

APPLICATION NOTE

Using StarDot's NetCam Digital Camera with DGR-115 Freewave Radios and our NL100



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This application note discusses using Campbell Scientific's NL100 and Freewave radios to retrieve images from StarDot's NetCam camera. It provides configuration information for the NL100, Freewave radios, and NetCam camera and describes creating a Windows 2000 dial-up RAS connection to start the image viewer. To complete this application, you may need to obtain the assistance of local computer experts.

Overview

This application, referred to as an NTCIP interface, was developed for Department of Transportation for various states. This NTCIP interface uses an NL100 with special firmware to provide a PPP (point-to-point protocol) connection on its RS-232 port. The NetCam is connected to the NL100's Ethernet 10BaseT connector which receives the HTTP requests.

The initial setup requires the following steps. Procedures for configuring individual devices and setting up the software are provided in later sections.

1. Load special firmware into the NL100 (SERSVR2.OS, 03/05/02).
2. Configure the NL100 (p. 2).
3. Install the NetCam support software on your computer in default folders, or keep track of where you installed them.
4. Configure NetCam Camera (p. 3).
5. Configure Freewave radio (p. 4).
6. Install the Freewave modem driver INF file on your computer (p. 7).
7. Create a networking Dial-Up RAS connection on your computer that dials through the Freewave radios (p. 11).
8. Connect the Freewave radios to the PC serial port and RS-232 connector on the NL100.
9. Attach the camera to the 10BaseT connector.
10. Power up the system. Power up the NL100 last, so it can send the auto-answer string to the Freewave.
11. Run the NetCam support software on your computer (p. 16).



Part of this application note configures the NL100 to allow images captured conditionally from the NetCam to be stored in and retrieved from a table-based datalogger. This feature has not yet been fully developed with Freewave radios.

NL100 Configuration



Before following this procedure, you need to load the new NL100 firmware (SERSVR2.OS, 3/5/2002). DOWNOS.BAT is a batch file that minimizes the number of keystrokes required to send new firmware to the NL100.

1. Telnet to the NL100 or directly connect to the NL100 by a Serial port.
2. After "Password:" type your NL100 Password; default is "nl100".
3. After "NL100/105 (ver, show, edit, defaults, reset, help, bye):", type "edit".
4. After "TLink config (TcpSer, 232-Bridge, RS232, disabled) []:", type "RS232".
5. At "RS485 config (PakBus, TcpSer, PakSer, disabled) []:", type "disabled".
6. At "CS I/O Config (PakBus, TcpSer, PakSer, disabled) []:", type "PakBus".
7. At "CS I/O SdcAddr/bps (SDC7, SDC8, 38k, 19k, 9600, 1200, 300)", type "SDC7".
8. At "CS I/O route broadcast interval (sec) (0..65000) [60]:", type "60".
9. At "RS232 config (PPP, SLIP, PMPP, PakBus, TcpSer, PakSer, ConfMon, disabled) []:", type "PPP".
10. At "RS232 bps (115k, 38k, 19k, 9600, 4800, 2400, 1200, 300) []:", type "38k".
11. At "EtherNet 10BASE-T (enabled, disabled) [enabled]:", type "enabled".
12. At "10BASE-T port IP address [0.0.0.0]:", type "192.168.20.41". (This entry is an example only. It'll vary for each application based on address assignments in the local area network.)
13. At "10BASE-T port network mask []:", type "255.255.255.0". (This entry is an example only. It will vary for each application based on address assignments in the local area network.)

14. At "Is there a default gateway (yes, no) [no]:", type "no".
15. At "PakBus node Id (1..4094) [678]:", type "678".
16. At "Clock neighbor node Id (0..4094) [0]:", type "0".
17. At "PakTcp server config (enabled, disabled) []:", type "enabled".
18. At "PakTcp server port number (3000..65000) []:", type "4001".
19. At "PakTcp client config (enabled, disabled) []:", type "disabled".
20. At "Configuration monitor telnet port (0..65000) [23]:", type "23".
21. At "Telnet session password [n1100]:", type (and remember) your password.
22. At "Serial server watchdog (minutes) (1..65000) [2]:", type "2".
23. At "Power Saving Mode (enabled, disabled) []:", type "disabled".
24. At "SNMP Version 2 (enabled, disabled) []:", type "enabled".
25. At "NTCIP Logger Address (1..50) [10]:", type "10" (PakBus ID for your Datalogger).
26. At "PMPP PC Address (1..50) [50]:", type "50".
27. At "RS232 port IP address []:", type "192.168.18.150". (This entry is an example only. It'll vary for each application depending on address assignments in the local area network.)
28. At "RS232 port, network mask []:", type "255.255.248.0". (This entry is an example only. It will vary for each application depending on address assignments in the local area network.)
29. At "PPP Password (Max. 8 characters) [ntcip]:", type your password for PPP. For the time being, username "test" is hard-coded into the NL100 OS.
30. At "Settings were changed (save, cancel):", type "save".

StarDot NetCam Configuration

This procedure requires the NetCam support software to be installed on your computer.

1. Connect your PC's Serial Port to S1(AUX) of your energized NetCam.
2. Execute "C:/Program Files/StarDot/NetCam/nc-tools.exe".
3. Press "Setup Wizard".
4. Select "Serial Port", Press "Next".
5. Select "Auto" for COM port, Press "Next".
6. After NetCam finds your COM port, press "Next".

7. After NetCam reads your current setting, press "Next".
8. Press "Next".
9. For your primary connection, select "Network", and press "Next".
10. Set your IP address by selecting "Static IP Address" and pressing "Next".
11. Set "192.168.20.50" as your NetCam IP Address. (This entry is an example only. It will vary for each application depending on address assignments in the local area network.)
12. Set "255.255.255.0" as your network SubMask. (This entry is an example only. It will vary for each application depending on address assignments in the local area network.)
13. Set "192.168.20.41" (the NL100's IP address) as your Gateway.
14. Press "Next".
15. Set Domain name server the same as your PC's settings.
16. Set HTTP Port as "80".
17. Press "Next".
18. Choose the method of transmitting your image. Choose HTTP. If you want to select "FTP", you need to have an FTP server running on your PC.
19. Press "Next".
20. Press "Next" to save all your configurations.

