

FLUKE®

NetTool™
Network Connectivity Tester

Users Manual

PN 1560821

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Chapter 1 Overview

Introduction

The Fluke NetTool™ Network Connectivity Tester (hereafter referred to as NetTool) is a unique handheld device that combines cable, network, and PC configuration testing into a single, handheld unit. NetTool was designed specifically to speed your frontline network troubleshooting, “moves, adds & changes,” and desktop-to-network connectivity work.

NetTool is available in two models: NetTool Standard model and NetTool Inline version.

NetTool Standard features include:

- Single-ended mode

NetTool Inline features include:

- Single-ended mode
- Inline Mode

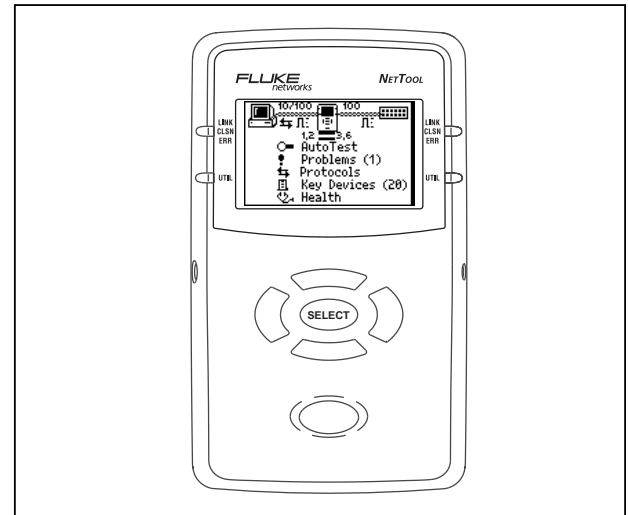


Figure 1-1. NetTool

ahn010f.eps

These features are discussed throughout this manual in their pertinent sections. You can also access **www.flukenetworks.com/nettool** and navigate to the NetTool area to access software updates, documents, and the latest news on NetTool.

Register Now!

Get a free personalized holster for your NetTool by visiting **www.flukenetworks.com/nettool** and registering your NetTool today. Follow the instructions to get a


company or personal name embossed on the holster. Upon registering your NetTool, Fluke will send the personalized holster free of charge.

Table 1-1 shows an overview of what NetTool provides.

Table 1-1. NetTool Overview

<p>Service Identification</p> <p>Telco Token Ring Ethernet</p> <p>Health</p> <p>Broadcast/Error meters</p> <p>Cable Test</p> <p>Wiremap</p> <p>PC Configuration</p> <p>Link Config Health Addresses Used Servers Used</p>	<p>Link Configuration</p> <p>Link ID Rx Pair Advertised Speed Actual Speed Level Polarity Advertised Duplex Actual Duplex</p> <p>Services (Key Devices)</p> <p>IP Servers IPX (NetWare) Servers NetBIOS Servers Printers Routers</p> <p>Problems – The Problem Log provides a concise list of all problems detected, from physical layer to application layer problems.</p>	<p>Single Ended Mode This mode enables you to check a network drop or network device for activity, determine its speed and duplex settings, confirm healthy frames are being received from the network; and to check connectivity to the network (when plugged into a hub or switch).</p> <p>Inline Mode If you have purchased this option, inline mode occurs when NetTool is plugged in between two devices simultaneously like a PC and the network. You must purchase this option for permanent activation. Trial uses are provided.</p> <p>Quick Reference Guide Read the <i>NetTool Quick Reference Guide</i> (P/N 1560839) that came with your purchase to become familiar with and quickly begin using your NetTool.</p> <p>Upgrade Get updates to NetTool software when they are released via the internet.</p> <p>Personalization Get a free holster for your NetTool by visiting the NetTool web site and registering your NetTool.</p>
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Software Version

To determine the version of the software in your NetTool, highlight the **Setup**  icon and press the **Select** (middle) button. Highlight **About NetTool...** and press **Select** again.

The software version number is displayed on the screen as **SW Rev: x.x**. Read the *NetTool Quick Reference Guide* (P/N 1560839) and the NetTool Blaster program online help for instructions on updating NetTool.

