NETWORK® INSTRUMENTS

WAN PROBE

WAN Probe Kit
Installation & Quick Start Guide

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Getting Started

Thank you for purchasing Network Instruments WAN Probe Kit. The WAN Probe Kit, when coupled with Network Instruments Observer ® software, offers full-featured frame capture, decode, and analysis for T1/E1, DS3/E3 and HSSI WAN links.

Installation Overview

To install the WAN Probe Kit, you must follow these overall steps:

1. Make sure that your system meets the requirements for hardware and software installation as described in **Hardware and Software Requirements** on page 3 of this *Guide*.

2. Install the network interface cards (NICs), and their custom software drivers. See **Installing the Interface Cards and Drivers** on page 9 of this *Guide* for detailed instructions.

3. Cable the NICs to the network. See "WAN Probe Kit Quick Installation Diagrams" on page 4 for a diagram that shows how to cable the TAP for a T1/E1 link; page 5 shows how to cable the TAP for a DS3/E3 link.

4. Run the WAN Configuration Utility (NIWANCFG.EXE) to define and name the links you wish to monitor.

5. Install and run the Probe software. See the *RMON1/2 & Advanced Probe User Guide* for details.

6. Run Observer and redirect the WAN Probe to the Observer console. See **Running Observer Software with the WAN Probe** on page 27 of this *Guide* for important information about running Observer with the WAN Probe Kit.

Unpacking and Inspecting the Parts

Your WAN Probe Kit includes a number of components. Take a moment after unpacking the kit to locate and inspect all of the parts.

• One (1) 10/100 Ethernet Network Interface Card and cable:
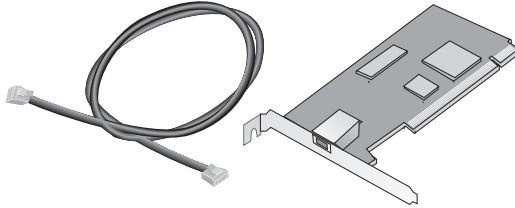
• The Network Instruments *Product CD-ROM/Application CD*, the *WAN Probe Kit Installation and Quick Start Guide* (this manual), the *RMON1/2 & Advanced Probe User Guide,* and the *Probe License Card*:
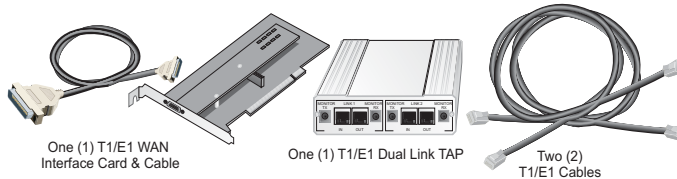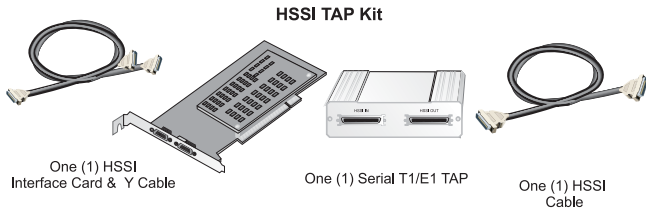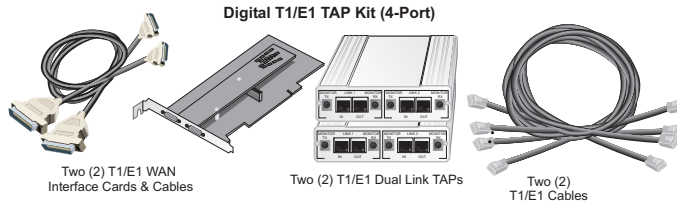

• Depending on the option you purchased, one of the following TAP kits, each of which includes a WAN Interface, TAP, and cables:

Digital DS3/E3 TAP Kit

One (1) DS3/E3 WAN Interface Card & Cable

One (1) DS3/E3 TAP

One (1) full-duplex DS3/E3 Coax Cable

Digital T1/E1 TAP Kit (2-Port)

One (1) T1/E1 WAN Interface Card & Cable

One (1) T1/E1 Dual Link TAP

Two (2) T1/E1 Cables

Digital T1/E1 TAP Kit (4-Port)

Two (2) T1/E1 WAN Interface Cards & Cables

Two (2) T1/E1 Dual Link TAPs

Two (2) T1/E1 Cables

Serial T1/E1 TAP Kit
(V.35 Version shown; others look slightly different)

One (1) Serial T1 WAN Interface Card & Cable

One (1) Serial T1/E1 TAP

One Serial Splitter Cable

HSSI TAP Kit

One (1) HSSI Interface Card & Y Cable

One (1) Serial T1/E1 TAP

One (1) HSSI Cable

Hardware and Software Requirements

Make sure that the system on which you plan to install the Probe Kit meets these requirements before you begin installing the kit.

Hardware Requirements

The PC must meet or exceed these specifications:

• To guarantee T1/E1 or DS3/E3 wire-speed: Pentium III 1.3 GHz or AMD 1700 1 GHz or faster.

• 512MB RAM

• 20 GB hard disk space

• 2 available PCI slots
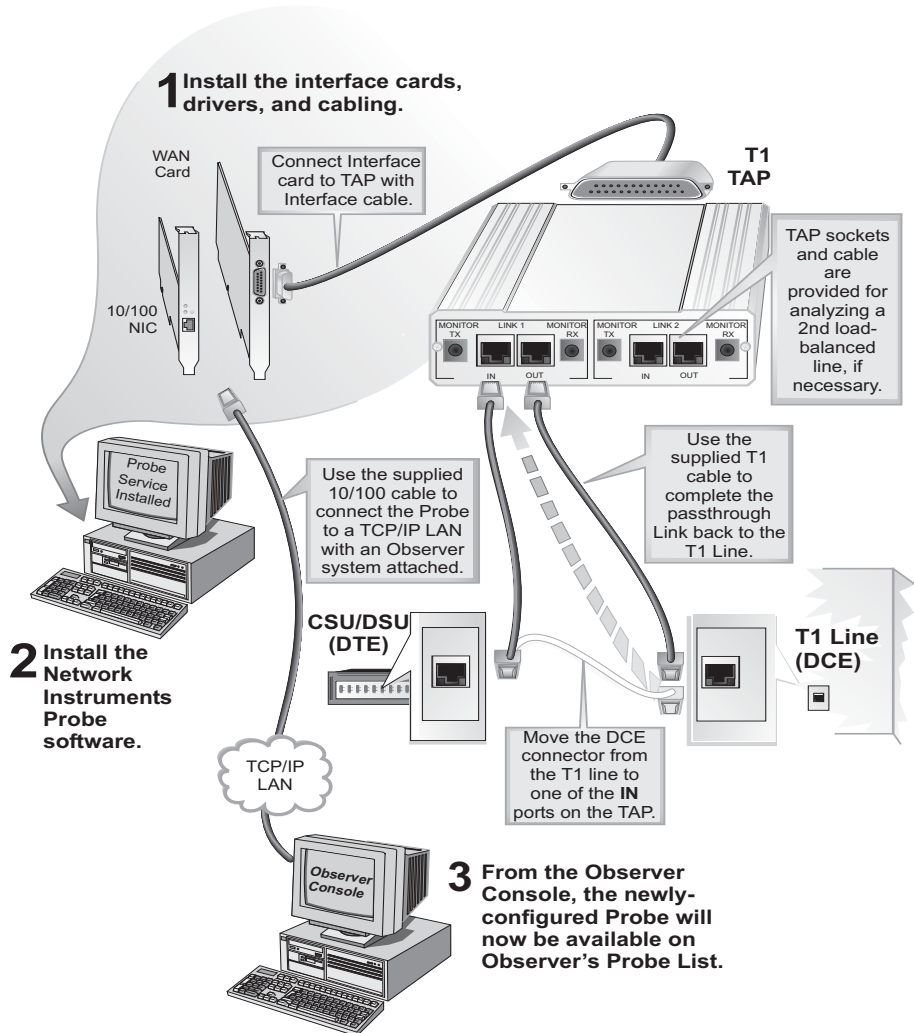
Software Requirements

The WAN Probe must be installed on Windows 2000 or Windows XP. Only the latest versions of Expert Observer and Observer Suite consoles are guaranteed to connect to the WAN Probe.