Now you can connect your StarDot NetCam to NL100.

Before viewing pictures, go into "DOS" and execute the command "arp-s 192.168.20.50 0030-F4-00-10-AB". "192.168.20.50" is the NetCam IP Address.

This command may be placed in a batch file that also calls the NetCam tools software NC_TOOLS.EXE. This is mentioned in Running NetCam Support Software section.

Freewave Radio Configuration

Use Hyperterminal or other terminal software set to 19.2 kbps. Configure Freewave radios in Mode 6, at 38.4 kbps, with cross-entries in call books, as shown:

Configuration for base Freewave S/N 900-5051:

MAIN MENU

Version 5.57 04-07-99

Standard Hop Table

Modem Serial Number 900-2546

- (0) Set Operation Mode
- (1) Set Baud Rate
- (2) Edit Call Book
- (3) Edit Radio Transmission Characteristics
- (4) Show Radio Statistics
- (5) Edit MultiPoint Parameters
- (6) TDMA Menu
- (Esc) Exit Setup

SET MODEM MODE

Modem Mode is 6

- (0) Point to Point Master
- (1) Point to Point Slave
- (2) Point to MultiPoint Master
- (3) Point to MultiPoint Slave
- (4) Point to Point Slave/Repeater
- (5) Point to Point Repeater
- (6) Point to Point Slave/Master Switchable) ← Select
- (7) Point to MultiPoint Repeater
- (Esc) Exit to Main Menu

SET BAUD RATE

Modem Baud is 038400

- (1) 115,200
 - (2) 76,800
 - (3) 57,600
 - (4) 38,400) ← Select
 - (5) 19,200
 - (6) 9,600
 - (7) 4,800
 - (8) 2,400
 - (9) 1,200
 - (A) Data, Parity 0
 - (B) MODBus RTU 0
 - (Esc) Exit to Main Menu
- Enter Choice

MODEM CALL BOOK

Entry to Call is 00

Entry	Number	Repeater1	Repeater2
(0)	901-3950)	← Enter	
(1)	000-0000		
(2)	000-0000		
(3)	000-0000		
(4)	000-0000		
(5)	000-0000		
(6)	000-0000		
(7)	000-0000		
(8)	000-0000		
(9)	000-0000		
(C)	Change Entry to Use (0-9) or A (ALL)		
(Esc)	Exit to Main Menu		

Enter all zeros (000-0000) as your last number in list



The default settings are used for the remaining menus and are only shown for completeness. Do not change the following parameters without reading the manual first.

RADIO PARAMETERS

- (0) FreqKey 5
- (1) Max Packet Size 8
- (2) Min Packet Size 9
- (3) Xmit Rate 1
- (4) RF Data Rate 3
- (5) RF Xmit Power 1
- (6) Slave Security 0
- (7) RTS to CTS 0
- (8) Retry Time Out 255
- (9) Lowpower Mode 4
- (Esc) Exit to Main Menu

MULTIPOINT PARAMETERS

- (0) Number Repeaters 1
- (1) Master Packet Repeat 3
- (2) Max Slave Retry 3
- (3) Retry Odds 3
- (4) DTR Connect 0
- (5) Repeater Frequency 0
- (6) NetWork ID 111
- (7) Reserved
- (8) MultiMasterSync 0
- (9) 1 PPS Enable/Delay 255
- (A) Slave/Repeater 1
- (Esc) Exit to Main Menu



The remote Freewave S/N 901-3950 is set up exactly the same, except its call-book, entry 0, is set to match the serial number of the base.

Installing FreeWave Modem INF File

MDMINT.INF Program

This is the INF file provided by FreeWave that is used to install the modem driver. Changes need to be made to the original file, which are shown in **bold underscore**.

```
; This INF file is for Freewave/Intuicom Wireless Data  
; Transceivers - Modem Driver
```

```
[Version]  
LayoutFile=layout.inf, layout1.inf  
Signature="$CHICAGO$"  
Class=Modem  
ClassGUID={4D36E96D-E325-11CE-BFC1-08002BE10318}  
Provider=%IT%  
DriverVer=03/03/2001,1.0.0.0
```

```
[ControlFlags]
```

```
[Manufacturer]  
%Intuicom% = Intuicom
```

```
[Intuicom]  
%DGR115% = DGR115
```

```
[DGR115]  
Addreg=All, GenericAddReg, DGR115Reg, EXTERNAL
```

```
[DGR115Reg]  
HKR,, Properties, 1, 80,01,00,00, 00,00,00,00, 00,00,00,00, 00,00,00,00,  
00,00,00,00, 10,01,00,00, 00,C2,01,00, 40,83,00,00
```

```
[All]  
HKR,,FriendlyDriver,,Unimodem.vxd  
HKR,,DevLoader,,*VCOMM  
HKR,,ConfigDialog,,modemui.dll  
HKR,,PortSubClass,1,02  
HKR,,EnumPropPages,, "modemui.dll,EnumPropPages"
```

```
[EXTERNAL]  
HKR,, DeviceType, 1, 01
```

[Strings]

IT = "Intuicom"

Intuicom = "Intuicom"

DGR115 = "Freewave Wireless Data Transceiver"

[GenericAddReg]

HKR, Init, 1,, "AT<cr><lf><cr><lf>"

HKR, Init, 2,, "AT<cr><lf><cr><lf>"

HKR, Monitor, 1,, ""

HKR, Monitor, 2,, ""

HKR,, Reset,, ""

HKR, Answer, 1,, ""