Supplied Equipment

The following equipment is supplied with the NetTool:

- Four (4) AA batteries (P/N 1560231)
- Serial Cable (P/N 1541340)
- Wiremap adapter (P/N 1563930)
- CD-ROM Disk (P/N 1560821)
- NetTool Users Manual*
- NetTool™ Blaster! (update software)

Optional Equipment

The following optional items and can be purchased through Fluke or your local distributor:

- A/C Adapter (P/N 1556346)
- Battery Charger (P/N 1572191)
- Rechargeable Batteries (P/N 1572184)

Placing Orders and Getting Assistance

To locate an authorized service center, visit us on the World Wide Web at **www.fluke.com** or call Fluke using one of the phone numbers listed below:

- USA : 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-36-5853)
- Europe: +31 40-267-8300
- Japan: +81-3-3434-0181
- Singapore: +65-★-737-2922
- Anywhere in the world: +1-425-356-5500

Getting Acquainted

Use four (4) AA size batteries (supplied P/N 1560231) or the optional rechargeable batteries (P/N 1572184) as shown (optional charger PN 1572191).

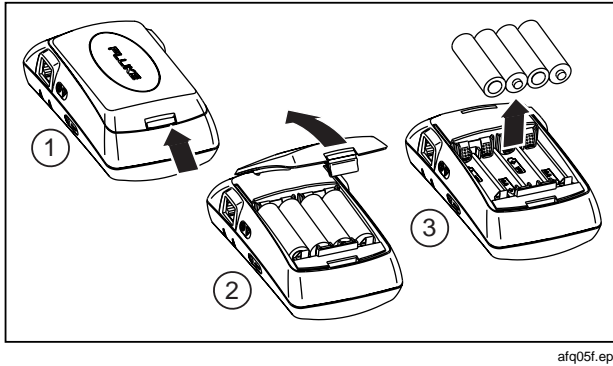


Figure 1-2. Battery Compartment

The optional AC adapter can be used to power the unit and conserve battery power. The adapter plugs into the left side of NetTool.

Read the *NetTool Quick Reference Guide* that came with your purchase to start using NetTool right away. You can also access www.flukenetworks.com/nettool for the

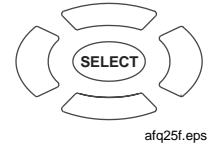
latest news on NetTool, troubleshooting tips, and service information.

Buttons and Indicators

- ⇒ **Power** – press once to turn on or off.
- ⇒ **Backlight** – Once NetTool has power, you may turn on the *backlight* by simply pressing the power button quickly. Turn it off by pressing the **Power** button quickly again.

Navigation Buttons

After powering up NetTool, just press the buttons that make up the oval under the screen and highlight an icon or menu item you wish to view (*up, down, right, left*). As you navigate, the highlighted area flashes. Also, if a list is longer than can be displayed, use the up and down buttons to scroll through it.

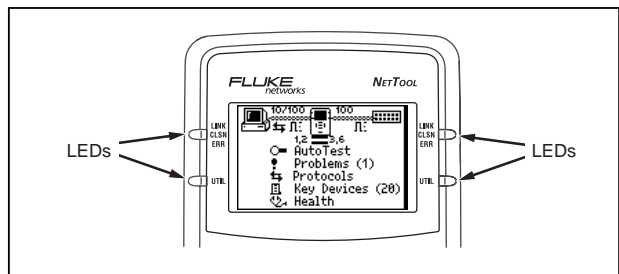


- ⇒ Press **Select** (middle button) once to view an item and related screens.
- ⇒ Within a screen that is “scrollable,” use the up and down key to scroll. Within a menu screen, the right button returns you to the **⌂**. The right and left buttons act as a page up (left) or page down (right) if there are more items to view.

⇒ Press the **Up** key to navigate to the **✘** (top right) and press **Select** to close the current screen.

NetTool LED Indicators

NetTool has two tricolor LED indicators on each side to reflect link and health information at a glance.



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Figure 1-3. NetTool LEDs

Link/Collision/Error LED

Green = Link pulse present

Yellow = Collisions occurring

Red = Errors occurring (FCS, jabbers, etc.)