WAN Probe Kit Quick Installation Diagrams

Follow the diagrammed steps below to install the WAN Probe Kit. More detailed NIC and software installation instructions follow in this *Guide*.
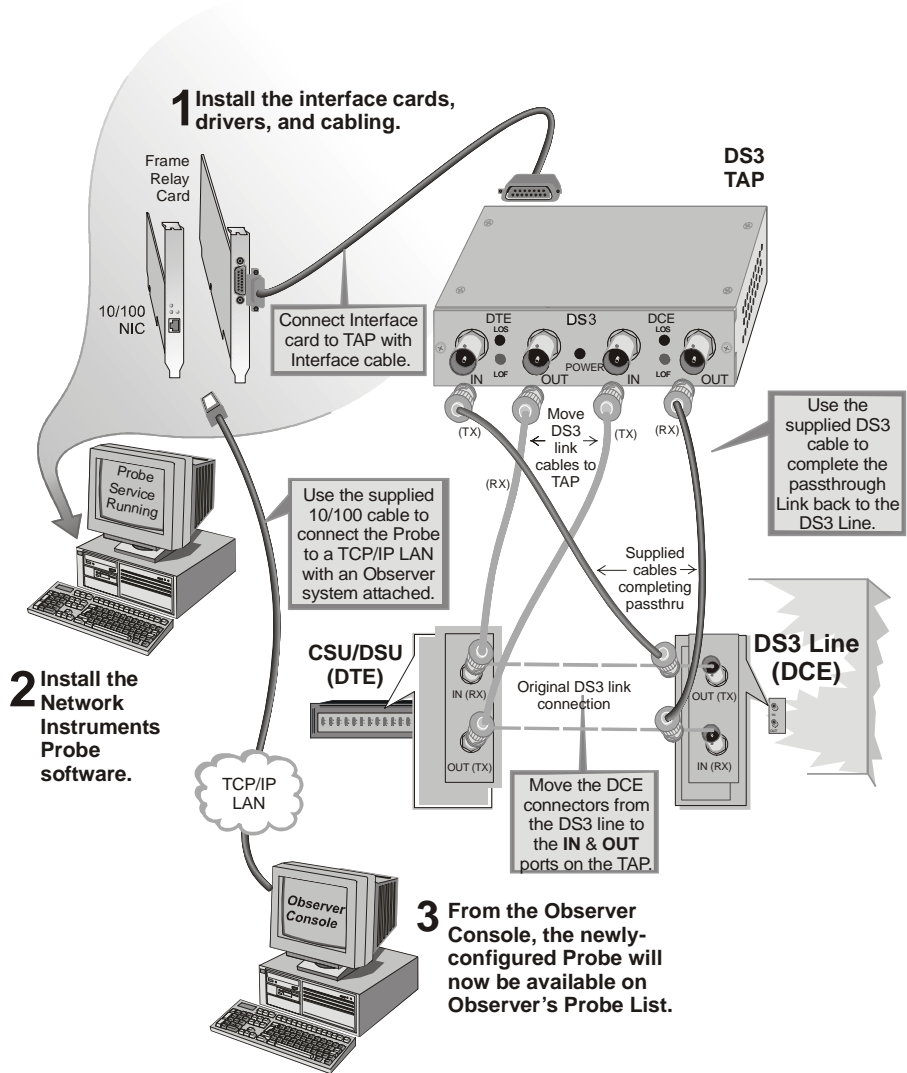
Digital T1/E1 TAP Quick Installation Diagram (2-Port[1])

The diagram below shows the WAN Probe Kit as it would be cabled to analyze a digital T1/E1 link with a Channel Service Unit/Data Service Unit (CSU/DSU). For a DS3/E3 and Serial T1 cabling diagrams, see the following pages.

1 Install the interface cards, drivers, and cabling.

WAN Card

Connect Interface card to TAP with Interface cable.

10/100 NIC

T1 TAP

TAP sockets and cable are provided for analyzing a 2nd load-balanced line, if necessary.

MONITOR TX | LINK 1 | MONITOR RX | MONITOR TX | LINK 2 | MONITOR RX

IN | OUT | IN | OUT

Probe Service Installed

Use the supplied 10/100 cable to connect the Probe to a TCP/IP LAN with an Observer system attached.

Use the supplied T1 cable to complete the passthrough Link back to the T1 Line.

2 Install the Network Instruments Probe software.

CSU/DSU (DTE)

T1 Line (DCE)

Move the DCE connector from the T1 line to one of the **IN** ports on the TAP.

TCP/IP LAN

Observer Console

3 From the Observer Console, the newly-configured Probe will now be available on Observer's Probe List.
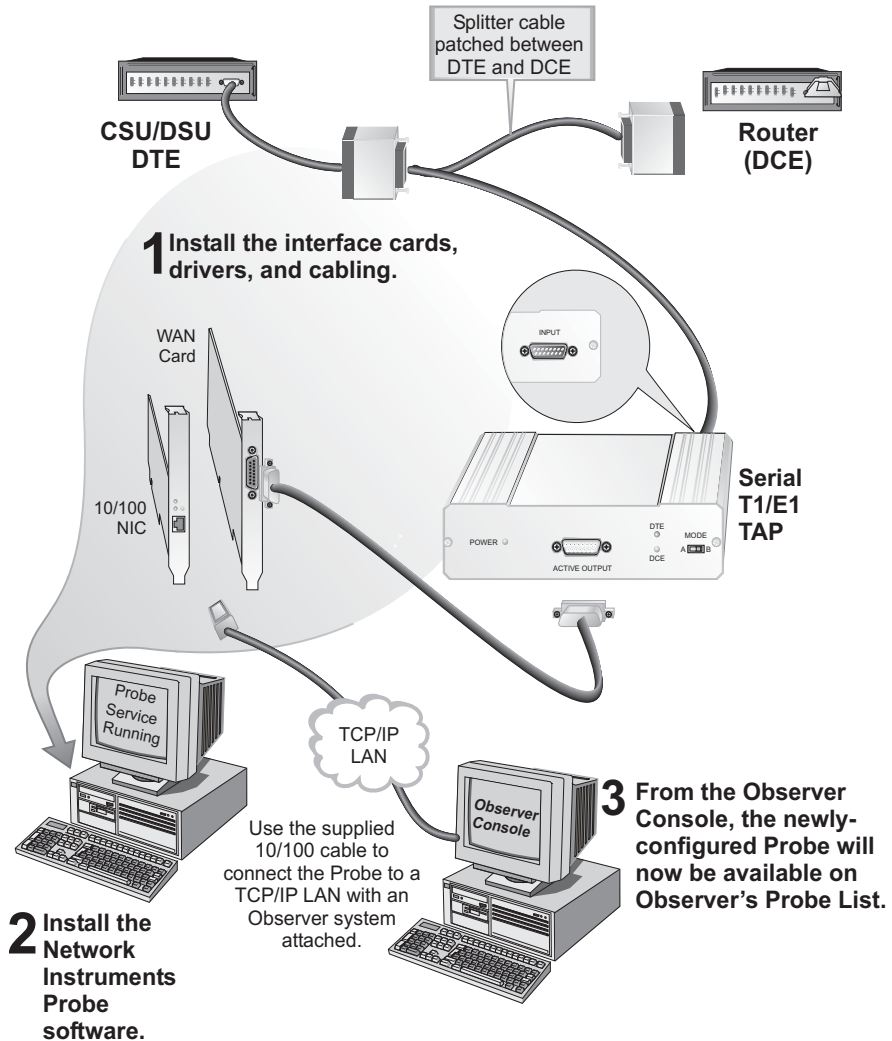
1. The 4-Port version of this system has an additional PC interface card, and an additional TAP and cable kit. Connect the second TAP kit as shown in the diagram. Run NIWANCFG to define and name the links you want to monitor.
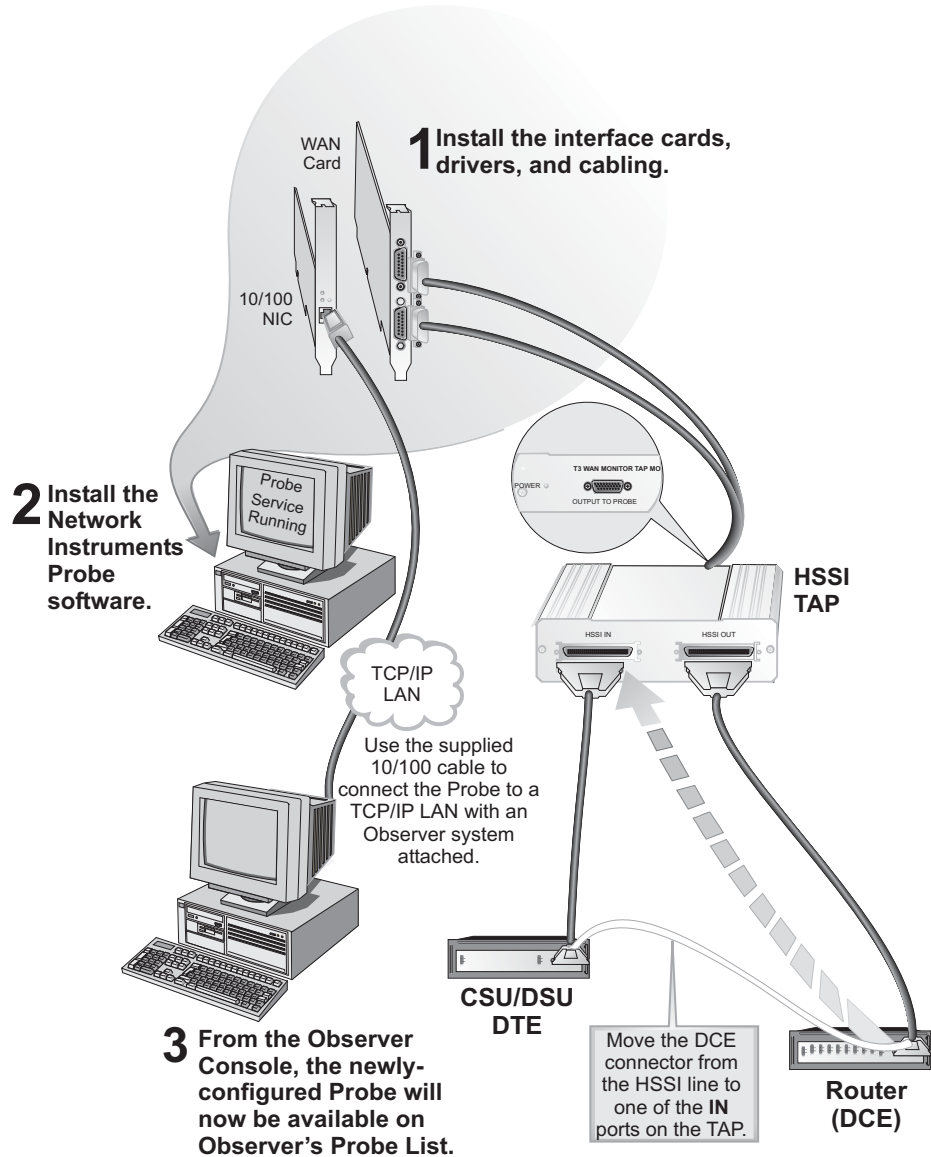
Digital DS3/E3 TAP Quick Installation Diagram