HKR, Hangup, 1,, ""

HKR, Settings, Prefix,, "AT"

HKR, Settings, Terminator,, "<cr><lf>"

HKR, Settings, DialPrefix,, "DT"

HKR, Settings, Pulse,, ""

HKR, Settings, Tone,, ""

HKR, Responses, "<cr>", 1, 01, 00, 00,00,00,00, 00,00,00,00

HKR, Responses, "<lf>", 1, 01, 00, 00,00,00,00, 00,00,00,00

HKR, Responses, "<cr><lf>OK<cr><lf>", 1, 02, 00, 00,00,00,00, 00,00,00,00

HKR, Responses, "<cr><lf>OK<cr><lf>CONNECT<cr><lf>", 1, 02, 00, 00,00,00,00, 00,00,00,00

HKR, Responses, "OK", 1, 02, 00, 00,00,00,00, 00,00,00,00

HKR, Responses, "OK<cr><lf>CONNECT", 1, 02, 00,

00,00,00,00, 00,00,00,00

Setting up the PC

This example installs the Freewave modem driver into Windows 2000 Professional.

1. Go to control panel.
2. Select Phone and Modem Options, and click on add new modem.
3. Check the box that says "Don't detect my modem; I will select it from a list" then click on "Next" (Figure 1).

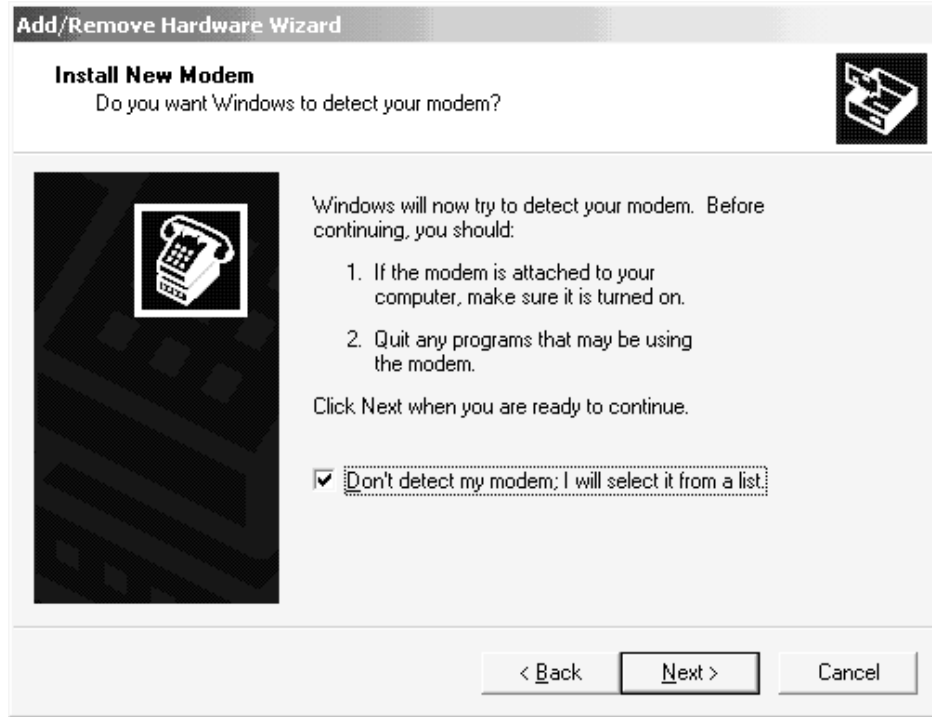


Figure 1

4. Select "Have disk" instead of selecting a modem from the list Windows generates, then click "Next" (Figure 2).

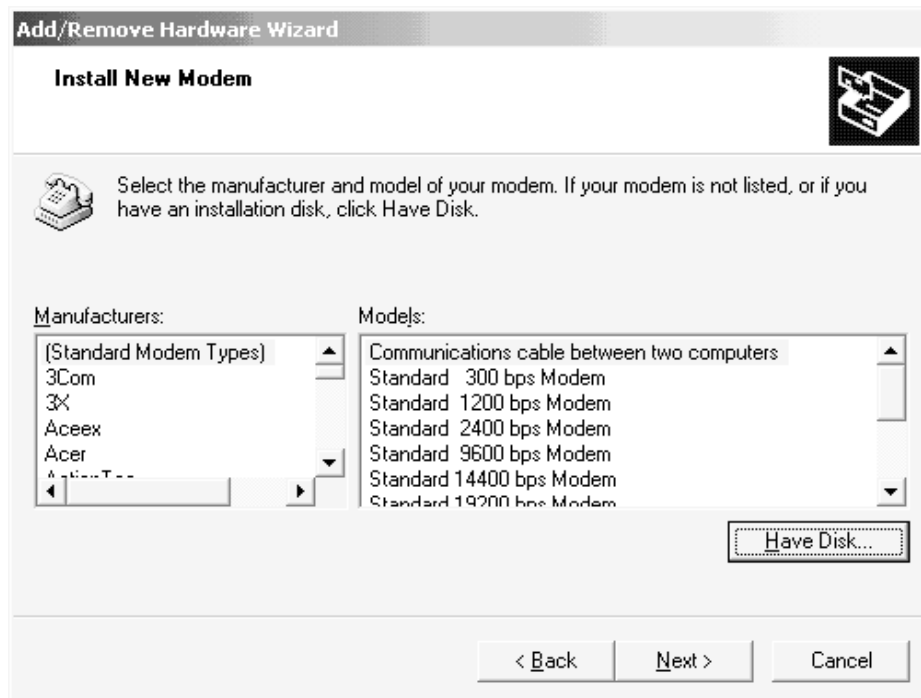


Figure 2

5. Browse to the folder containing the file named MDMINT.INF, provided with the FreeWave firmware, and select it (Figures 3 and 4).

