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CPE INSTALLATION MANUAL Chapter 3

Version 1.1.2

revision 1.0

TOPICS:

ANTENNA INSTALLATION:

CAUTION: THE ANTENNA ASSEMBLY MUST BE INSTALLED BY AN AUTHORIZED, CLEARWIRE APPROVED CONTRACTOR IN ACCORDANCE WITH STATE AND LOCAL BUILDING AND ELECTRICAL CODES.

Installation of the Outdoor Unit and Antenna for Compliance with FCC RF Exposure Requirements

The Outdoor Unit (2401-02) is mechanically and permanently secured to the antenna as one complete assembly. The whole assembly is, at all times, required to either be installed on the roof of the building, on the side of the building, pointing outward, or on an antenna tower. The minimum height above ground is 10 feet. In addition, to meet FCC RF Exposure requirements, the installation must be carried out by professional technical staffs according to Clearwire installation procedures. The antennas specified in this permissive change application may only be used in point-to-point.

Below: Figures 3-1, 3-2 and 3-3 depict typical antenna installations:

Figure 3-1. Low Gain Panel Antenna Installation

Figure 3-2. High Gain Panel Antenna Installation

Figure 3-3. High Gain Reflector Antenna Installation

WARNING:

INSTALLING ANTENNAS NEAR POWER LINES IS DANGEROUS. FOLLOW THE MANUFACTURER'S INSTRUCTIONS IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE U.S. CONSUMER PRODUCT SAFETY COMMISSION.

Antenna installation includes the following:

1. Safety Precautions:

- Check for overhead power lines before beginning installation. Stay at least twice the length of the antenna away from all power lines. TOUCHING MASTS, CABLES, METAL GUY WIRES, ANTENNAS OR ANY METAL OBJECT TO POWER LINES CAN CAUSE A FATAL SHOCK!
- If any part of the installation comes in contact with a power line, DO NOT TOUCH IT OR TRY TO REMOVE IT! Call the local power company.
- Do not use a metal ladder.
- Avoid installing antennas on a windy day.
- Properly ground the installation in accordance with state and local electrical codes.

2. Site preparation:

- Erect masts or towers with grounding systems in accordance with state and local codes.
- Drill holes and prepare antenna for mounting.
- Drill and prepare RF cable access and cable run holes as needed.
- Other custom mounting accommodations as needed (fabricate custom brackets or the like).

3. Antenna Mounting:

- Mount antenna assembly on wall, mast or tower according to manufacturer's instructions.

NOTE: The antenna must be mounted for vertical polarization.

- Point antenna toward the assigned cell site.

4. Grounding:

- ROOFTOP INSTALLATIONS
    - Rooftop installations require 2-point grounding using #2 AWG solid copper wire. Bond to any of the following:
        - Building steel or lightning protection ground wire.
        - Cold water main.
        - Ground conductor to exit or halo down.
    - Ground the RF cable at the entry to building or cabinet.
- TOWER INSTALLATIONS
    - Ground all antennas at the top of the tower. Bond to the tower itself, or run a ground conductor down.
    - If the tower is over 200 feet tall, ground the RF cable at the middle of tower.

- Ground the RF cable at the bottom of the tower.
- Cadwelds underground.
- Double lug compression above ground. Bolts must be stainless steel.
- Kopr-Shield all mechanical interfaces.
- 2-Point grounding to inside of building.
- Halo ground installed at least 18 in. below grade.
- Halo comprised of #2 AWG tinned solid copper wire.
- Test the grounding system to prove system less than 10 ohms.
- All grounds should "flow downstream" with minimum bend radius (6 in. for #6, 12 in. for #2).
- Halo must have 10 ft. ground rods driven down approximately every 10 ft. Rods must be 5/8 in. steel clad with pure copper not less than 0.0012 in.

For all antenna locations, point the antenna towards the designated cell site identified by the Network Manager. Use the methods described in the **Site Survey** section of Chapter 2 of this manual to maximize performance and minumize interference.

5. RF Cable Run:

- Run RF cable from antenna to IDU location, again keeping aesthetics in mind. Make it as unobtrusive as possible.
- Form a drip loop close to where the cable enters the building. Caulk and seal around the entrance.
- Connect the RF cable to the ODU and weatherproof the connection.

IDU INSTALLATION:

Once the antenna assembly is installed and the RF cable is run, install the IDU as follows.

1. Connect the RF cable to the IDU RF connector.
2. Plug the subscriber Ethernet LAN connector into the IDU LAN port. When connecting to the LAN via a hub, use a straight through cable (standard). When connecting directly to a PC, use a crossover cable.
3. Connect the power supply output to the IDU DC PWR connector.
4. Plug the power supply into an AC outlet to power up the IDU. Check the IDU front panel LEDs. The PWR and CPU LEDs should be lit, and both FAULT LEDs should be off. If all three RADIO status LEDs (RX, TX and LINK) are lit, the link is good. (Note: The equipment may require a few moments to establish the link.)
5. Configure the IDU with the proper IDU IP Address and Ethernet Host Address (if entering new code) in accordance with the procedure below.
6. Once a link is established, contact the network manager to confirm the link and complete the IDU configuration.

CONFIGURATION:

Before beginning normal operation you must perform IDU configuration and PC configuration.

IDU Configuration:

Local configuration of each IDU will give each Subscriber Unit sufficient information to establish a session with a Master Unit. Each IDU must be configured with the proper IDU IP address, subnet mask, transmit frequency channel, receive frequency channel, and maintenance mode setting. This can be accomplished either before installation or on site. Use a palmtop computer or PC running a terminal emulation application such as Hyper Terminal. Once a session is established, all configuration can be done remotely from the network manager. Configure each IDU as follows:

- Power down the IDU. Connect the IDU rear panel CONSOLE port to the serial port of the computer.
- Power up the IDU. As soon as the unit begins to auto-boot, halt the boot process by pressing any key on the computer.
- At the **[VxWorks Boot]** prompt, press **p** to display parameters, or **c** to change parameters.
- Table 2-3 depicts the Boot Parameters Edit Screen. For each parameter, press **Enter** to accept the existing value, or enter the appropriate new value and press **Enter** to change the value. Enter the IDU IP address at the **inet on ethernet (e):** parameter.