1 Install the interface cards, drivers, and cabling.

Frame Relay Card

10/100 NIC

DS3 TAP

Connect Interface card to TAP with Interface cable.

DTE DS3 DCE
LOS LOS
LOF POWER LOF
IN   OUT   IN   OUT

(TX) (TX) (RX)

Move DS3 link cables to TAP

(RX)

Use the supplied DS3 cable to complete the passthrough Link back to the DS3 Line.

Probe Service Running

Use the supplied 10/100 cable to connect the Probe to a TCP/IP LAN with an Observer system attached.

Supplied cables completing passthru

CSU/DSU (DTE)

DS3 Line (DCE)

IN (RX)

Original DS3 link connection

OUT (TX)

2 Install the Network Instruments Probe software.

OUT (TX)

IN (RX)

TCP/IP LAN

Move the DCE connectors from the DS3 line to the **IN** & **OUT** ports on the TAP.

Observer Console

3 From the Observer Console, the newly-configured Probe will now be available on Observer's Probe List.

Serial T1 TAP Quick Installation Diagram

Splitter cable patched between DTE and DCE

CSU/DSU DTE

Router (DCE)

1 **Install the interface cards, drivers, and cabling.**

WAN Card

INPUT

10/100 NIC

Serial T1/E1 TAP

POWER   ACTIVE OUTPUT   DTE   DCE   MODE A B

Probe Service Running

TCP/IP LAN

Observer Console

3 **From the Observer Console, the newly-configured Probe will now be available on Observer's Probe List.**

Use the supplied 10/100 cable to connect the Probe to a TCP/IP LAN with an Observer system attached.

2 **Install the Network Instruments Probe software.**

HSSI TAP Quick Installation Diagram

WAN
Card

1 **Install the interface cards, drivers, and cabling.**

10/100
NIC

T3 WAN MONITOR TAP MO
POWER
OUTPUT TO PROBE

2 **Install the Network Instruments Probe software.**

Probe
Service
Running

HSSI TAP

HSSI IN   HSSI OUT

TCP/IP
LAN

Use the supplied
10/100 cable to
connect the Probe to a
TCP/IP LAN with an
Observer system
attached.

**CSU/DSU
DTE**

Move the DCE
connector from
the HSSI line to
one of the **IN**
ports on the TAP.

**Router
(DCE)**

3 **From the Observer Console, the newly-configured Probe will now be available on Observer's Probe List.**

1. Install the Interface Cards, Drivers, and Cabling

The TAP kit allows the Probe to capture frames from a T1/E1 or DS3/E3 link. The 10/100 NIC allows the Probe to communicate with the Observer console via TCP/IP, or to capture packets from a 10/100 network.

- For detailed card installation instructions, refer to **Installing the Interface Cards** on page 10 of this Guide.

For driver installation instructions, refer to **Updating the WAN and 10/100 Drivers** on page 11 of this Guide.

2. Install the Probe Software

The Probe software turns the system into a data collection device for any Expert Observer or Observer Suite console. It also installs the custom driver files that you will use to update the NIC drivers in Step 2.

- The *Advanced and RMON Probe User Guide* describes in detail how to install and run the Probe software. When prompted for the product to install, select Advanced Probe

- Make sure that you also read and follow the instructions for software license and registration.

- Run NIWANCFG if you need to define single or multiport links.

3. Connect to the WAN Probe from the Observer Console

Once the Probe system is installed, running, and cabled, you must redirect the Probe so that it appears on the Observer main window's Probe list. From the Observer console, Click **Tools**->**Redirect Probe** and enter the Probe's IP address.

The Probe will now appear on the probe list on the left side of the Observer main window. Click on the Probe to connect.

Installing the Interface Cards and Drivers

Safety and Handling Precautions

Danger!

Electrical current from power, phone and communications cables can be hazardous.

To avoid potential shock hazards:

- Only use grounded sockets for connecting equipment to the power supply.

- Do not carry out any installation, maintenance or (re)configuration work and do not connect or disconnect any power cables during an electrical storm.

- If installing in a Hot Plug system, please follow the safety instructions specific to this system. Read the relevant documentation.

- Electrical installations must comply with the safety regulations relating to the country in which they are operated.

Caution

Electrostatic discharge may damage or destroy circuit boards.

- Do not open the antistatic bags until you are ready to install the cards.

- We recommend you wear an antistatic wrist strap when installing the interface cards. Remove the computer cover and connect the wrist straps (using an electric conductor) to the computer chassis. **Note: Do NOT connect the wrist strap to the ground terminal of the power supply. Faulty wiring could make this terminal live and potentially lethal.**

- Hold the antistatic packaging of the interface cards for at least two seconds against the bracket of an extension slot on your computer. This reduces the static charge in the packaging and in your body.

- Do not touch any circuits on the network cards or any of their port contacts. Do not place the network cards on the computer cover or any other metal surface.

- Avoid unnecessary movement since this can increase electrostatic charge.

- Never use excessive force when working with the network card or the PCI bus. If you need to place the network card somewhere after removing it from the antistatic bag, make sure that you place it on the antistatic bag and on a level surface.

Installing the Interface Cards

Have the computer manual available and if necessary, a key or screwdriver to open the cover.

1. Install the Network Instruments Probe Software as described in the *RMON1/2 & Advanced Probe User Guide*. You must install this software **before** you install the hardware so that Windows will have access to the custom drivers.

2. Switch off the computer in which the network cards are to be installed.

3. Disconnect the power cord from the power outlet. Follow the safety instructions set out above.

4. Open the computer cover as described in your computer manual. You may need a screwdriver or key to loosen the fasteners on the cover.

   If you are installing the network cards in a tower computer it is best to lay the computer on its side so you can apply the correct force to insert the cards into the PCI bus slots.

5. Locate two open PCI bus slots on the motherboard. Consult the section in your computer manual that describes how to install expansion cards in the system motherboard.

6. Remove the brackets (if any) from the expansion slots. Follow the instructions in your computer manual.

Choose any 2 PCI Slots
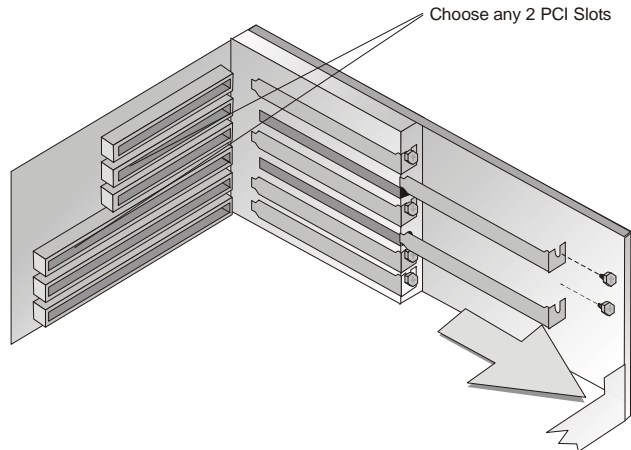
7. Remove the interface cards from their antistatic bags.