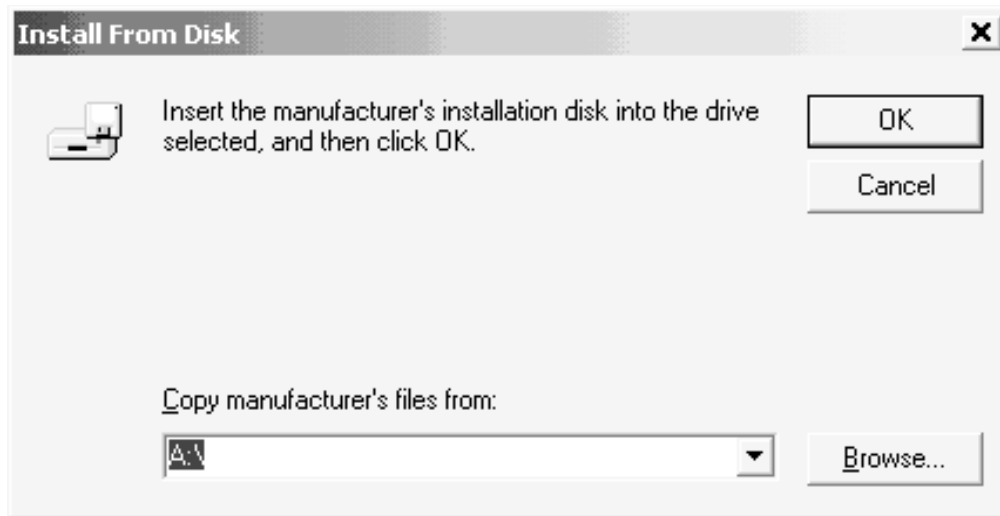


Figure 3

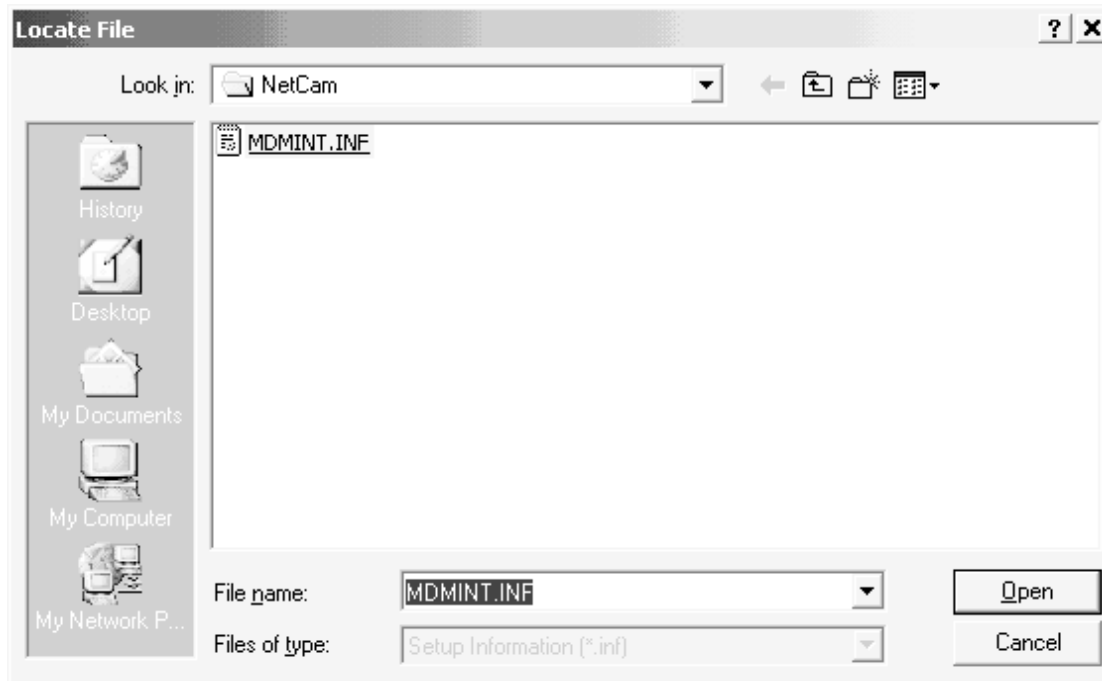


Figure 4

6. Click on "Open."

7. Select the COM port to which the Freewave transceiver will be attached. COM1 is selected in Figure 5.

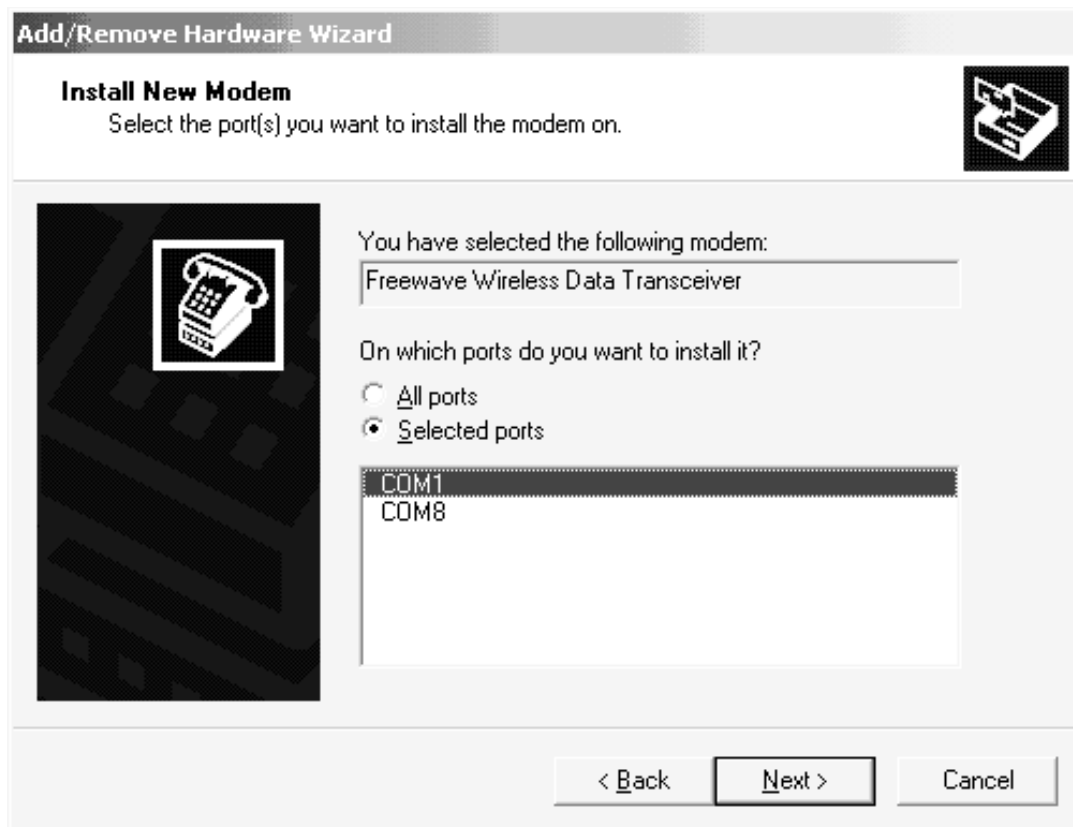


Figure 5

8. Go back to Phone and Modem Options, and right-click on the new Freewave modem entry.