  NOTE: The Masters and the router must be on the same subnet.

Table 2-3. Boot Parameters Edit Screen

Commands: '=clear field: '-'=go to previous field; ^D=quit

boot device	: FLASH (or ei, if entering new IDU software)
processor number	: 0
host name	: iarws5 (or any name you choose)
file name	: ***(enter name of updated IDU software if updating IDU software)***
inet on ethernet (e)	:xx.xx.xx.xx ***(enter IDU IP address)***
inet on backplane (b)	**:Leave Blank**
host inet (h)	: xx.xx.xx.xx ***(enter host IP address for FTP server if entering new IDU software)***
gateway inet (g)	**:Leave Blank**
ftp user (u)	: anonymous
ftp password (pw) (blank=use rsh)	: aaaaa
flags (f)	: 0x8 (change to 0x0 for slow boot)
target name (tn)	: beta17
startup script (s)	: **Leave Blank**
other (o)	: xx.xx.xx.xx.xx.xx ***(Do NOT change: MAC address set at factory)***

- At the **[VxWorks Boot]** prompt, enter "@" to reboot with the changed parameters.
- At the **Press any key to change device parameters** prompt, press any key to advance to the Security Log-On. Enter the appropriate Account Name and password to advance to the Device Parameters Menu. Table 2-4 shows the Device Parameters Menu.

Table 2-4. Device Parameters Menu

1. Maintenance Mode	Set to **DISABLED** for normal operation.
2. GPS Pulse Fakeout	Set to **DISABLED** for normal operation.
3. Server Assign	Sector 000 Server 0 ***(appropriate primary or backup sector)***
4. Cell ID	0 (appropriate cell number)
5. Tx Frequency Channel	6 ***(enter transmit frequency channel and press* ENTER*)***
6. Rx Frequency Channel	6 ***(enter frequency channel and press* ENTER*)***
7. Subnet Mask	255.255.255.240 ***(enter the subnet mask HEX value)***
8. User Print Mask	0x0000 ***(do not change)***
9. Performance Test Vars.	
10. Frequency Hopping	Off
11. Frequency Hopping	Halted
12. Frequency Hopping	0
13. Change Password	
14. Quit	

- In the Device Parameters Menu screen, press the appropriate number to change each parameter. For each Subscriber Unit, the TX Frequency Channel must match the RX Frequency Channel of its Master Unit. Likewise, the Subscriber Unit's RX Frequency Channel must match the TX Frequency Channel of its Master Unit.
- Press **14** to quit when done.

PC Configuration:

Each participating PC on the subscriber LAN must be properly configured for connection to the Internet using Clearwire™ Wireless. Table 3-3 lists the information you'll need before configuring each PC. Obtain this information from your ISP Direct network manager.

Table 3-3. PC Configuration Information

Site Name

IP Address of Clearwire™ ISP Direct (Gateway)

Available IP range for this site

IP Address of DNS server

IP Address of Gateway (same as ISP Direct)

Before you configure each PC, verify that it has network interface card and is able to communicate with the ISP Direct®. The best way to do is to use ping utility. At the DOS prompt, type

C:\> **ping <**IP address>

If there is a connection problem, you will see a **request timed out** message. This indicates that you don't have the proper TCP/IP connection locally.

- Check the LAN LINK LED on the IDU front panel. It should be lit, indicating an Ethernet link.
- Make sure that the IP Addresses for your IDU and the ISP Direct are in the same Class C subnet.
- Make sure your routing tables are set to allow pings to be sent (consult the LAN administrator).

If the ping is successful you'll see this: **Reply from a.b.c.d. bytes= x time=y ms TTL=254**.

After a successful ping, proceed with PC configuration as follows:

1. Using either Windows 95® , 98® or Windows NT®, select **Start | Settings | Control Panel.**

NOTE: For Windows 3.1® or lower, you'll need to use other TCP/IP software, such as Novell®. For other operating systems, such as MAC or Unix, consult the manufacturer for TCP/IP setup procedures.