8. Insert the interface cards in the appropriate PCI bus slots.

Make sure that the contacts of the network cards are correctly aligned with the PCI bus slots on the motherboard. Push the network cards down vertically until they are properly seated in the bus slots.

10/100 Ethernet NIC

WAN Interface
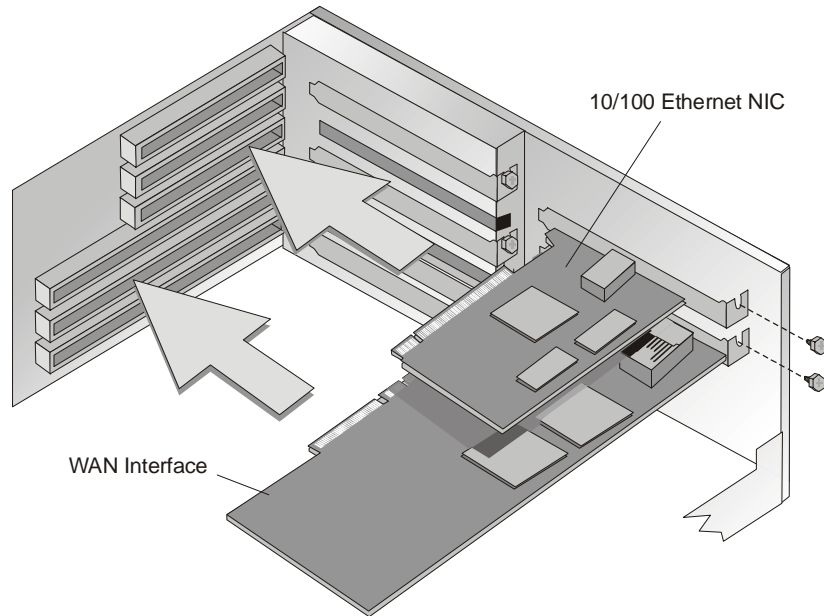
9. Tighten the locking screws on the fixing brackets until the cards are firmly connected to the computer cover (or to the attachment provided for expansion cards).

10. Close the computer cover and replace and tighten any screws.

11. Reconnect the power supply, **following the safety instructions.**

12. Turn the system on. The new hardware will be recognized differently depending on whether you are running Windows 2000 or Windows XP. Refer to the appropriate section that follows to complete the driver installation.

Updating the WAN and 10/100 Drivers

After you have installed the cards and turned on the computer, both Windows 2000 and Windows XP will attempt to recognize and install drivers to match the new hardware. Make sure that you have installed the Network Instruments Probe software; you must supply a directory that the Network Instruments install program creates to the **Found New Hardware** wizard.

WAN and 10/100 Driver Installation: Windows 2000

The procedure for each NIC is different because of the way Windows 2000 recognizes the two cards:

- The WAN Interface card isn't recognized at all, so you need to have already installed the Network Instruments Probe software when you turn the system on. When the **Found New Hardware** wizard asks you for the driver location, specify the **C:\Observer Files\Drivers\WAN** directory, which contains the custom driver for the WAN Interface card.

- The 10/100 card is recognized, but a standard driver is installed. You must manually update the driver, specifying its location in **C:\Observer Files\DRIVERS\Intel21143\Win2000** directory. You *must* specify the location; Windows will not install the custom driver if you tell it to search for the driver.

These procedures are described in more detail in the sections that follow.

Letting the Wizard Search for the WAN Driver

When Windows 2000 starts up after the card installation, the **Found New Hardware Wizard** opening dialog is displayed. Follow these steps to complete the wizard.

1. Click **Next**. The wizard asks you how you want to install the custom driver:
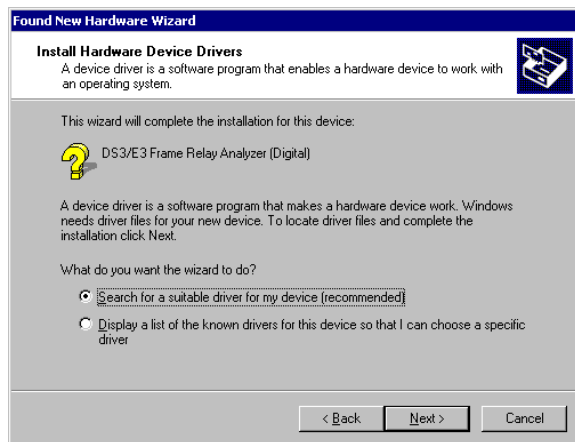
2. Choose "Search for a suitable driver for my device." Click **Next**. The wizard asks where it should look for the driver files:
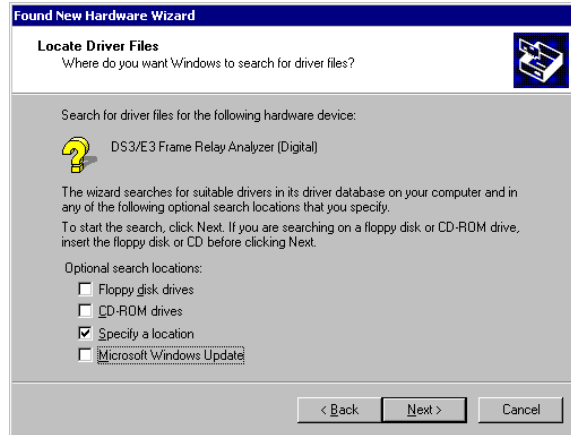
3. Choose "Specify a Location" and click **Next**.
   The wizard displays a file locator:

4. Enter or browse to the following directory (assuming C:\Observer Files is your Observer directory):

   C:\Observer Files\DriversWAN

The wizard tells you which driver it found:
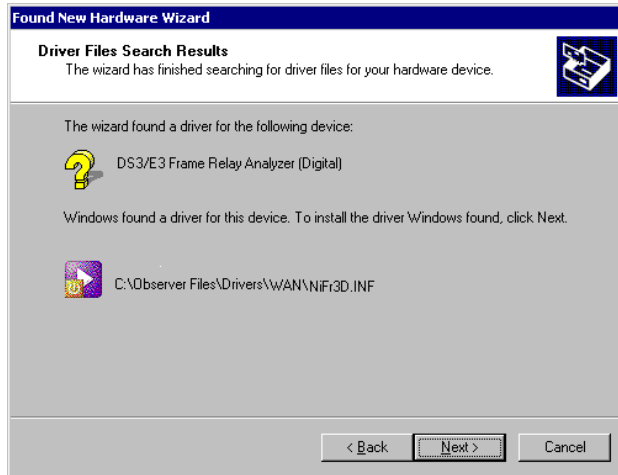
5. Click **Next**. The wizard informs you that the driver it found lacks a Microsoft digital signature:
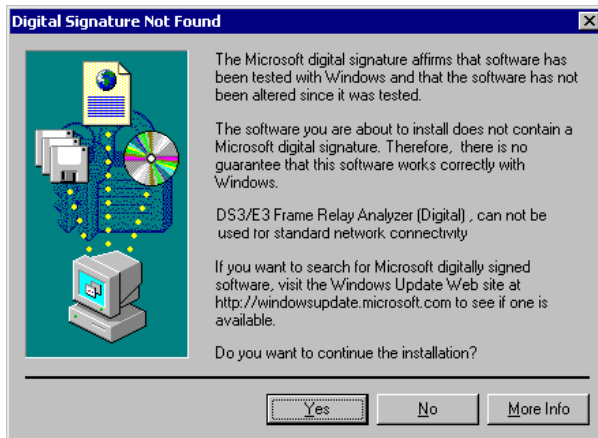
6. Click **Yes**. Network Instruments has tested and verified that the driver works correctly with Observer and Probe on Windows 2000.

   After installing the driver, the wizard displays a confirmation dialog telling you that the driver was successfully installed. Click **Finish** to close the wizard.

Manually Updating the 10/100 NIC Driver by Specifying a Directory

Although Windows 2000 reports that it found the correct driver for the Network Instruments 10/100 NIC, the standard driver that it has installed needs to be updated to work best with Network Instruments Probe or Observer.

A custom driver is required to make the 10/100 NIC work optimally with Probe and Observer. Therefore you must manually update the driver as described in the following steps.

1. Right-click on My Network Places icon on the desktop and select **Properties** from the pop-up menu. The Network Connections folder is displayed.