9. Select "Properties" on the drop-down menu.

10. Select a port speed of 38400 and click on "OK" (Figure 6).

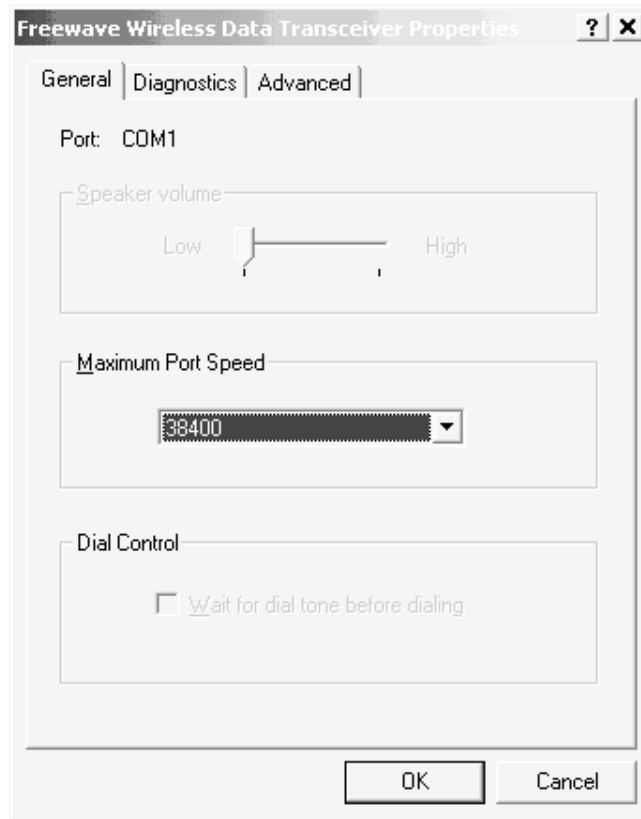


Figure 6

Creating an RAS Dial-up Connection on Windows 2000 Professional

1. Under the Start menu, click on Settings.
2. Go to Network and Dial-up Connections.
3. Click on "Make New Connection".
4. Click on "Next" when the wizard starts.