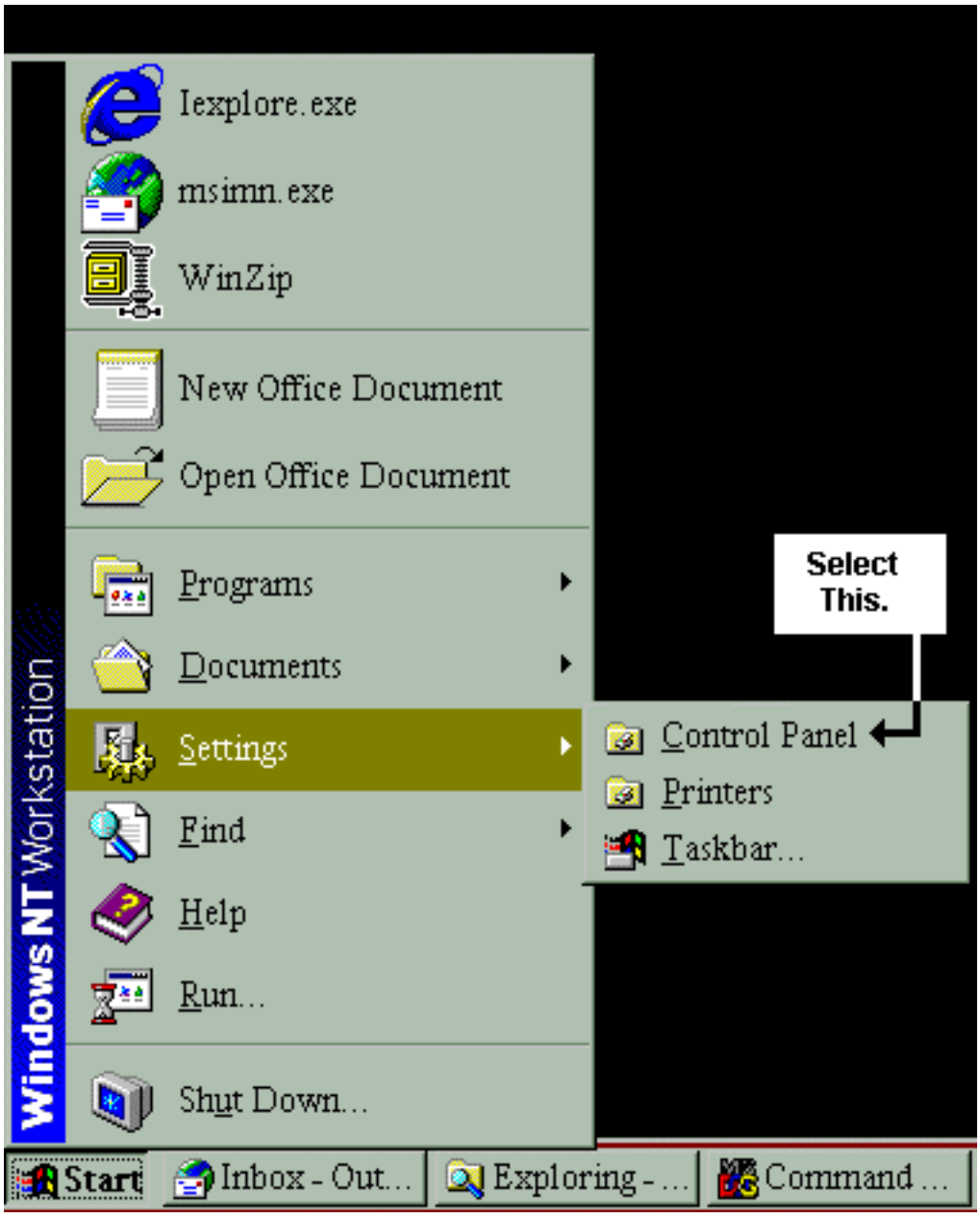

Figure 3-4.

2. Open the **Network** property window.

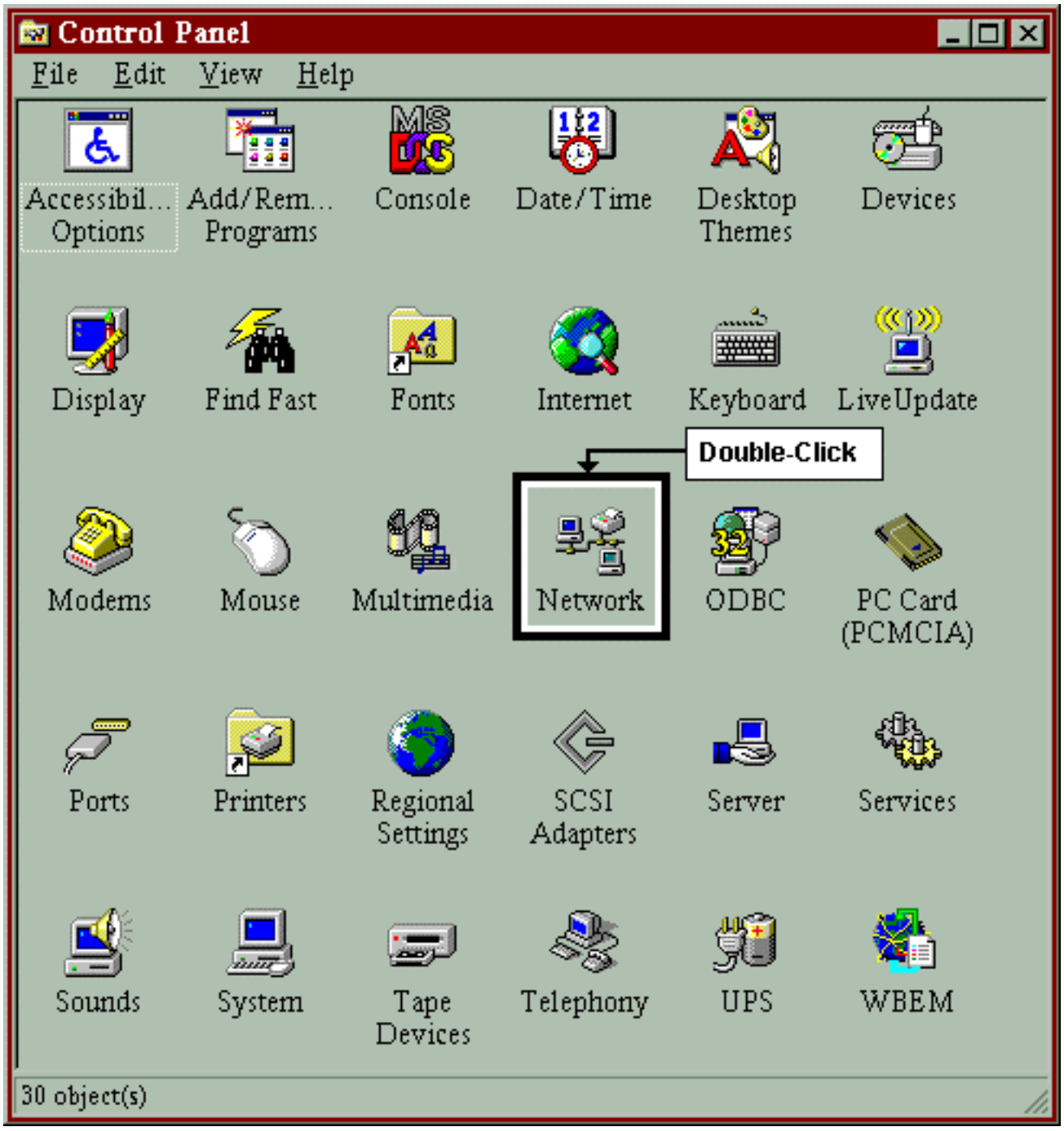

Figure 3-5.