2. Right-click on the **Intel 21143 Based PCI Fast Ethernet** connection and select **Properties** from the pop-up menu. Click **Configure...** on the **Intel 21143 Based PCI Fast Ethernet Adapter Properties** window. Click the **Driver** tab at the top of the resulting window, and the following dialog is displayed:

3. Click **Update Driver...**

The **Upgrade Device Driver Wizard**'s **Welcome** dialog is displayed. Click **Next** and the wizard asks you whether you want to search for a driver or pick one from a list:

4. Choose "Search for a suitable device" and click **Next**. The wizard asks you where to search for the driver:
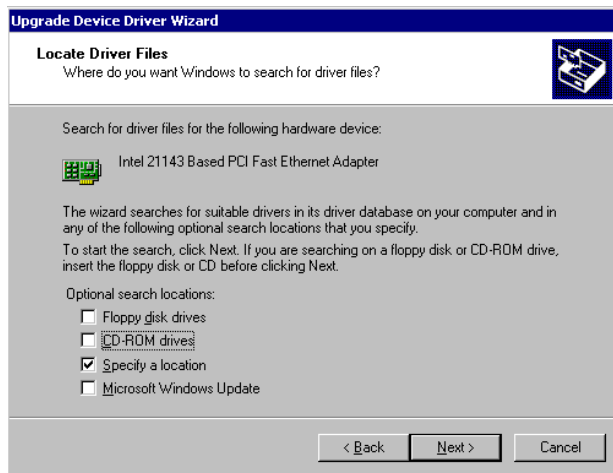
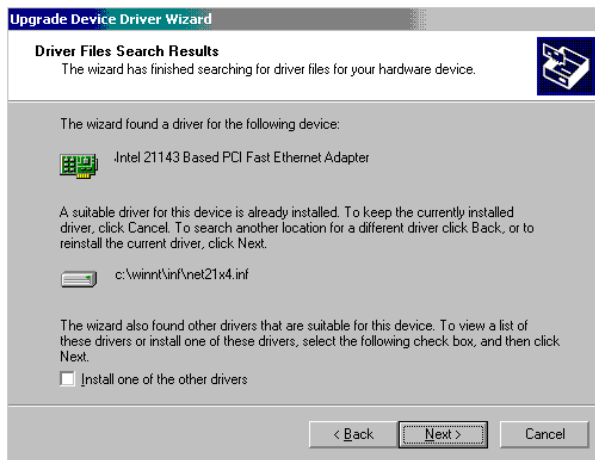5. Choose "Specify a Location" and click **Next**.
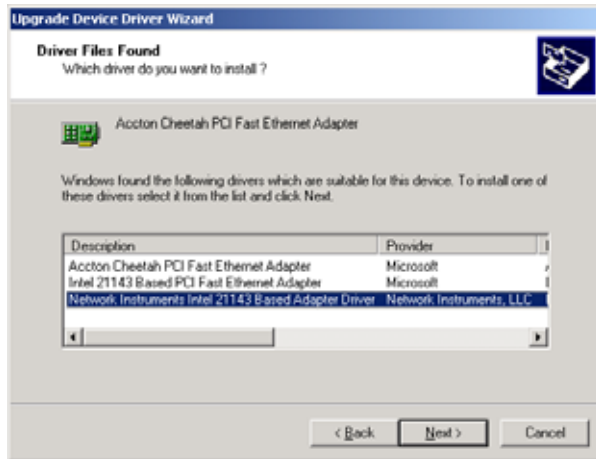
The wizard displays a file locator dialog:

6. Enter (or browse to) the following path (assuming the Observer directory is C:\Observer):

   c:\Observer Files\drivers\intel21143\win2000

7. Click **OK**, and the following dialog is displayed:

8. Choose "Install one of the other drivers" and click **Next**. The wizard shows a list of drivers to pick from:

9. Choose "Network Instruments Intel 21143 Based Adapter Driver" and click **Next**. After installing the device driver, the wizard displays an information dialog telling you that the driver was successfully installed. Click **Finish** to complete the driver installation.

WAN and 10/100 Driver Installation: Windows XP

When you reboot after installing the NICs, Windows XP will find drivers in its own library that it reports as matching. These drivers will not work correctly with Probe and Observer software: You must manually update the driver for each card, using the drivers supplied on the Network Instruments Application CD.

Follow the instructions in the section below to install the driver for each card.

Manually Updating the NIC Drivers

1. From the desktop **Start** menu, highlight **My Computer** and right-click. Choose **Properties...** on the pop-up menu. Click the **Hardware** tab on the resulting properties dialog, and the following is displayed:
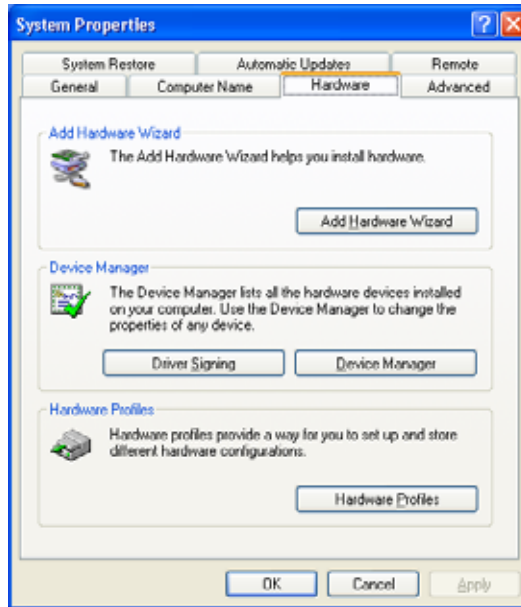
2. Click **Device Manager...** The **Device Manager** browser is displayed:
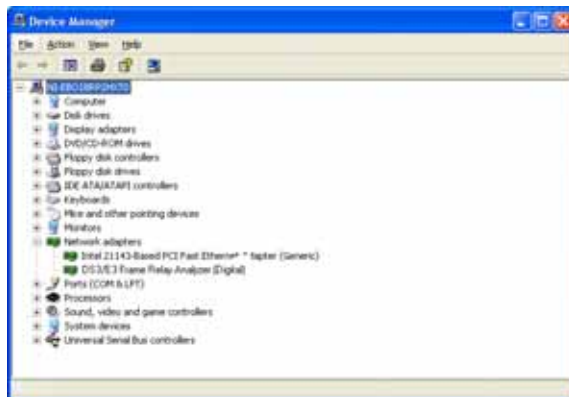
3. Browse to and right-click on the **Network Adapters > WAN Analyzer** driver (which will be named according to type: Digital T1/E1, DS3/E3, or Serial T1). Choose

Properties... and click the **Driver** tab on the resulting dialog, which will display the properties for that device.

4. Click **Update Driver...**,

   The **Hardware Update Wizard** asks you how you want it to install the driver:
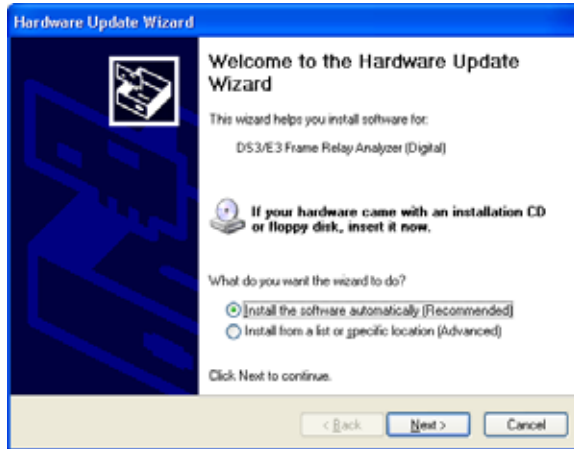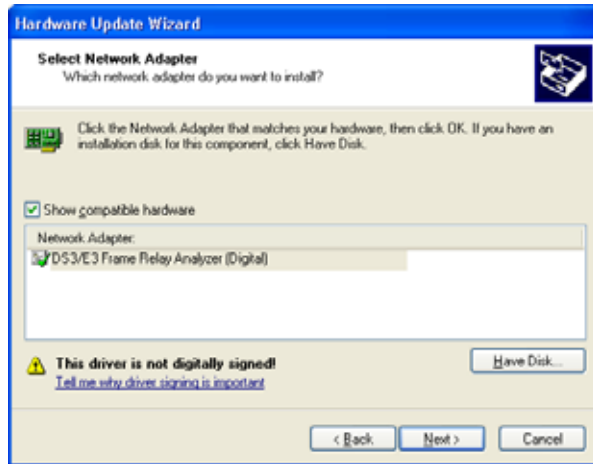

