manager searches for the PROTOCOL.INI in a subdirectory named \LANMAN. Be sure to use the /i: switch and specify the name of the subdirectory where the PROTOCOL.INI is located, or create a \LANMAN subdirectory and move the PROTOCOL.INI file there.

11. Using a text editor, open the PROTOCOL.INI file that came with your network card. This file is a fragment of a complete PROTOCOL.INI file, usually containing just the settings for the network card. As an example, here's the PROTOCOL.INI that shipped with the 3Com EtherLink 16:

```
; PROTOCOL.INI section for 3Com EtherLink16 and EtherLink16 TP Adapter Cards
DRIVERNAME = ELNK16$
```

Add a section name above the network card section. Names must be sixteen characters or less, and can contain any character but a "." (The name itself isn't important, but this

name will also be entered in PCCONFIG's network card setting screen and in the case of VINES 5.5 or FW-patched VINES 4.11, in the BINDINGS = field of the VINES protocol section -- and the name must match exactly in all three places.) For example, you can call the network card section "Etherlink16," as shown here:

```
; PROTOCOL.INI section for 3Com EtherLink16 and EtherLink16 TP Adapter Cards
[ETHERLINK16]
DRIVERNAME = ELNK16$
```

Some network cards may also require that you add lines for the card's resources, such as the interrupt and I/O address, to the PROTOCOL.INI. Be sure to check the specific card's documentation and add only the lines required by the network card. Also be sure that any settings made in the PROTOCOL.INI match the settings made on the network interface card, either in software or hardware. See the end of this tutorial for sample PROTOCOL.INI files for the 3Com503, 3Com507, and 3Com509.

12. Run PCCONFIG and select 1. Network Card Settings. Page down through the alphabetized list of VINES native drivers until you find the NDIS Ethernet driver you want:

- NDIS Ethernet
- NDIS Ethernet with Socket/Datalink Interface

13. Press <Enter> to display the NDIS Ethernet configuration screen.

```

                                     +-----+
                                     | Network Card Settings |
+-----+-----+-----+-----+-----+-----+
                                     | NDIS Ethernet |
+-----+-----+-----+-----+-----+
|
| Specify new parameters for the controller by changing the
| current values which are displayed below. Note, be sure to
| change the corresponding jumper settings on the controller.
|
| Interrupt Level (2 - 15) :      3
| PROTOCOL.INI bindings =      ETHERLINK16
|
|
| Press F10 when done; ESC to exit this screen and
| retain the original values.
|
+-----+-----+-----+-----+-----+

```

- Enter the network card's interrupt level as configured in the first step.
- Enter the name of the network card section from PROTOCOL.INI into the "BINDINGS =" field. (Don't enter extra spaces at the end of the name because they'll be read as part of the name.) Note that the name to enter is the PROTOCOL.INI's network card section name, not the name of the driver file itself.

Press <F10> to save the settings and return to PCCONFIG's main menu.

14. Select 2. Login Environment Settings, then select 1. Select Default Communications Driver. Select the name of the NDIS Ethernet driver selected above.

14. Reboot the workstation.

Sample PROTOCOL.INIs

Every NDIS card driver is different; some may require settings in the PROTOCOL.INI file, others may not. Be sure to read whatever NDIS documentation from the card vendor that you find on disk or in the packaging. Note that the EtherLink16 has no resources configured in the PROTOCOL.INI; when resource settings were in the file, errors were generated during the load process. On the other hand, the 3Com EtherLink II needs to have the driver name, interrupt value, and I/O address configured.

The complete PROTOCOL.INI file contains two other sections, one for the Protocol Manager, one for the VINES NDIS software. The Protocol Manager section in all cases is not needed. The VINES protocol section is needed by VINES 5.5, but not needed under VINES 5.0.

If you run into problems, try commenting out specific lines in the protocol.ini file using the semi-colon at the beginning of the line -- or call LAN Services for assistance. You may be better off trying the card first with the pared-down PROTOCOL.INI from the network card vendor, without any additional settings. Below are three PROTOCOL.INI sample files that we've tried in LAN Services EISA machines.

EtherLink III (3C509)

```
[VINES_XIF]
DRIVERNAME = NDISBAN$
BINDINGS = ELNK3
```

```
[ELNK3]
IOADDRESS = 0x300
DRIVERNAME = ELNK3$
MAXTRANSMITS = 6
```

EtherLink 16 (3C507)

```
[VINES_XIF]
DRIVERNAME = NDISBAN$
BINDINGS = ETHERLINK16
```

```
[ETHERLINK16]
DRIVERNAME = ELNK16$
```

EtherLink II (3C503)

```
[ETHERLINKII]
DRIVERNAME = ELNKII$
INTERRUPT = 5
IOADDRESS = 0X300
TRANSCEIVER = EXTERNAL [or ONBOARD]
```

Using NDIS

The NDIS driver components are compatible with 80386 memory managers, so they be loaded in the high memory area. To do so, execute BAN with the /NC parameter and then manually execute the files that BAN would normally run. Place the following commands at the end of the workstation's autoexec.bat file to load the VINES NDIS driver and redirector into the high memory area and execute the remaining commands needed for NDIS support.

VINES 4.11(6) with FW-1 patch, VINES 5.5 VINES 4.x and 5.0

```
ban /nc
ndisban [or nddgban.com]
```

```
ban /nc
ndisban [or nddgban.com]
```

```
lh redir4
netbind.exe
arswait.exe
z:
login
```

```
lh redir4
z:
login
```

See the LAN Cookbook and the Windows Cookbook for additional information about memory management and Banyan VINES.