3. Open the TCP/IP Properties window.

   a. For Windows 95® or 98®: Select **Configuration| TCP/IP| Properties**.

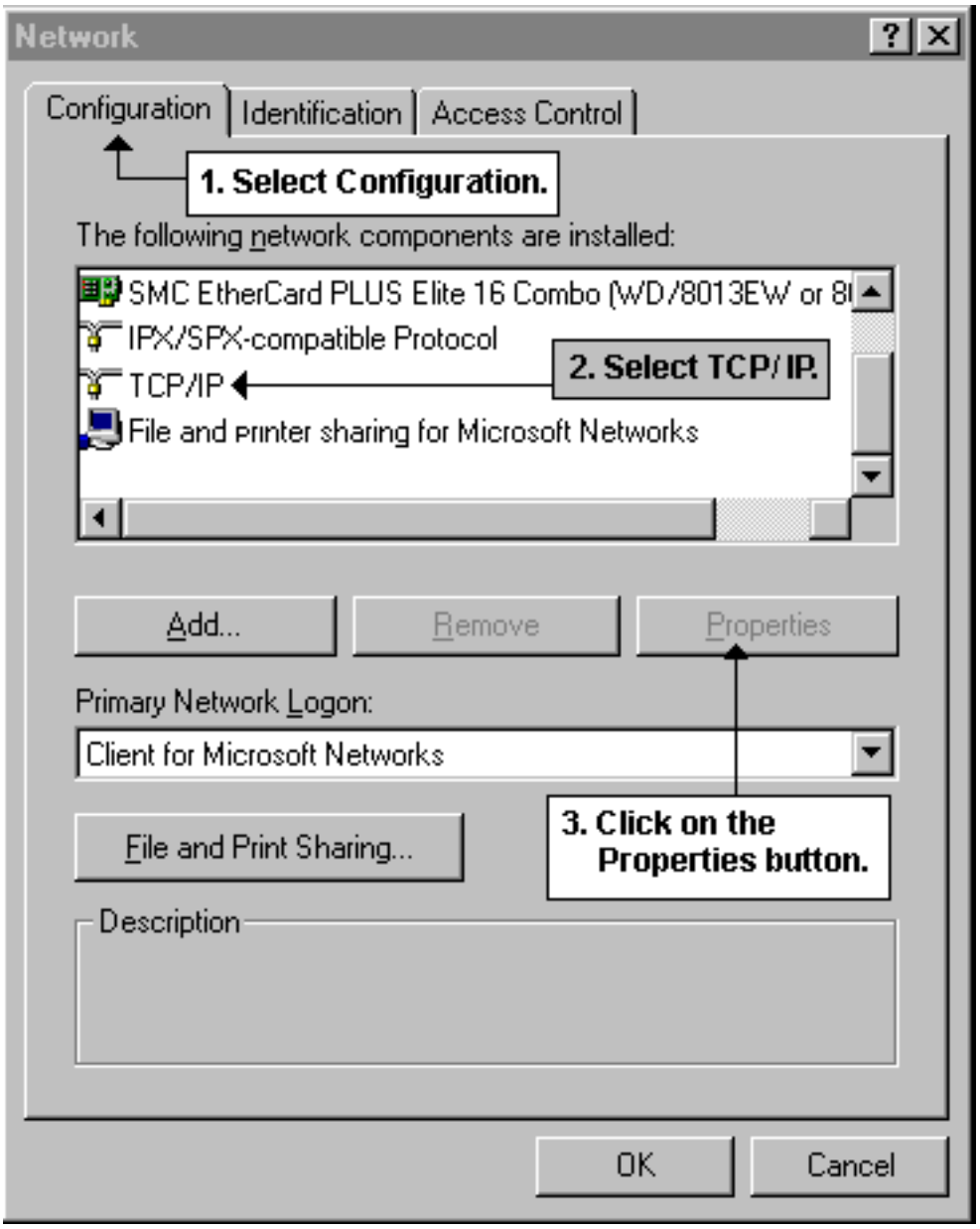

Figure 3-6.