Utilization LED

The bottom tricolor LED indicates utilization percentages for each side.

Green = utilization levels below 40%

Yellow = levels between 40% and 70%

Red = levels greater than 70%

Serial Connection

Connecting NetTool to a PC via the serial cable (supplied) allows you to download new software, enable options, or save screens using the NetTool Blaster program supplied on the CD-ROM.

NetTool Modes

NetTool has two RJ-45 jacks, one on each side of the unit. Plug it in and turn it on...either between two devices like a hub and a PC or directly into a wall plate to check a network drop.

NetTool can be used in two modes: **Single-Ended Mode** and **Inline Mode**.

Single-ended Mode

Note

To optimize discovery, connect NetTool with the device (like a PC) off, turn NetTool on, press **AutoTest**, then turn the device on.

- ⇒ Plug an RJ-45 cable into a network drop or a single network device, such as a hub, PC, server, or printer.
- ⇒ Plug the other end of the cable into either side of NetTool and press **AutoTest** by pressing the **Select** button. The NetTool screen displays the NetTool itself and the other device.

Use this mode to quickly prove a network drop or network device is active, determine its speed and duplex settings, confirm healthy frames are being sent, and check connectivity to the network (when plugged into a hub or switch). Read Chapter 2, *NetTool Menus*, for more information on the menus and icons.

Inline Mode

Note

NetTool must sense traffic on a network or device so it can supply protocol or health information.

Inline means NetTool is plugged in between two devices simultaneously such as a PC and network hub. Use this mode to verify that a PC will communicate properly with the network.



Cable Testing

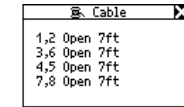
Using Cable AutoTest, you can check cable length, detect split pairs, or use the wiremap adapter (supplied P/N 1563930) to verify pin-to-pin continuity from the near to the far end of a cable.

Cable AutoTest

- ⇒ Plug the cable to test into the jack on either side of the NetTool. Power up NetTool. **AutoTest** flashes. Press **Select**.
- ⇒ Highlight the Spool icon and press **Select** to see cable status. NetTool detects cable length, opens, shorts, and split pairs.



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afq32s.bmp

Wiremap

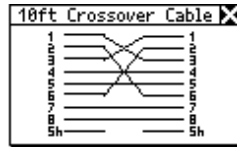
⇒ To use wiremap, attach the wiremap adapter to the far end of the cable.



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⇒ Power up NetTool. **AutoTest** flashes. Press **Select**.

⇒ Highlight the Wiremap icon and press **Select**.



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Service Identification

- ⇒ Plug NetTool into any RJ-45 wall jack.
- ⇒ Power up NetTool and select **AutoTest**. Doing so shows you what service is active on the jack being tested:

Telco: Shows the tip and ring pins (in the case of voice being carried on an RJ-45).

⚠ Caution

Although NetTool can detect Telco signals, it is **not designed to be connected to the public telephone network. Disconnect immediately. NetTool cannot reliably discover Telco information with the AC adapter or serial cable connected.**

- ⇒ **Token Ring:** Indicates the presence of a Token Ring network.
- Ethernet:** Tells you if the jack is hot, what's on the other end (hub, switch, etc.), as well as the speed and duplex, level, and polarity. Also shows the segment ID so you can pick the right network to hook up to a PC (if there are multiple jacks).

Services Discovered

Table 1-2 lists the services detected by NetTool.