5. Select "Dial-up to private network" then "Next" (Figure 7).

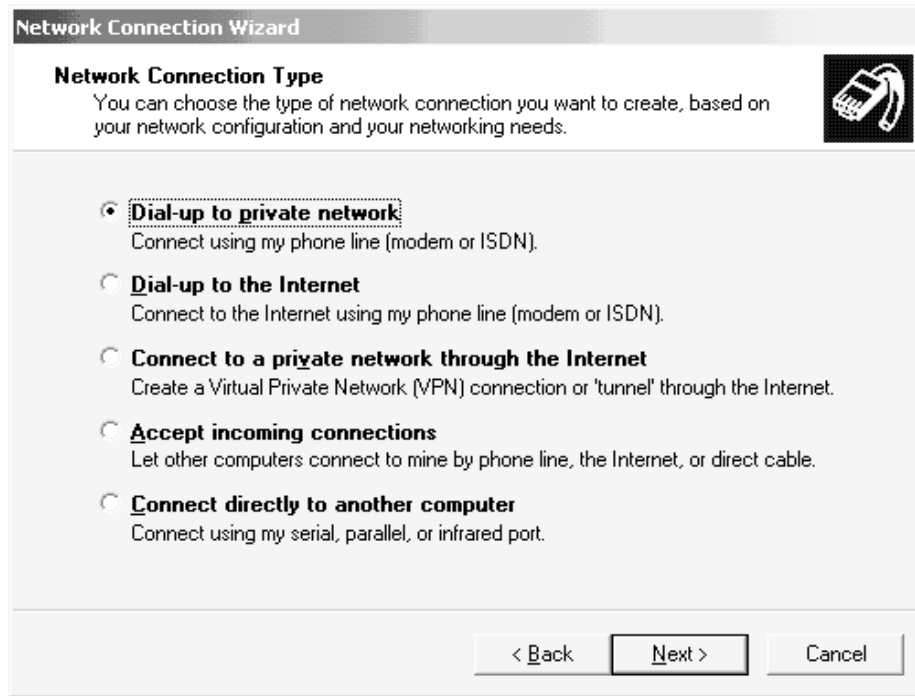


Figure 7

6. Select the Freewave device then "Next" (Figure 8).

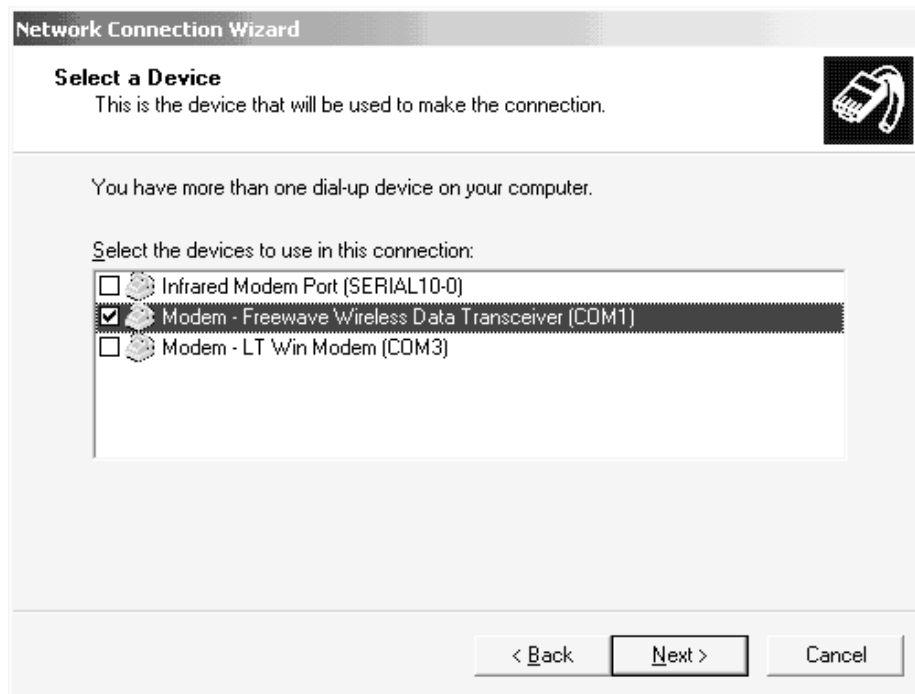
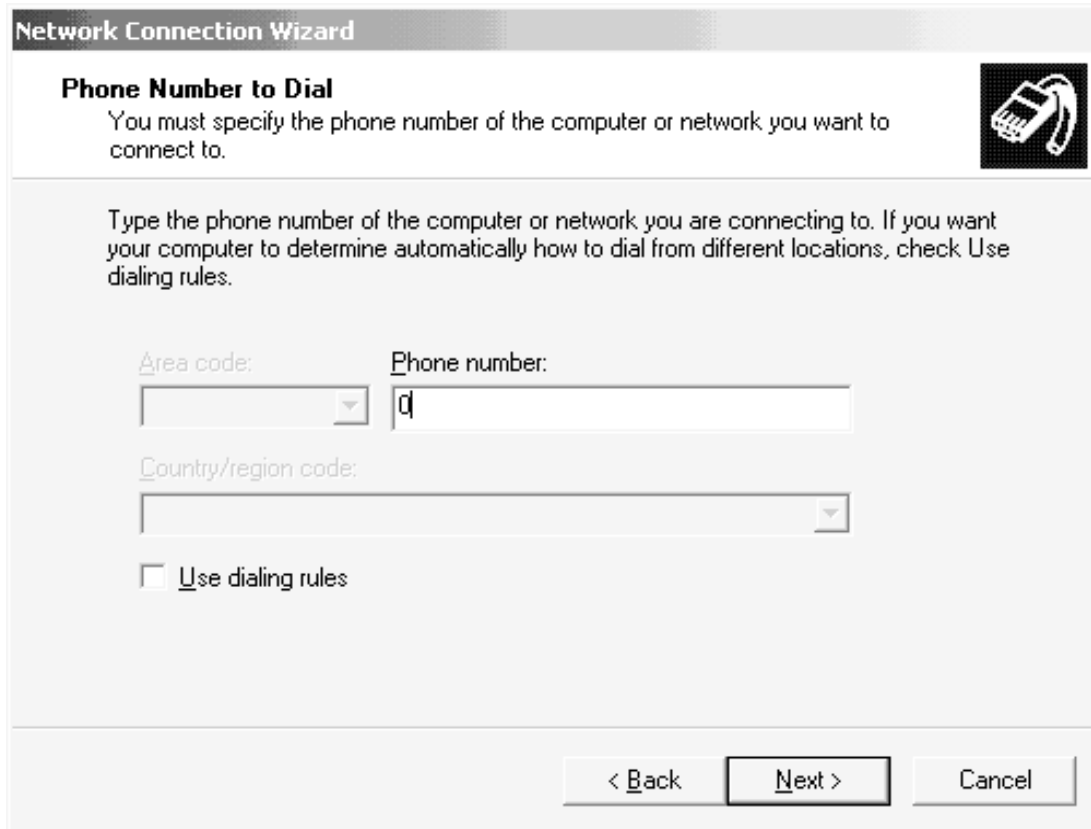


Figure 8

7. Enter 0 for the phone number to connect to the first entry in the Freewave call book and click on "Next" (Figure 9).



The screenshot shows a dialog box titled "Network Connection Wizard" with a sub-header "Phone Number to Dial". The main text reads: "You must specify the phone number of the computer or network you want to connect to." To the right is an icon of a mobile phone. Below this, instructions state: "Type the phone number of the computer or network you are connecting to. If you want your computer to determine automatically how to dial from different locations, check Use dialing rules." The form contains three input fields: "Area code:" (a dropdown menu), "Phone number:" (a text box containing the digit "0"), and "Country/region code:" (a dropdown menu). A checkbox labeled "Use dialing rules" is unchecked. At the bottom are three buttons: "< Back", "Next >", and "Cancel".