b. For Windows NT®: Select **Protocols| TCP/IP Protocol| Properties.**

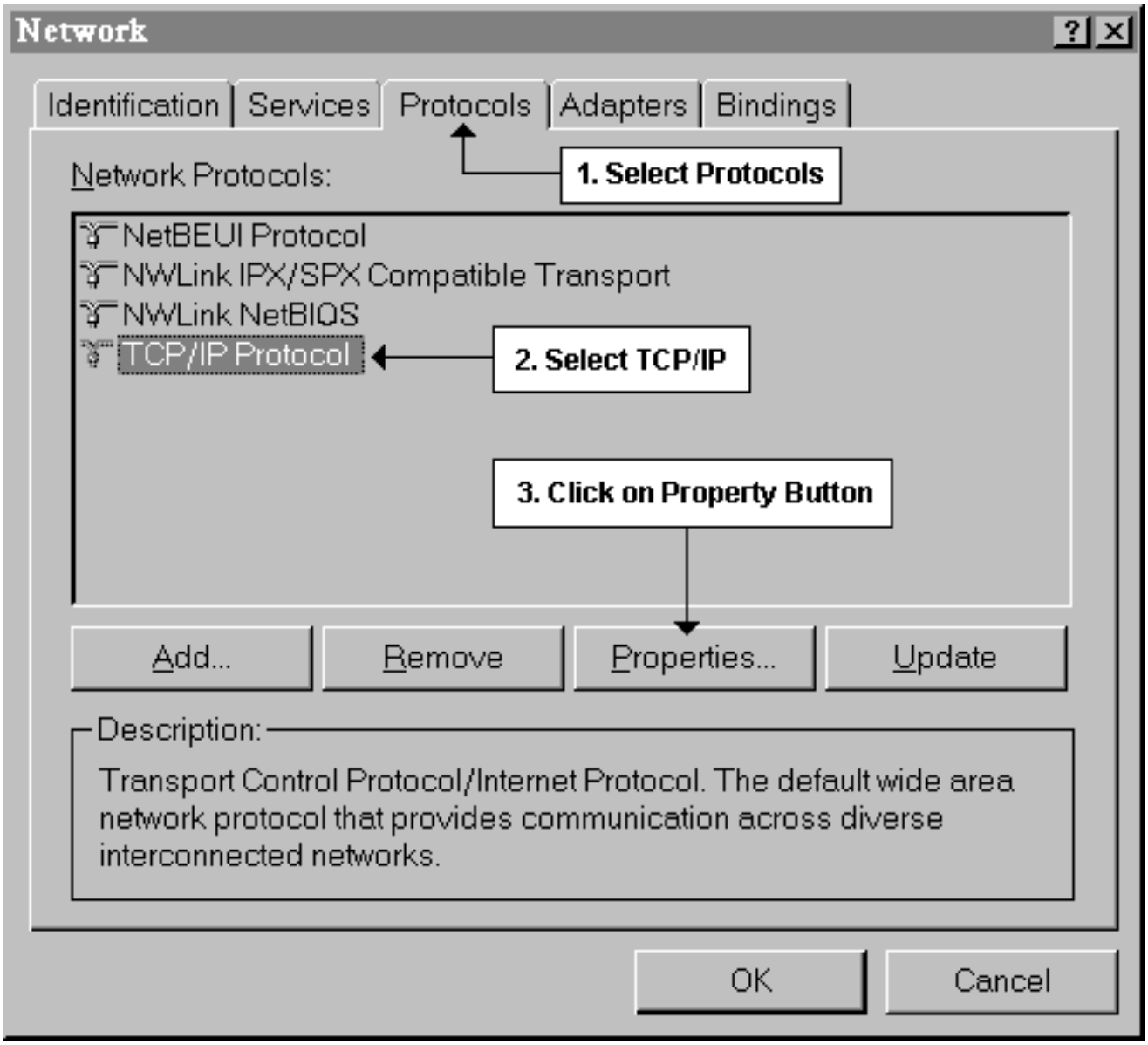

Figure 3-7.

4. Enter the IP and Gateway Address. The Gateway Address is the default intermediate destination for IP packets.

a. For Windows 95®or 98®:

1) Select the **IP Address** tab.

2) Check the **Specify IP Address** button.

3) Enter the IP Address for the PC.

4) Enter the subnet mask. (255.255.255.0 for most cases. Consult the LAN administrator for exceptions.)