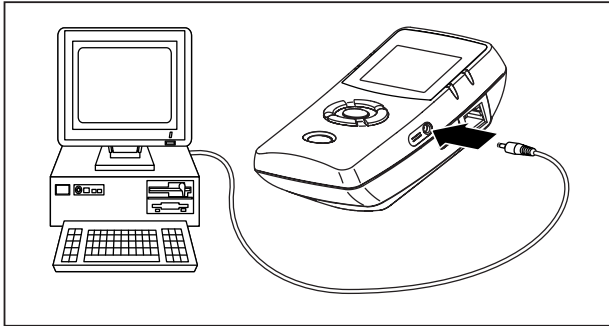
Table 1-2. Services Discovered

Device	Services
Servers	<p>IP Servers (IP services discovered): DHCP, DNS, email (SMTP, POP, IMAP), Web (HTTP, HTTP proxy), WINS.</p> <p>NetWare Servers (IPX service types): Nearest File Server, File Server, NetWare Access server, Time Synchronization Server, NetWare Directory Server (NDS), NetWare Management Server.</p> <p>NetBIOS Servers: Primary Domain controllers, Backup Domain controllers, Master Browsers.</p>
Routers	<p>IP Routers: RIP, IGRP, EIGRP, OSPF, IRDP, RIP2.</p> <p>IPX routers: RIP.</p>
Printers	<p>IP Printers - IP Printers, IP Print Spoolers.</p> <p>IPX Printers - IPX Print services.</p> <p>DLC Printers - Microsoft DLC, HP DLC.</p>

NetTool Updates, etc.

Get updates to NetTool software when they are released. To check the version you have, select the **NetTool Setup** icon.

- ⇒ To find out if there is a new version, access **www.flukenetworks.com/nettool** and navigate to the software download area. Check the software file displayed in that area and determine if it is a new file.
- ⇒ To update your NetTool, follow the web instructions to download the file. Use the supplied serial cable as shown in Figure 1-4.



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Figure 1-4. Serial Cable Connection

- ⇒ If you received the upgrade on CD-ROM, install the link utility by running SETUP.EXE from the CD-ROM. Follow the directions given by the SETUP program.
- ⇒ If you downloaded the upgrade from the web, run the self-extracting upgrade program to install the newer version. After installing and starting the program, select **Help** from the top menu and follow the instructions to update your NetTool.

NetTool Blaster



Updating NetTool is a simple process that requires you to run the update utility that came on CD-ROM or from the web.

Chapter 2

NetTool Menus

Introduction

Navigating within NetTool is easy and fast. If a link pulse is detected, NetTool searches for devices on the network and then displays them on its easy-to-read display. Navigation is based the icons and menu below them.

NetTool Menus




There are two sets of menus to assist in troubleshooting: the **top area** (Figure 2-1) containing icons and the **main menu** (Figure 2-2) below the icons.



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Figure 2-1. Top Area

The three top area icons take you through menus corresponding with the three elements of the connection:

-  ⇒ **PC**
-  ⇒ **NetTool Setup**
-  ⇒ **Network**

The main menu takes you through various discovery screens that reflect NetTool's connection to devices.

In addition, link information is displayed between the device icons and cable information is displayed below the NetTool Setup icon (see *Link and Cable Information* later in this chapter).

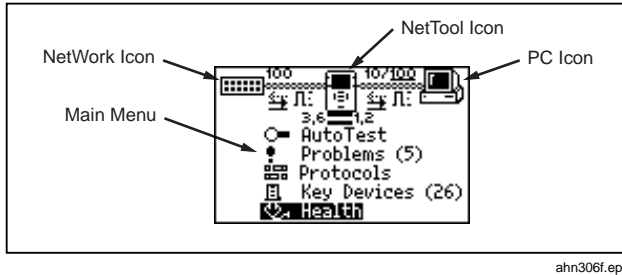



Figure 2-2. NetTool Menus

NetTool Menus - PC

⇒ Connect NetTool to a PC and press the PC  icon. The icon displays on the left or right, depending on where you connected the cable. Figure 2-3 displays the list of PC information you can access.

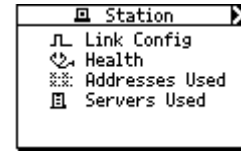


Figure 2-3. Station Menu

⇒ After the PC sends frames, you can scan the PC configuration by navigating through the menu. This view of the PC is invaluable in troubleshooting networked PCs.