5. Choose "Install from a specific location" and click **Next**. The wizard then asks where to look for the file:
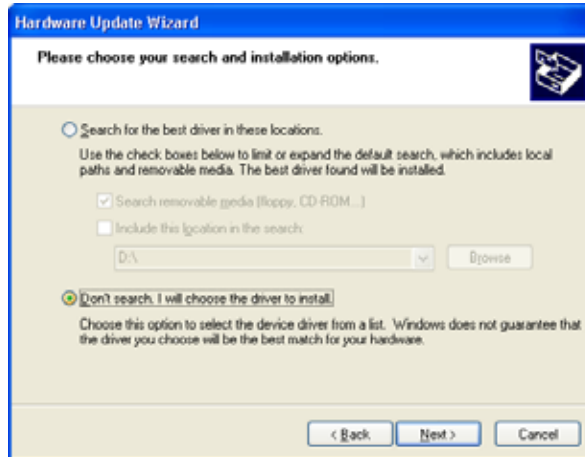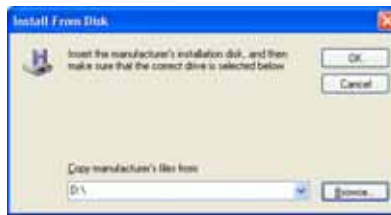

6. Select "Don't search...I will choose the driver to install." and click **Next.**

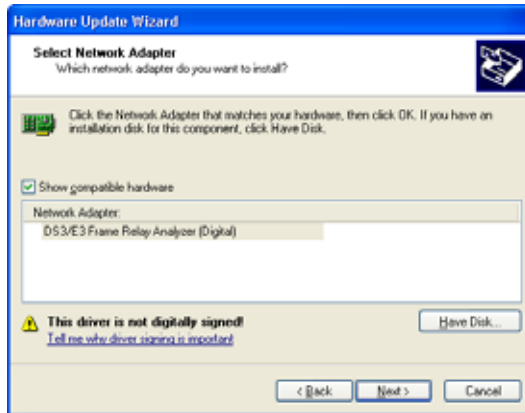The Wizard then shows you what it thinks is the matching driver:

7. Click **Have Disk...**, and a file locator dialog is displayed:

8. Enter (or browse to) the following path and click **OK** (assuming your Observer directory is C:\Observer Files):

    C:\Observer Files\Drivers\WAN

The wizard then displays the driver it found**:**

Depending on which card you have installed, one of the following adapters will be listed:

DS3/E3/HSSI WAN Analyzer (Digital)
T1/E1 WAN Analyzer (Digital)
T1 WAN Analyzer (Serial)

9. Click **Next.**

Windows informs you that the driver lacks a Microsoft digital signature:

10. Click **Continue Anyway**. Network Instruments has tested and verified that the driver works correctly with Probe and Observer on Windows XP.

11. After the wizard finishes installing the driver, Click **Finish** to close the confirmation dialog.

12. Repeat these same steps for updating the 10/100 NIC**.** When asked to specify a location for the driver, enter (or browse to) this path (assuming C:\Observer Files is your Observer directory):

> c:\observer files\drivers\intel21143\win2000

13. Click through the rest of the wizard as you did for the 10/100 driver. After you click **Finish...** on the last dialog, the custom driver installation is complete.

Configuring Ports Into Logical Links

You must define the physical *ports* on the WAN interface card or cards into logical *links.* Each WAN interface card includes 1, 2 or 4 physical ports. By using the WAN Driver Configuration tool to define logical links consisting of 1 or more ports, you will be able to:

- in the case of links with more than one port, obtain a cumulative view of statistics from more than one port

- in all cases, create meaningful names that you will see in the Observer probe list.

A good situation in which to view multiple ports as a single link is in the case of a pair of load-balancing WAN lines. Some link groupings make no sense and are not recommended, such as configuring a link consisting of ports connected to WAN lines coming from separate ISPs. Note that you can only create links from ports of the same type; for example you cannot create a link that contains both HSSI and DS3 ports.

Starting the Configuration Utility

Before you start the configuration utility, make sure you have closed Observer and shut down any Network Instruments Probe instances that may be running.

Click on **Start->Observer->WAN Driver Configuration.**

The configuration tool scans the system for NI WAN interface cards, displaying them in the order they are physically installed in the bus. Each card is identified by bus and device # (displayed at the top of the card), and the number of the physical slot the card occupies in the PC bus.

The ports on each card are listed under the card ID label, along with any logical links the port is associated with. If this is the first time the utility has been run, (or you have

performed a **Clear All** and **Rescan**), the utility will assign a logical link to each port, as shown in this two-card example:
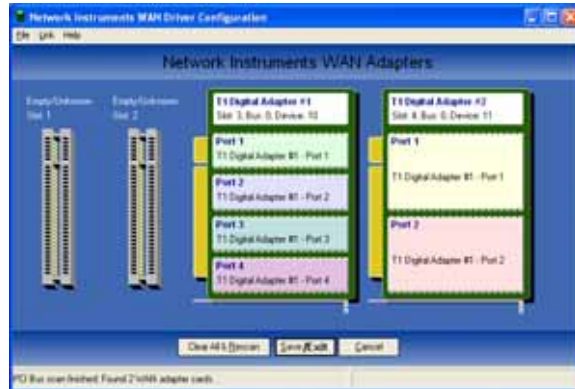
To create a link, use Shift+Click to select the ports you want to add to the link and choose **Link->Add Selected Ports to Link->New...** from the main menu (or right-click menu). The utility prompts you to name the link. As you create links, they are added to the **Link** menu for easy selection.

The example below shows the display after a number of logical links have been configured. Note that the New York link includes physical ports from both interface cards. The color coding helps you see immediately which ports belong to the same link:
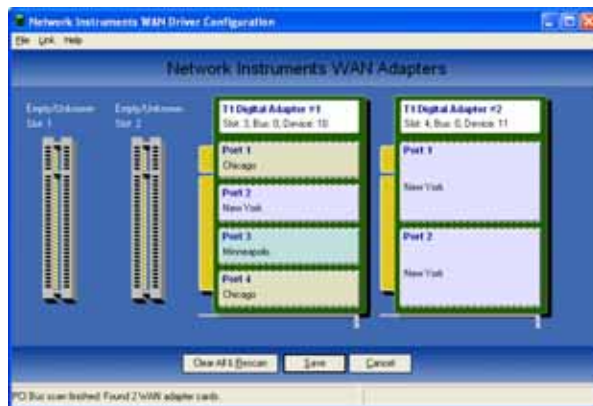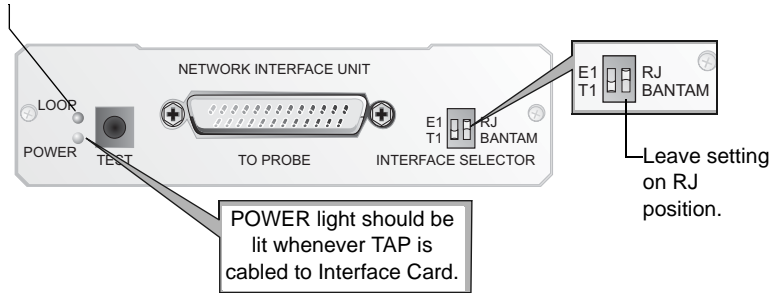

Click **Save/Exit** when you have configured the links you wish to create. The links you have configured will appear as named interfaces in Observer's WAN Probe list.

TAP Status LEDs and Switches

Take a moment to understand the TAP status LEDs, and the switch settings on the type of TAP you have installed on your Probe.

Digital T1/E1 TAP

LOOP Should remain unlit for normal operation.

NETWORK INTERFACE UNIT
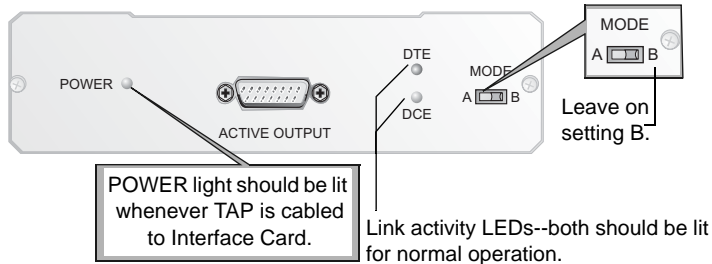
LOOP

POWER

TEST

TO PROBE

E1
T1

RJ
BANTAM

INTERFACE SELECTOR

E1
T1

RJ
BANTAM

Leave setting
on RJ
position.

POWER light should be
lit whenever TAP is
cabled to Interface Card.

Digital DS3/E3 TAP

Loss of Signal,
—*un*lit when the
given device
(DTE or DCE)
drops carrier.

DTE
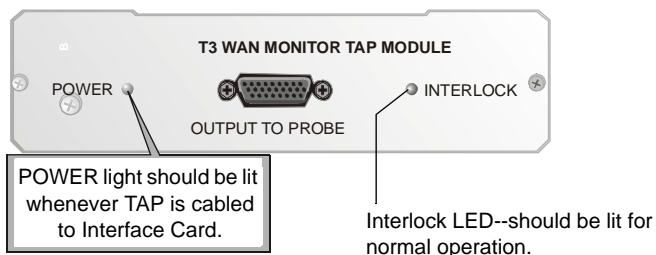LOS

DSE

DCE
LOS

IN

LOF

OUT

POWER

IN

LOF

OUT

Loss of Frame
—*un*lit when the
given device
(DTE or DCE)
drops a frame.