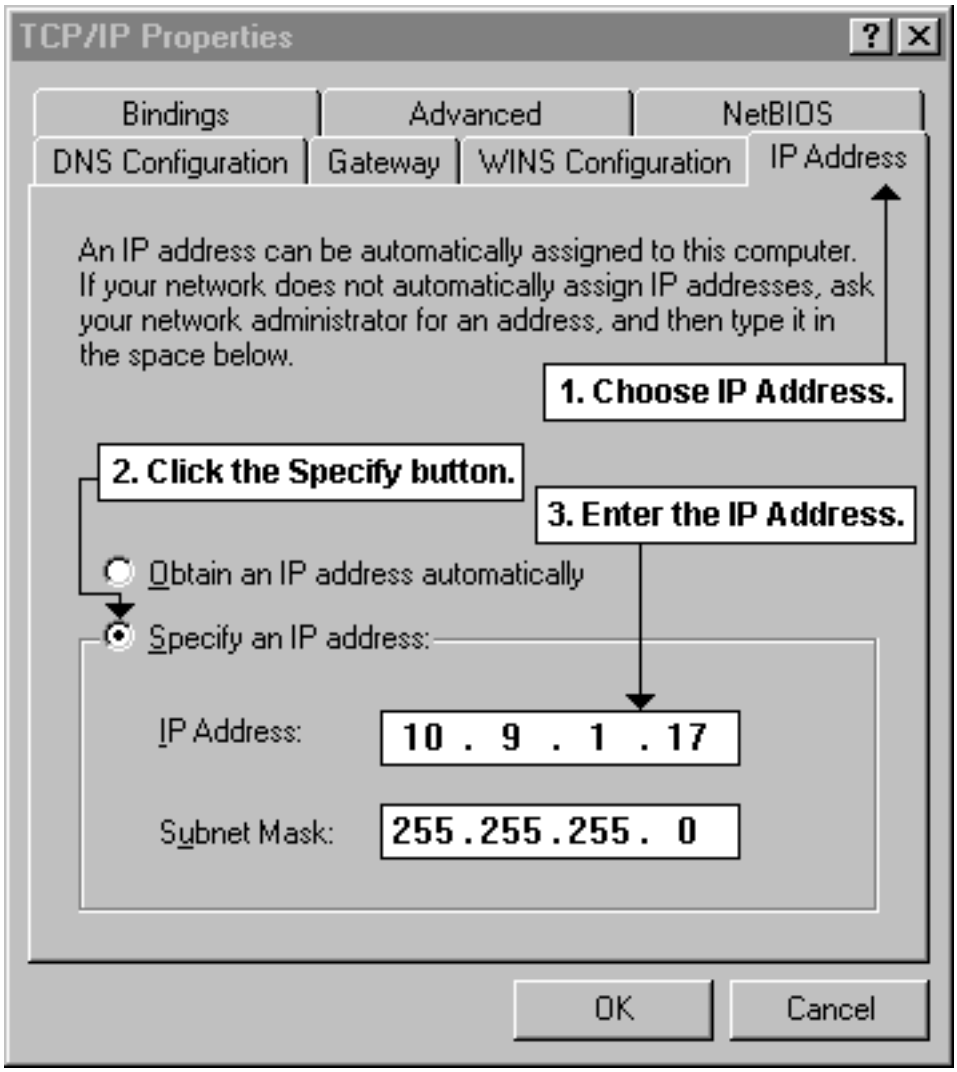

Figure 3-8.

5) Select the **Gateway** tab.

6) Enter the Gateway Address (IDU IP Address).

7) Click the **Add** button to add the Gateway Address.

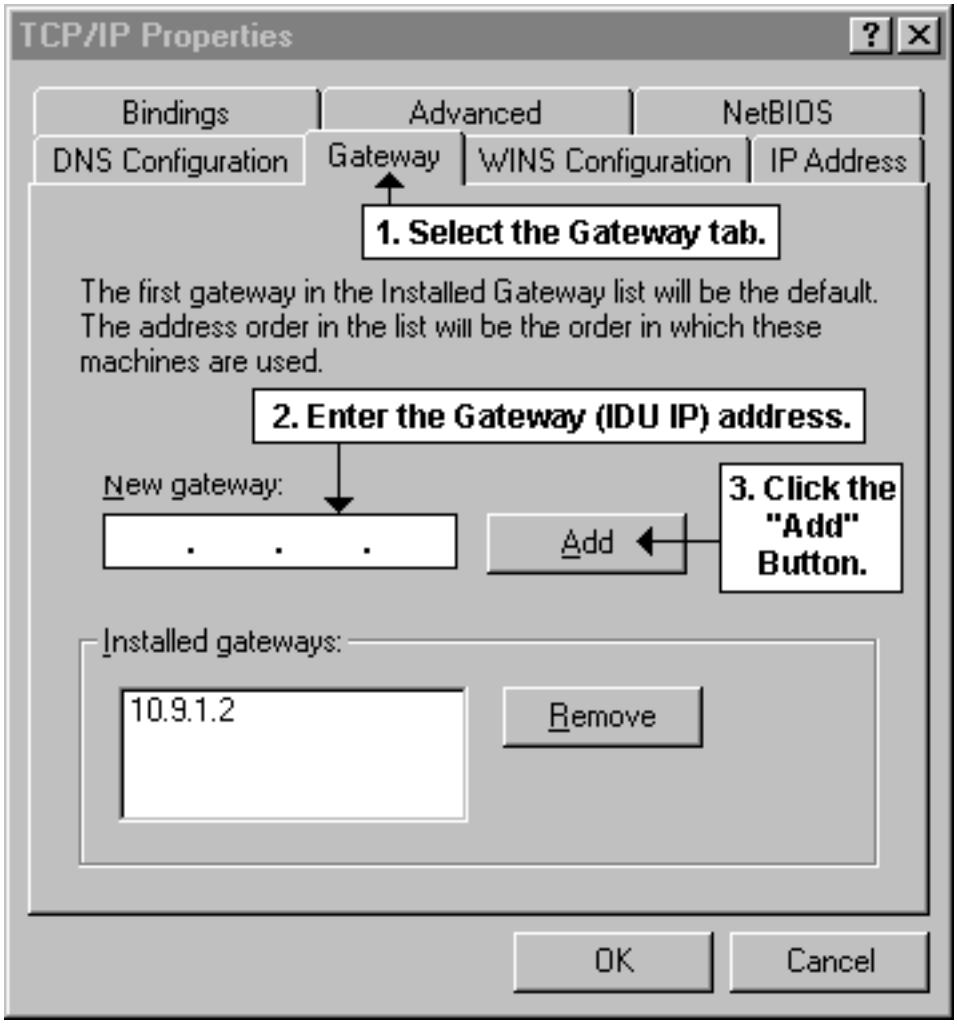

Figure 3-9.

b. For Windows NT®:

1) Select the **IP Address** tab.

2) Choose the appropriate interface.

3) Check the **Specify an IP address** button.

4) Enter the IP Address for the PC.

5) Enter the subnet mask. (255.255.255.0 for most cases. Consult the LAN administrator for exceptions.)

6) Enter the Gateway Address (IDU IP Address).