Link Configuration

The Link Config screen (Figure 2-4) provides the following key link pulse information about the device (e.g., the PC) to which NetTool is connected:

Receive (Rx) Pair	Polarity
Advertised Speed	Advertised Duplex
Actual Speed	Actual Duplex
Level	

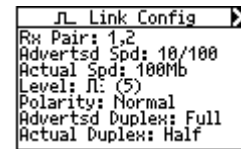
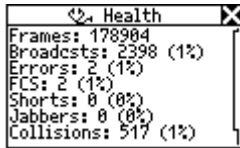


Figure 2-4. Link Configuration Details

Health

The Health option enables you to check the health of frames the PC has sent since you started **AutoTest** and isolate PC related problems. There are two types of Health screens: one that displays activity since the last **AutoTest** (Figure 2-5) and one that relates to what is going on now. In other words, statistics accessed from a device-related menu (Figure 2-3) are cumulative (as in Figure 2-5) whereas statistics you see from the main menu are a “snap shot” of what is going on now for a given device (read *Health* later in this chapter).



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Figure 2-5. Health Details

Addresses Used

NetTool displays the best-discovered name on the PC as well as the IP, IPX, and MAC address of the PC.



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Figure 2-6. Addresses Used

Servers Used


This area shows the network resources the PC is using, including HTTP, SMTP, POP, WINS, Nearest NetWare, DHCP and DNS servers, as well as the router gateway.



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Figure 2-7. Servers Used

NetTool Setup

Select the **NetTool**  (middle) icon. The NetTool Setup screen displays (Figure 2-8). You can:




- ⇒ Check the battery  level.
- ⇒ Change measurement setting from feet to meters.
- ⇒ Enable/disable **Auto Off**. If you leave the unit on without touching any keys for more than two minutes, **Auto Off** automatically shuts the unit down and saves battery power.
- ⇒ Adjust the display contrast. Highlight  and press **Select** to decrease contrast or  to increase it.
- ⇒ Highlight **Unwanted Protocols** and press **Select** to specify protocols that NetTool will warn you are present on the network. This helps in situations like a network-wide migration away from certain protocols. If NetTool sees them, it reports them in the Problem Log.
- ⇒ Select **Restore Defaults** to restore all factory settings. If you have not changed any settings, NetTool displays **Defaults Restored** and no action is required.
- ⇒ View software/hardware details. Highlight and select **About NetTool** to view the serial number, MAC address, and revision information.



Figure 2-8. NetTool Setup

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Network



The Network  icon displays on the left or right depending on where you connected the cable. Highlight the Network  icon and press **Select** to view available network activity (Figure 2-9).



Figure 2-9. NetWork Menu

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Link Config: (described in the PC section)

Health: (described in the PC section)

Segment ID: If there are multiple Ethernet drops, knowing the Segment ID tells you which jack to use for the correct configuration.

Link and Cable Information



Notice the link and cable information between the device icons in Figure 2-10. Note the duplex settings and link speeds that are underlined. The underline signifies a determined or negotiated result.



Figure 2-10. Top Area





Duplex Settings

NetTool provides duplex settings for each device, advertised or collision-determined. Duplex mismatches can impede communication between devices.

-  Full Duplex
-  Half Duplex

Link Level and Polarity: Polarity is displayed via waveform shaped icons as shown in Table 2-1.

Table 2-1. Link and Polarity Level

Indicator	Definition
	Normal level, normal polarity
	Normal level, reverse polarity
	Low level, normal polarity
	Low level, reverse polarity. Link level is displayed by the height of the waveform.

1,2 = 3,6

Cable Status: NetTool shows you the status of the cables connected to it below the Setup icon and detects whether the cables are straight or swapped. NetTool sees a swap cable problem and swaps it internally, allowing you to troubleshoot past a simple swap cable problem.

NetTool Main Menu

The main menu items are your starting point. View NetTool's discovery screens to resolve connectivity problems. The results are displayed in the top area and within the discovery screens accessed from the main menu.

AutoTest

- ⇒ Plug NetTool inline between the PC and the network.
- ⇒ Power up the PC.
- ⇒ Select **AutoTest**. The example shown in Figure 2-12 represents NetTool connected inline between a PC and a network hub.