POWER light should be lit
whenever TAP is cabled to
Interface Card.

Serial T1 TAP

POWER

DTE

DCE

ACTIVE OUTPUT

MODE

A ▭ B

MODE

A ▭ B

Leave on
setting B.

POWER light should be lit
whenever TAP is cabled
to Interface Card.

Link activity LEDs--both should be lit
for normal operation.

HSSI TAP

T3 WAN MONITOR TAP MODULE

POWER

OUTPUT TO PROBE

INTERLOCK

POWER light should be lit
whenever TAP is cabled
to Interface Card.

Interlock LED--should be lit for
normal operation.

Running Observer Software with the WAN Probe

After you have installed the WAN Probe Kit hardware, drivers, and Probe software, you can run Network Instruments Observer to connect to the Probe and begin analyzing the network. To connect to the Probe, follow these steps:

1. Start Observer. From the **Tools** menu, select **Redirect Probe...**

2. Enter the name and IP address of the Probe system.

You can now select the Probe from the Observer Probe list. Observer works with the WAN Probe just as it does with any other Network Instruments Probe, with a number of differences, which are described below.

WAN Probe/Device Setup

Before you can analyze the WAN link, you must set some device options. Right-click on the WAN icon in the Probe List and select **Probe or Device Setup** from the pop-up menu (or from the **Options** menu). Depending on what type of WAN link you are analyzing, click the **T1/E1, DS3/E3/HSSI**, **Serial T1/E1**, or **Serial DS3/E3** tab.

Digital DS3/E3/HSSI Probe Settings

Setting	Explanation
WAN/Frame Relay Type	Choose DS3 (T3) , E3 or HSSI to match the type of link you are analyzing.
Encapsulation	You must set this to match the settings on the frame relay CSU/DSU. The encapsulation options are: -ATM-DXI - ATM Data Exchange -Frame Relay - Cisco -Frame Relay - IETF Standard -HDLC - Cisco Proprietary -LAPB (modulo-128) -LAPB (modulo-8) -PPP - Point-to-Point Protocol -X.25 over LAPB (modulo-128) -X.25 over LAPB (modulo-8)
Subprotocol	If ATM or LAPB is the selected encapsulation method, you must choose the subprotocols on the link. ATM subprotocol choices are NLPID and SNAP multi-protocol; LAPB subprotocol choices are IP and Ethertype multi-protocol
Fractionalized	Check if your link is configured for fractionalized operation.
Bandwidth	Set to match the bandwidth setting of the link you are analyzing.

Digital T1/E1 Probe Settings

Setting	Explanation
WAN/Frame Relay Type	Choose T1 or E1 to match the type of link you are analyzing.
Encapsulation	You must set this to match the settings on the frame relay CSU/DSU. The encapsulation options are: -ATM-DXI - ATM Data Exchange -Frame Relay - Cisco -Frame Relay - IETF Standard -HDLC - Cisco Proprietary -LAPB (modulo-128) -LAPB (modulo-8) -PPP - Point-to-Point Protocol -X.25 over LAPB (modulo-128) -X.25 over LAPB (modulo-8)

Setting	Explanation
Subprotocol	If ATM or LAPB is the selected encapsulation method, you must choose the subprotocols on the link. ATM subprotocol choices are NLPID and SNAP multi-protocol; LAPB subprotocol choices are IP and Ethertype multi-protocol
Link 1 and Link 2 Channel Settings (Note that for the link and settings to be activated, you must check the "On" checkbox for that link).	
Fractionalized	Check if this link is configured for fractionalized operation.
Channel selector checkboxes	Choose the channels you want to be included in the analysis.
Include in Util. Thermometer.	Check if you want to include statistics from this link in the Bandwidth Utilization Thermometer.

Serial T1/E1 Probe Settings

Setting	Explanation
WANFrame Relay Type	Choose T1 or E1 to match the type of link you are analyzing.
Encapsulation	You must set this to match the settings on the frame relay router. The encapsulation options are: -ATM-DXI - ATM Data Exchange -Frame Relay - Cisco -Frame Relay - IETF Standard -HDLC - Cisco Proprietary -LAPB (modulo-128) -LAPB (modulo-8) -PPP - Point-to-Point Protocol -X.25 over LAPB (modulo-128) -X.25 over LAPB (modulo-8)
Fractionalized	Check if your link is configured for fractionalized operation.
Bandwidth	Set to match the bandwidth setting of the link you are analyzing.

Operating Observer Passively

When analyzing a WAN link via the Observer Probe, Observer runs "passively." Passive operation guarantees that analysis will not affect the WAN link; however, it does have some implications when running Observer. Because there is no link over which the Probe system can transmit frames on the link, the following features are unavailable:

• Traffic Generation

• Collision Test

- Efficiency History

- Replay Packet Capture

Analyzing a WAN Link with Observer

In general, the WAN analysis works much like Ethernet analysis. One difference is that, when appropriate, Observer identifies WAN links by their Data Link Connection Identifier (DLCI) rather than by MAC address as is done with standard protocol analysis. In addition, many WAN statistical modes break out the data by DCE, DTE, and summary to reflect the full-duplex nature of WAN links. Modes unrelated to WAN analysis are greyed out and unavailable.

The following sections describe how the available Observer modes operate to analyze a WAN link.

Discover Network Names

To access this mode, choose **Tools->Discover Network Names**

Discover Network Names mode will show DLCIs instead of MAC addresses. You can also define the Committed Information Rate for each DLCI you are monitoring with WAN Observer.

Setting the Committed Information Rate (CIR) for a DLCI

The Committed Information Rate defines the guaranteed bandwidth for a WAN connection. If you want Observer's WAN Vital Signs and WAN Load by DLCI to monitor CIR compliance, you must specify the CIR. A number of WAN triggers and alarms also use this information, allowing you to be notified if the link is not performing to the CIR.

To set the CIR for a DLCI or group of DLCIs, click the edit DLCI CIR button on the Discover Network Names mode window. The following dialog is displayed:
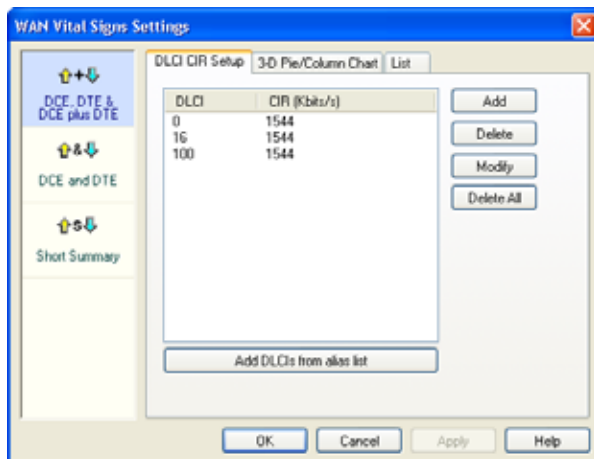
Add a DLCI (or select one from the list and click **Modify**). Type or use the spinbox to set the CIR in Kbits/sec for the DLCI. Click OK when you are done.

WAN Bandwidth Utilizationl

To see the percentages of bandwidth saturation on DCE, DTE and DCE+DTE (Summary) for each configured link, choose **Statistics->Bandwidth Utilization.** The mode starts automatically:
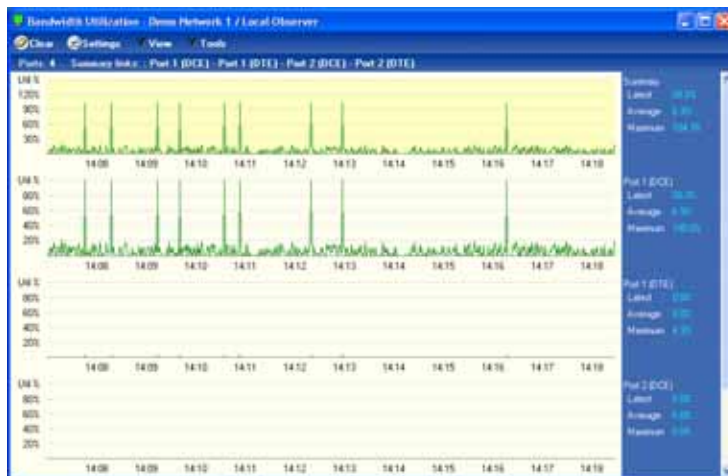
WAN *links* have two *ports* (DCE and DTE), so for a dual link T1, you could display up to 5 charts (including the summary). The mode is available in chart,

pie, graph and dial views. The display setup dialog (click **Settings** to access), lets you choose what ports to display as well as color and scale options.