Figure 9

8. Select "For all users" if desired and give the connection a name. The connection is named "NetCam" in Figure 10.



Figure 10

9. Go back to Network and Dial-Up Connections.
10. Right-click on the NetCam connection.
11. Select Properties on the drop-down menu.
12. Select the Freewave modem (Figure 11).
13. Click on "Configure" (Figure 11).



Figure 11

14. Select the speed and hardware settings as shown in Figure 12, then click "OK".

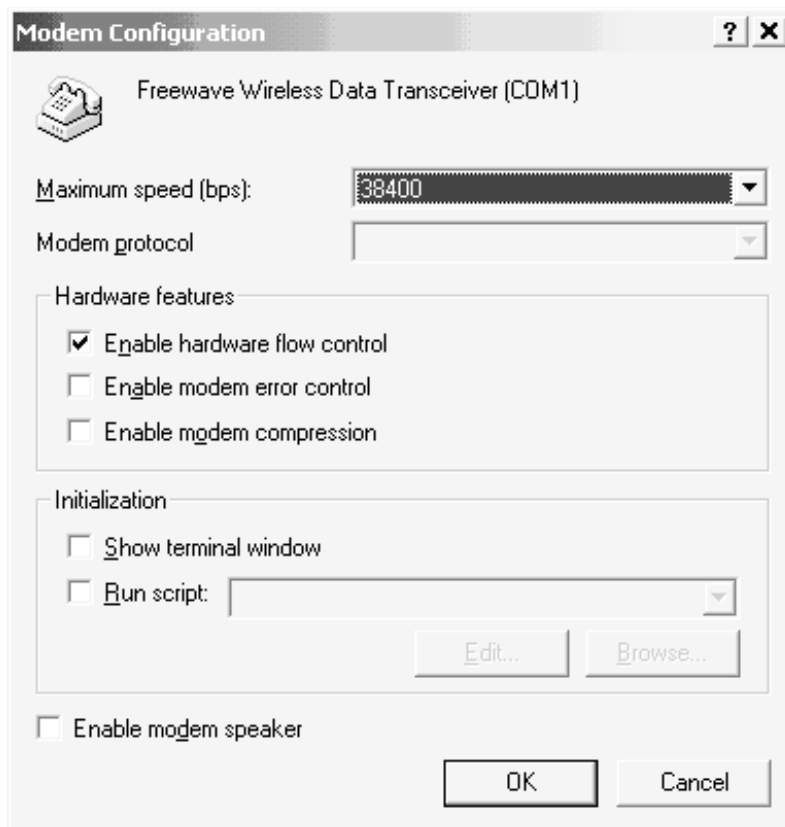


Figure 12

15. Click on the Options tab and set them as shown in Figure 13, then click "OK".



Figure 13

16. Click on the Security tab, then select "Typical".
17. Go to the Networking tab.

18. Select PPP in the combo-box and make sure only the TCP/IP box is checked (Figure 14).

19. Click on "Settings".

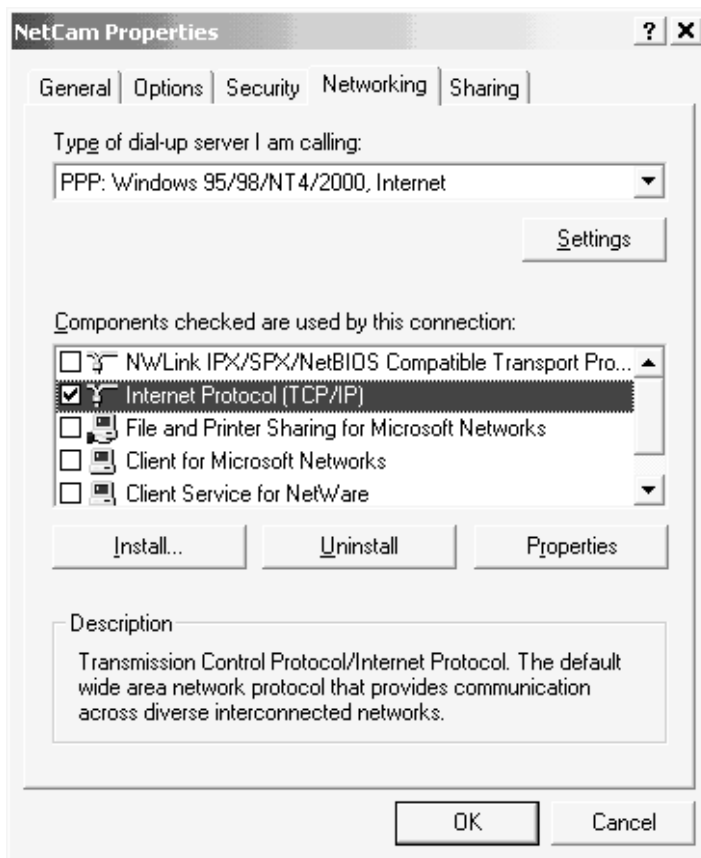


Figure 14

20. Check only the "Enable LCP extensions", then click on "OK" (Figure 15).

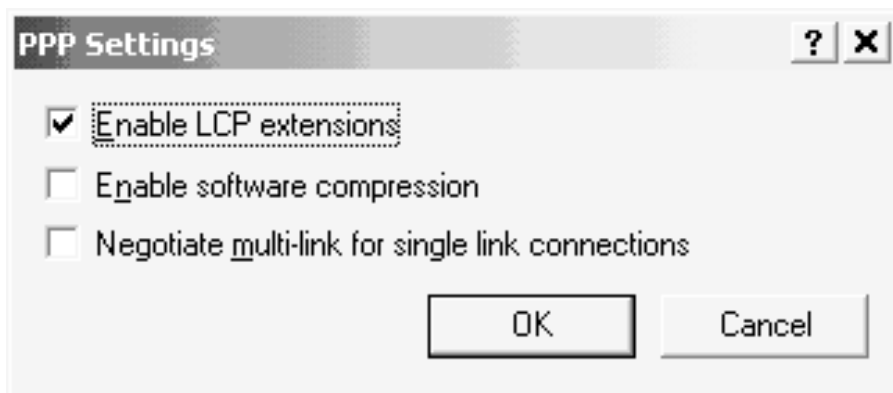


Figure 15

21. With TCP/IP selected, click on "Properties". (Returns to Figure 14.)
22. Select the "Use the following IP address" radio button (Figure 16).
23. Enter an IP address (Figure 16 is consistent with the NL100) then click on "OK".