Figure 2-11. AutoTest

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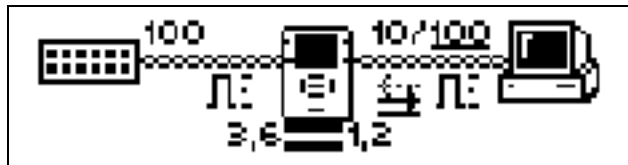


Figure 2-12. AutoTest Results

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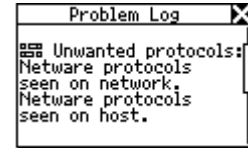
- ⇒ Select the **PC** or **Network** icon for more link configuration information, health, Segment ID, and for PCs, address and server information.

Problems



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Figure 2-13. Problems



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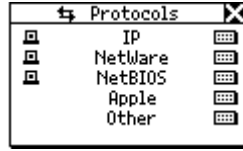
Figure 2-14. Problem Log

- ⇒ Select **Problems** to view the Problem Log. The Problem Log provides a concise list of all problems detected, from physical layer to application layer problems. You can think of problems fitting into two categories: **Link Connectivity** level and **Network** level. Read Chapter 3 for full descriptions of problems and general troubleshooting tips.

Protocols



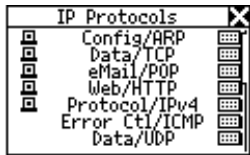
ahn237f.wmf



ahn238.wmf

Figure 2-15. Protocols **Figure 2-16. Protocol List**

- ⇒ Select **Protocols** to view the protocols seen on the desktop or network (Figure 2-16). This can be very useful for finding protocol configuration mismatches.
- ⇒ View details by highlighting any protocol listed and pressing **Select**. Figure 2-17 shows an example of IP Protocols. The icons listed on each side represent the device (i.e., PC, network) and whether that given protocol is running on that device. Table 1-2 lists the protocols that NetTool can discover.



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Figure 2-17. IP Protocols

Key Devices



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Figure 2-18. Key Devices **Figure 2-19. Key Device List**

- ⇒ Select **Key Devices** to view all the servers, routers, and printers NetTool has found on the network (Figure 2-19). NetTool always attempts to display the highest level address possible for that device, be it a NetBIOS name, DNS name, IP address or Mac address. This helps you determine which services or servers exist on the network.
- ⇒ The list of devices can be invaluable in troubleshooting because it verifies whether a device is seen on the network which helps pinpoint where a configuration problem may exist.

Health

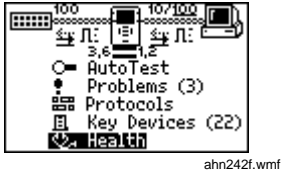


Figure 2-20. Health

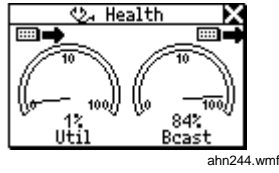


Figure 2-21. Health Display

- ⇒ This feature enables you to segment problems. After you select **Health** from the main menu, you can view the health of frames and simultaneously check each side of the connection for healthy frames in real time (Figure 2-21).
- ⇒ Use the navigational buttons and press **Select** on any item within the screen to change the view. For example, selecting **Util** changes the view to broadcast traffic, collision levels, or errors coming from either device to which NetTool is connected.

- ⇒ You can also highlight the device in the upper right or left to change what NetTool is viewing in real time and the direction (to/from network or to/from PC). This enables you to make comparisons. For example, you may see a high percentage of network utilization and the PC is also registering high utilization. You can segment what the PC is doing to contribute to that large number by highlighting **Util** and pressing **Select** (broadcasts, errors, etc.).
- ⇒ Highlight the reading below a meter and press **Select** to view the data expressed as “per second” (frames broadcasts, errors, etc.) or as a percentage of current activity.

Note

*If you exit the Health display and return later without powering down, NetTool displays the “last-saved” settings. If you power down NetTool while viewing the Health display, the readings will not be saved. Access Setup screen and select **Restore Defaults** to restore factory settings.*

Chapter 3 Problems

Introduction

Select **Problems** (Figure 3-1) from the main menu to view the Problem Log. The Problem Log (Figure 3-2) provides a concise list of all problems detected, from physical layer to application layer problems.