> The Bandwidth Utilization display is not subject to any filters as it compares the actual activity on the network to the network's theoretical capacity.

WAN Vital Signs by DLCI

In WAN Observer, the Network Vital Signs display is replaced by the WAN Vital Signs by DLCI mode. This mode provides a summary of the errors occurring on a WAN link (E1/T1/DS3/E3).

You can choose what portion of traffic you wish to view from the list box in the upper left corner of the window: DCE, DTE, or Summary.

DTE (Data Terminal Equipment), in the context of a WAN link, refers to the DSU/CSU. DCE (Data Circuit-terminating equipment) refers to the WAN switch (which may reside remotely at the line provider's site). Summary view shows a concatenation of traffic from both ends of the link.

List View

The following statistics are shown, broken down by DLCIs (which are listed in the leftmost column). You can change the sort order by clicking on any of the column headings:

Column	Description
DLCI	Data Link Connection Identifier of the statistics that follow.
DCE KBits/s Max	The maximum bit rate sensed so far from the DCE side of this DLCI, in Kbits per second.
DTE KBits/s Max	The maximum bit rate sensed so far from the DTE side of this DLCI, in Kbits per second.
DCE Kbits/s Avg	The average bit rate sensed on the DCE side of this DLCI, in Kbits per second.
DTE Kbits/s Avg	The average bit rate sensed on the DTE side of this DLCI, in Kbits per second.
DCE FECN under CIR	The number of packets seen on the DCE side of the link that had the Forward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.

Column	Description
DTE FECN under CIR	The number of packets seen on the DTE side of the link that had the Forward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.
DCE BECN under CIR	The number of packets seen on the DCE side of the link that had the Backward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.
DTE BECN under CIR	The number of packets seen on the DTE side of the link that had the Backward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.

WAN Load by DLCI

In a WAN installation, Observer's Network Activity Display is called WAN Load by DLCI. This mode shows critical WAN transfer rate and congestion statistics in a number of formats. This display can show you the health of a WAN link at a glance and can warn of impending slowdowns due to congestion or other error conditions.

The WAN Load by DLCI mode can be viewed as a dial, graph, or list display. Except for list view, there are no setup options for WAN Load by DLCI mode. Every view includes a dropdown box that lets you select which DLCI you want to monitor.

To activate WAN Load by DLCI, choose **Statistics > WAN Load by DLCI**. Press the Play button to start the mode.

Dial View

The WAN Load by DLCI mode in dial view shows transfer rate, CRC error rate, FECN/BECN frame rates graphed on dial meters.

DLCI CIR Setup

Click **Settings** and then the **DLCI CIR Setup** tab to display a dialog that lets you enter DLCIs and their corresponding Committed Information Rates. You can eithe enter the DLCIs manually, or automatically add DLCIs from Observer's current alias list.

Graph View

The WAN Load display in graph view shows these same statistics (transfer rate, CRC error rate, and FECN/BECN frame rates) as superimposed spike meters. The Committed Information Rate (CIR) is also shown, allowing you to view the network activity against the baseline performance you have contracted to receive from your WAN service provider

You can select line, point, or bar-style meter, and the colors for each statistic by right-clicking on the chart. The dropdown menus at the top of the display let you select what DLCIs to view, and how the chart should be scaled (linearly, logarithmically, or autoscale). For linear scales, you can also set the CIR or the line rate as the maximum value for the chart.

List View Display Properties

The Network Activity List view has only one display property option. To reset the columns to their default widths, click on the icon or go to **Mode Commands->Display Properties** (or simply right-click on the display).

To reset column widths to their default values, click Yes. To leave them in their present state, click No.

Top Talkers

Just as in standard Observer, Top Talkers shows the IP and MAC address of stations on your network sorted by volume of traffic generated and received. In WAN Observer, the MAC Address tab shows DLCIs sorted by volume of traffic. Also, the sorting and charting statistical criteria (such as percentage of packets, packets per second, etc.) that apply to WAN is a subset of those available for standard network analysis.


WAN Filtering

In addition to the standard Observer packet filtering rules (station address, pattern matching, etc.), there are two WAN-specific filtering rules available for use with WAN probes:

- DLCI Address, which lets you enter the number of the DLCI address you wish include or exclude.

- WAN Conditions, which let you include or exclude frames based on flow direction, forward and backward congestion, and discard eligibility.

To create a WAN filter rule, choose **Actions->Filter Setup for Selected Probe.** The default filter rule (any address<-->any address) is displayed. Select and right click on the rule to display the popup menu:
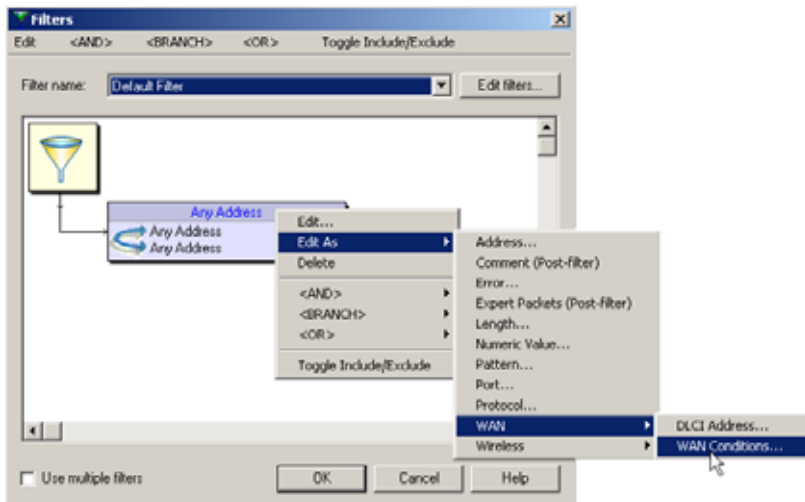
Choose the desired filter rule from the menu. A dialog is displayed letting you set the filter rule options. Refer to the Observer Reference Guide and online help for further information about using filters and editing rules.

Triggers and Alarms

WAN Observer adds WAN-related criteria to the standard Triggers and Alarms mode.

Click the [Alarm Settings] button located in the lower left corner of Observer's main window. A dialog that allows you to select the Probe or Probes for which you want to set alarms is displayed:

The **Alarm List** tab lets you turn alarms on and off:
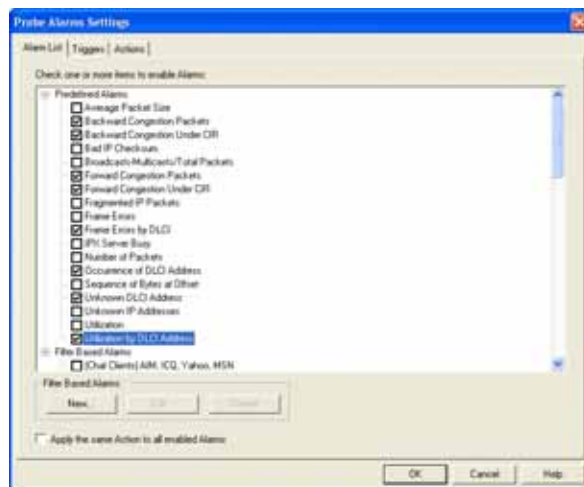
Check the alarms you wish to set, then click the **Triggers** tab to set the criteria by which the alarms will be triggered:
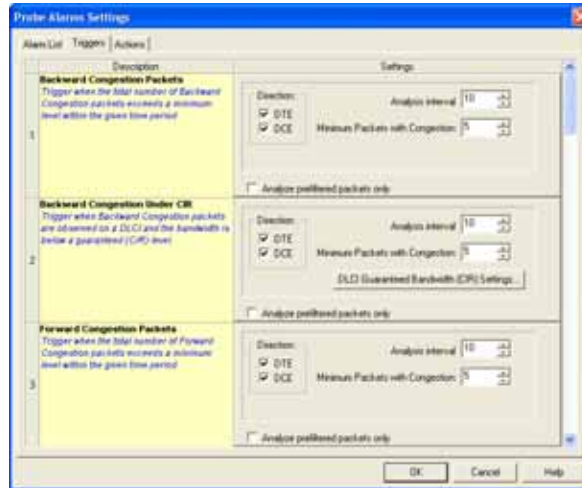
Note that most WAN alarms can be set on the DTE or DCE side or both; note also that the Committed Information Rate displayed is that which you set in Discover Network Names mode. See "Setting the Committed Information Rate (CIR) for a DLCI" on page 30. The **Actions** tab lets you define actions to launch if an alarm is triggered. You can log messages, send email, or even send a pager alarm.

Notes:

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