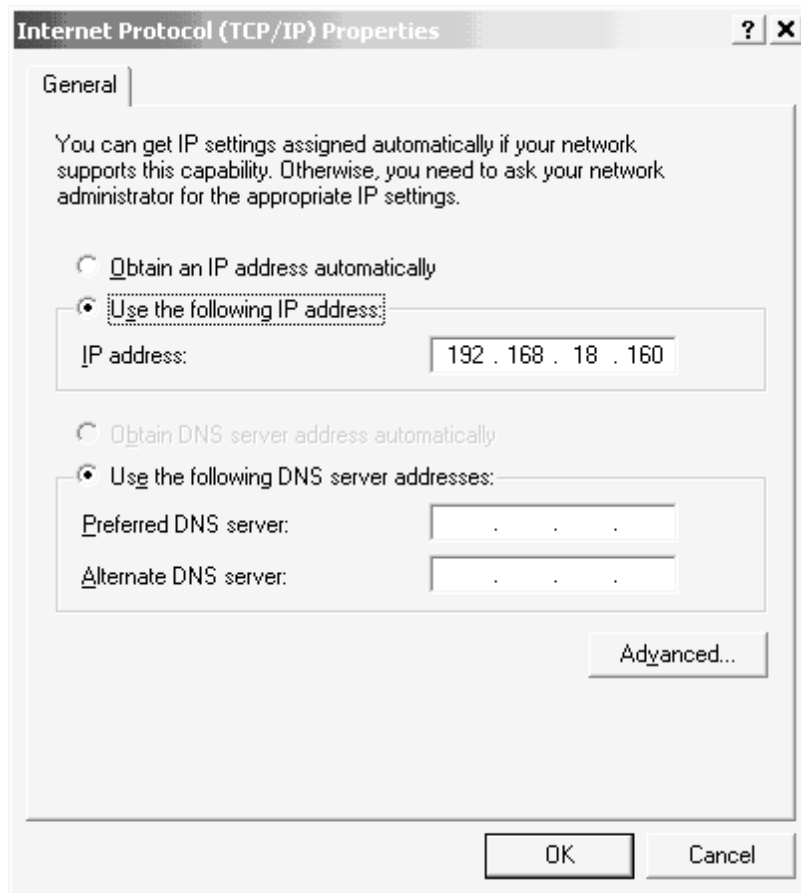


Figure 16

24. Click on "OK" to close the properties box.

Running NetCam Support Software

1. Create a batch file that executes the "ARPEXE" utility described in the section titled "StarDot NetCam Configuration Procedure" and starts the NetCam viewer tools, NC_TOOLS.EXE.
2. Click on the new NetCam dial-up connection.

3. Start the viewer using the batch file.
4. Select the camera (Figure 17).
5. Click on the view button. Figure 18 shows an example of a StarDot NetCam image.

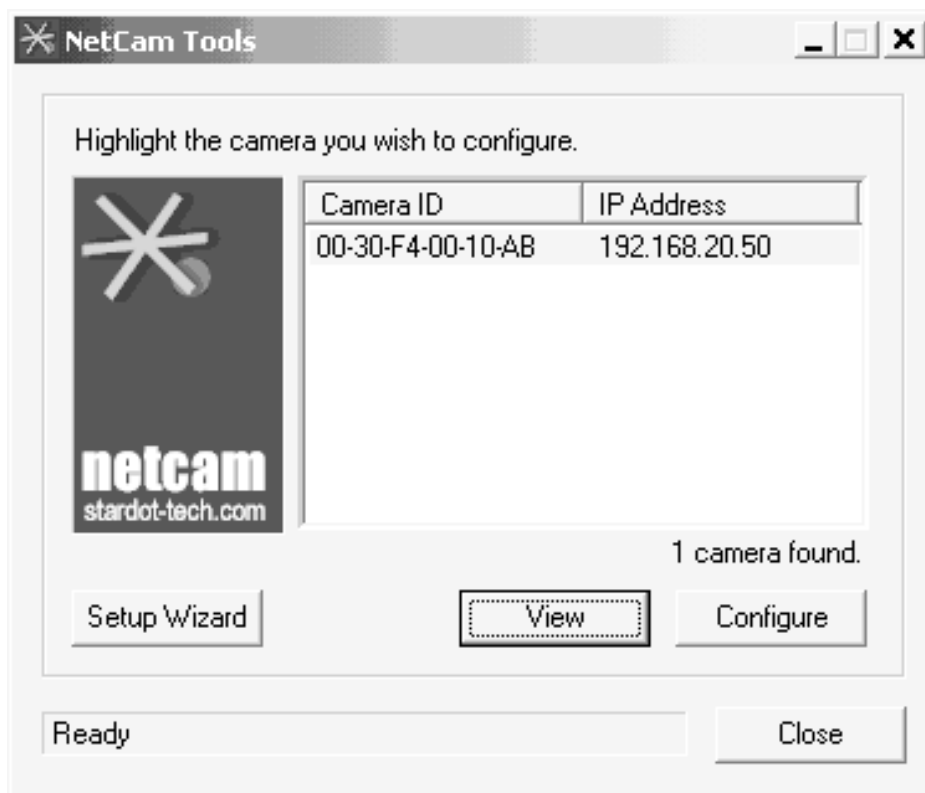


Figure 17



Figure 18