Figure 3-1. Problems

ahn301f.wmf

Each type of problem has an icon associated with it. For example, health-related problems are represented by a stethoscope icon. As you see problems, you will become familiar with the associated icons that display.

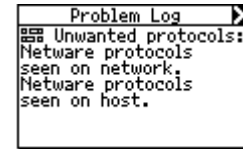


Figure 3-2. Problem Log

ahn302f.wmf

More importantly, you should understand that just because something is listed in the Problem Log does not necessarily indicate a catastrophic problem. For example, Unwanted Protocols are listed in the Problem Log but they are not a major impediment to the operation of the PC on the network.

You can think of problems fitting into one of two categories, **Link Connectivity** or **Network** level. Link Connectivity problems relate to cabling or cabling properties. Network problems are those involving

PC/network configuration settings or PC to server interactions.

Generally, network problems you encounter in setting up or changing a PC's connection to the network can be resolved by checking the network settings area on the PC.

In single-ended mode, NetTool can only report **Unwanted Protocols** and link connectivity level problems. Inline mode is required for all other problems. Read Chapter 1, *Overview*, for an explanation of these two modes.

The great thing about NetTool is that it enables you to see which side the problem lies, between the PC and NetTool or between NetTool and the network itself. Whether it is a cabling problem or a protocol mismatch, NetTool helps you isolate a problem and keep things running.

The following section lists the problems that NetTool can detect. Each problem is explained in more detail (if needed) and a possible **Remedy** is listed. Every network is complex and the remedy listed is meant to help you start troubleshooting. This is not an exhaustive troubleshooting guide.

Link Connectivity Problems

These problems involve cabling or cabling properties and are classified as follows:

Problem: *Speed mismatch*

Explanation: The network is running at 10 Mbps and the PC is running at 100 (or vice versa). This problem prevents connection to the network.

Remedy: Correct the speed mismatch by making sure both devices are running at the same speed.

Problem: *Pair mismatch*

Explanation: Link pulse is being sourced on the same wire pair by both sides. This problem does not prevent connection to the network. NetTool automatically swaps the pairs to correct this problem.

Remedy: Check cabling. It could be plugged into an uplink port. Also, there could be a crossover cable between NetTool and the device.

Problem: *Duplex mismatch*

Explanation: One side is running at half duplex and the other is running full duplex. This problem prevents connection to the network.

Remedy: Reconfigure the devices so the duplex settings match.

Problem: *Polarity reversed*

Explanation: The polarity of the detected link pulse is reversed.

Remedy: There is most likely a pair reversed. Check cabling to ensure the pairing is corrected.

Problem: *Level low*

Explanation: The link pulse detected from a device is low. This can negatively affect performance.

Remedy: Replace the NIC card or change hub/switch ports. This could also be caused by excessive cable attenuation.

Problem: *Transmit pair open*

Explanation: The wire pair used for transmit (1,2 or 3,6) has an open. This problem prevents connection to the network.

Remedy: Isolate the cable and replace it.

Network Problems

This section lists all the network problems with a brief explanation of each problem. Also listed are some basic corrective steps you can take for each problem (if applicable). Keep in mind this is not an exhaustive list of troubleshooting steps. If you know what you need, the network administrator for the network you are troubleshooting can provide you with a lot of information to correct these problems.

Health

Problem: *Short Frames received (also jabber/FCS).*

Explanation: Short Frame is a frame smaller than the minimum legal size (less than 64 bytes after the preamble) with a good frame check sequence. Jabber is defined as frames longer than the maximum legal size (greater than 1518 bytes). Frame Check Sequence (FCS) Bad FCS means the header information is probably correct but the checksum calculated by the receiving station does not match the checksum appended to the end of the frame.

Remedy: Check NIC card or NIC driver file. This could also be caused by cabling or grounding problems.

Problem: *Excessive utilization seen (also collisions).*

Explanation: Excessive utilization/collisions is defined as a collision rate of greater than 5 percent or a utilization rate of greater than 70 percent.