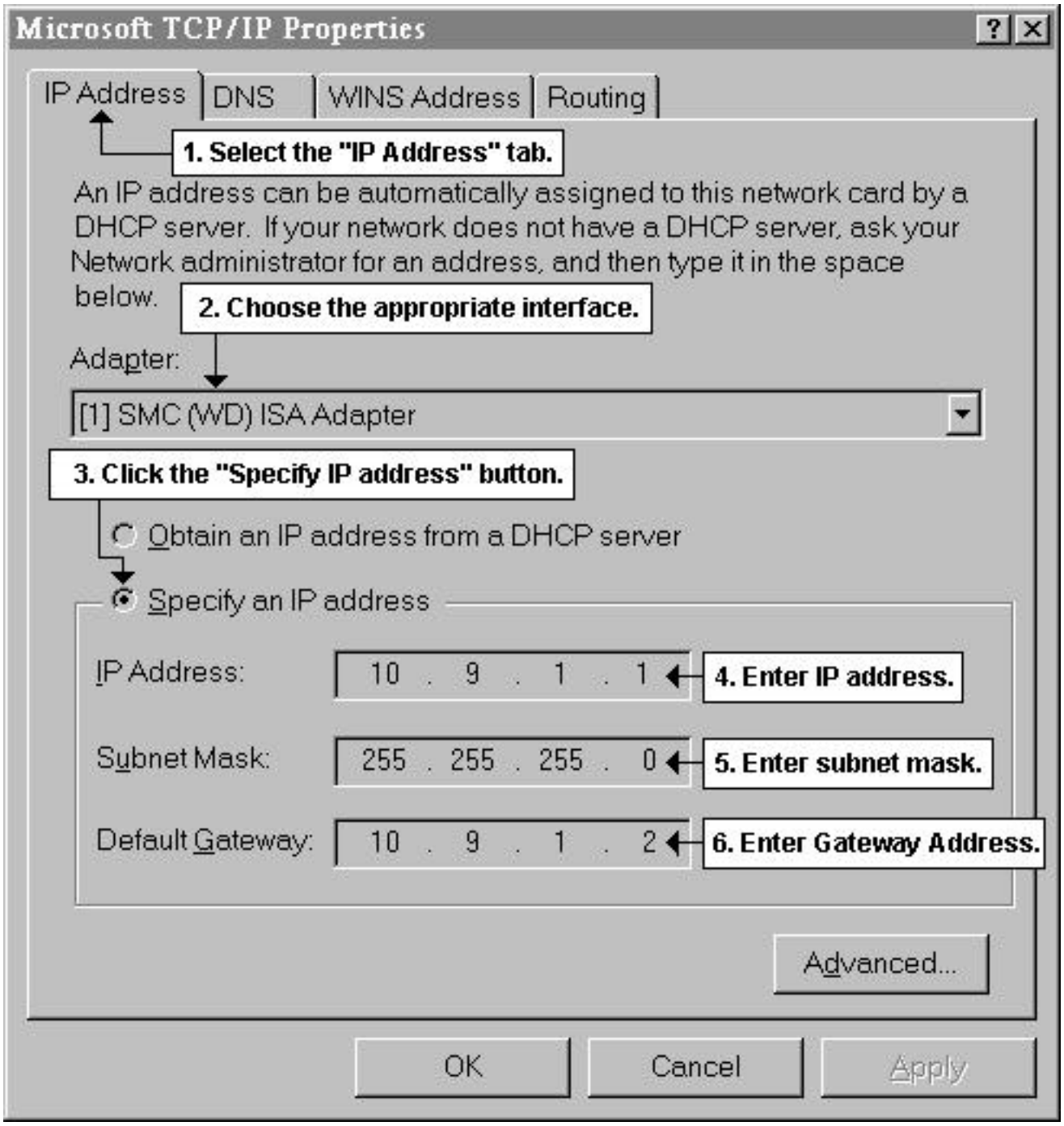

Figure 3-10.

5. DNS server configuration. The DNS server program that runs at the ISP side resolves domain names to IP addresses. To be connected to Internet, the PC has to know the IP address of this server in order to request IP resolution. Most ISP's have a primary and a secondary DNS server.

a. For Windows 95® or 98®:

1) Select the **DNS Configuration** tab.

2) Check the **Enable DNS** button.

3) Enter the DNS server IP address.

4) Click the **Add** button.

5) Repeat steps 3) and 4) for each additional DNS server IP address.

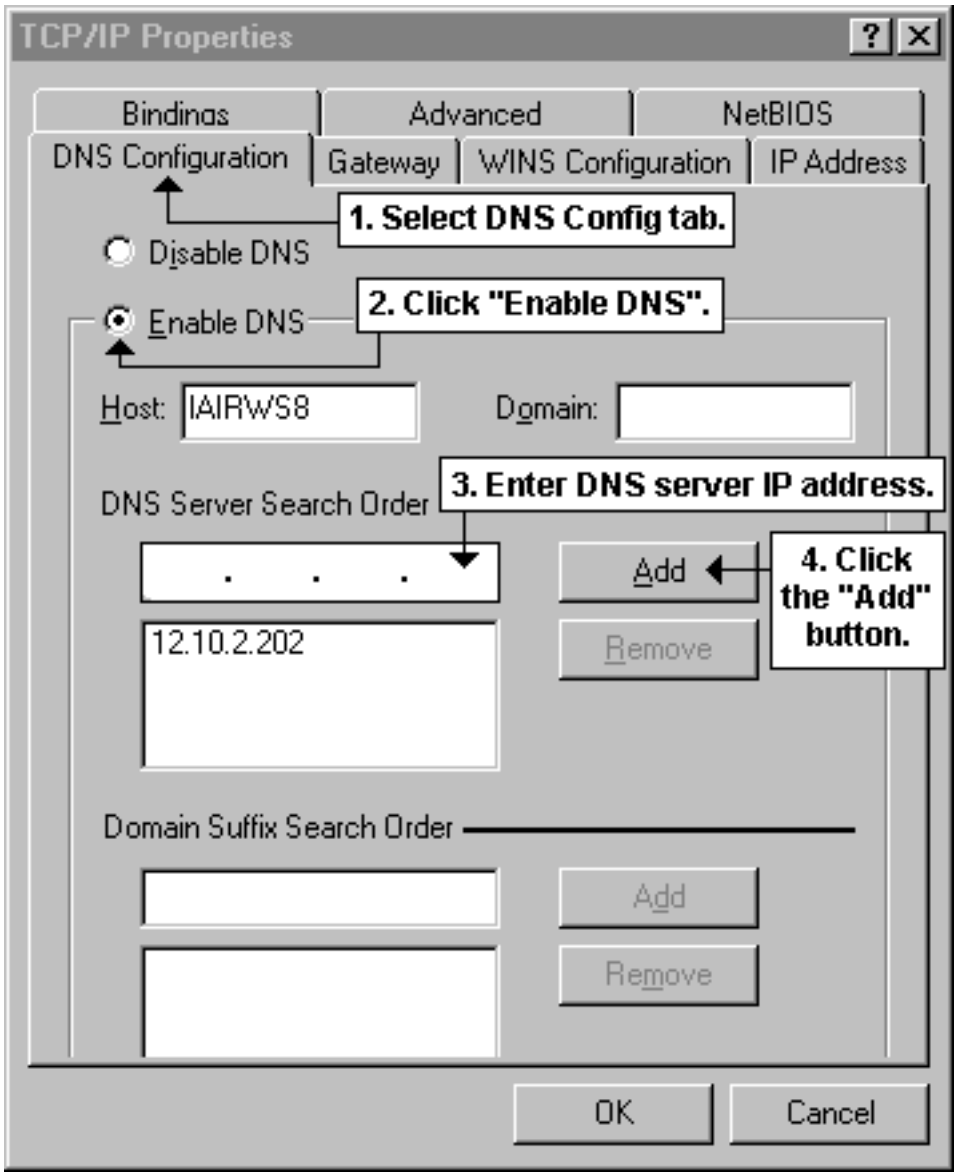

Figure 3-11.

b. For Windows NT®:

1) Select the **DNS** tab.

2) Press the **Add** button. When prompted, enter the DNS IP address.

3) Repeat step 2) for each additional DNS server IP address.

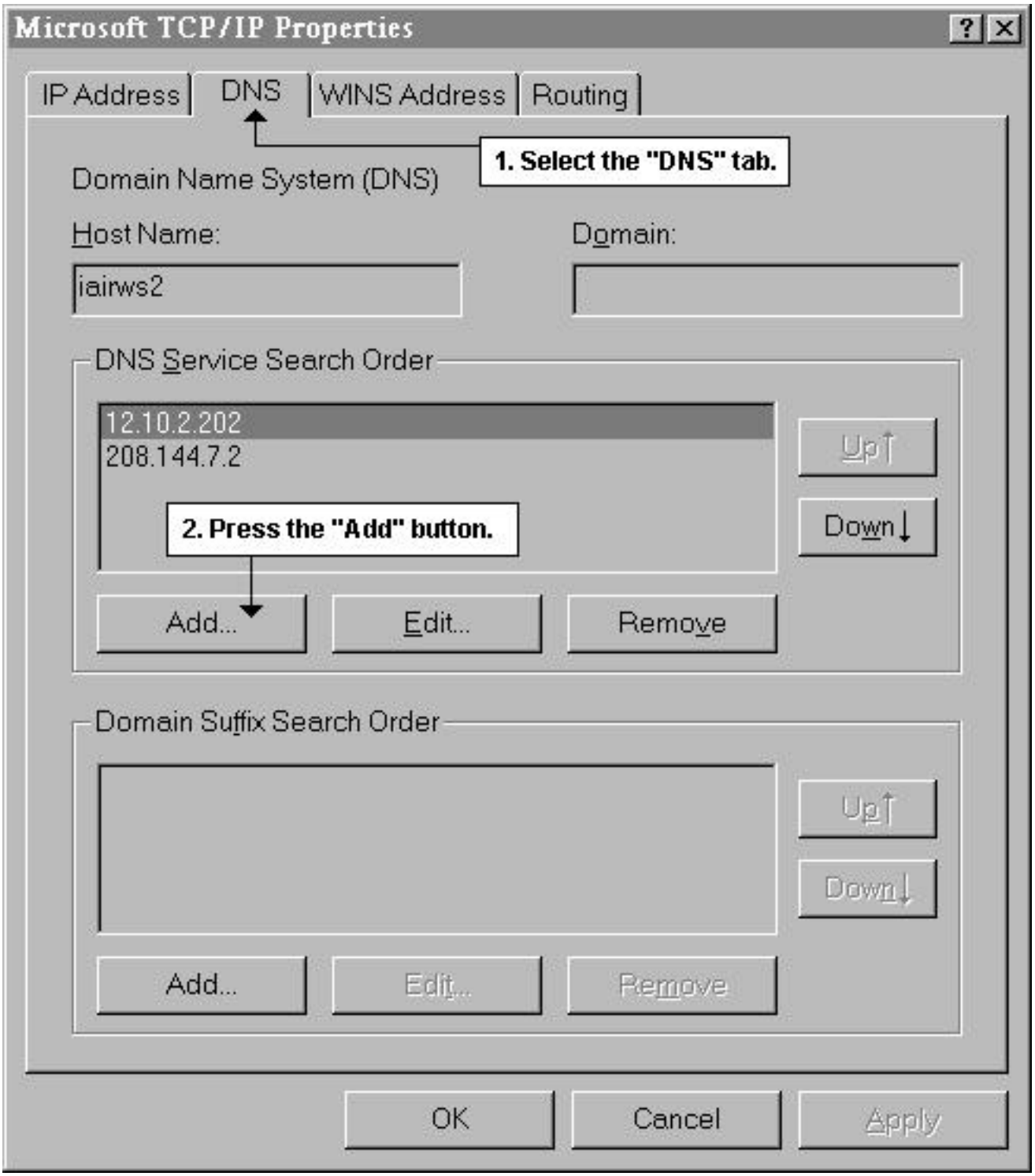
Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
1. Select the "DNS" tab.
Domain Name System (DNS)
Host Name:
Domain:
iairws2
DNS Service Search Order
12.10.2.202
208.144.7.2
2. Press the "Add" button.
Up
Down
Add...
Edit...
Remove
Domain Suffix Search Order
Up
Down
Add...
Edit...
Remove
OK
Cancel
Apply

Figure 3-12.