Remedy: If this problem exists everywhere on the network, it is most likely caused by excessive traffic. If it is isolated to one PC, you can suspect cabling. For collisions, suspect excessive traffic. Reduce traffic on the network. Check cabling. Change the NIC card or switch/hub port. For utilization, reduce the number of stations in the collision domain. Install a switch. Use a tool like the Fluke LanMeter™, OneTouch™ Network Assistant, or Protocol Inspector™ to determine the top contributors to further segment this network.

NetWare

Problem: *Ethernet frame-type mismatches.*

Explanation: In order for the PC and network to communicate they both must be configured for the same frame type (802.3-raw, 802.2, Ethernet II, and SNAP). You can configure a client for a single frame type. A server can optionally be configured to recognize some or all frame types.

Remedy: Use NetTool to determine the frame types used. If the client is suspected, determine the frame type of the client. Determine frame types enabled on server.

Problem: *No nearest server replies seen on network.*

Explanation: After a PC boots up it sends a broadcast to initiate a connection with the closest server. If after three attempts there is not response, this problem is listed in the problem log.

Remedy: Ensure that GNS (Get Nearest Server) is enabled on the server and check connectivity to routers by doing an IPX ping with a Fluke LanMeter™ or OneTouch™ Network Assistant. Check the Key Devices list. If the routers are listed then NetTool is seeing the routers but the PC is not. You might suspect a bad NIC card or NIC card configuration file.

Problem: *No first responder seen on network. Unable to configure PC network number.*

Explanation: During boot up, a PC running IPX sends a query to the router asking for its network number. If after 3 queries there is no response, this problem is listed in the problem log.

Remedy: Check connectivity from the PC to the network drop.

TCP/IP

Problem: *PC using incorrect IP subnet mask.*

Explanation: NetTool has determined that the PC is not properly configured.

Remedy: Access PC network properties and correct the IP subnet mask.

Problem: *Router issued ICMP redirect. Hosts or devices using incorrect gateway/routers.*

Explanation: NetTool has determined that the PC is not properly configured.

Remedy: Access PC network properties and correct the IP address. You should also make sure the DHCP server is giving the correct addresses.

Problem: *Duplicate IP detected.*

Explanation: NetTool has detected a duplicate IP address configured on a remote device. You should never have duplicate IPs running on the network. This problem prevents the PC from connecting to the network until it is resolved.

Remedy: Identify at least one of the devices and change its address to a valid one that is not being used.

Host Configuration

Problem: *BootP/DHCP server not responding.*

Explanation: The PC is dynamically configured to find DHCP servers and none are found.

Remedy: Check the router and the DHCP server itself to make sure they are running. Either could be misconfigured. Check connectivity to the DHCP server.

Problem: *DHCP server issuing IP address that causes duplicate IP on network.*

Explanation: The DHCP server in question is not detecting an address and is provisioning a duplicate.

Remedy: This could be caused by a statically configured PC. Find the statically configured PC on the network and change its IP address to a valid and unique IP address. Merging two unique networks into one could lead to this type of problem. It could also point to a DHCP server problem or an implementation bug.

Name Resolution

Problem: *No DNS server found on network to resolve names.*

Explanation: The PC is configured to use DNS (Domain Name Server) and none can be found.

Remedy: Make sure the DNS server is up and running. Access PC network properties and make sure settings are correct.

Problem: *DNS resolution failed.*

Explanation: There are multiple DNS servers on the network and the PC is configured for the wrong one.

Remedy: Find out the correct DNS information, access PC network properties and configure the PC with that information.

Problem: *WINS resolution failed.*

Explanation: The DNS server cannot determine the NetBIOS names.

Remedy: You can manually fix this problem in the DNS configuration section of network properties.

Problem: *Incorrect WINS server xxx.xxx.xxx.xxx configured on PC.*

Explanation: There are multiple WINS servers on the network and the PC is configured for the wrong one.

Remedy: Find out the correct WINS information, access PC network properties and configure the PC with that information.

Problem: *No WINS server found on network to resolve names.*

Explanation: The PC is configured to use WINS (Windows Internet Name Service) and none can be found.

Remedy: Make sure the WINS server is up and running. Access PC network properties and make sure

Problem: *PC WINS incorrect.*

Explanation: NetTool sees a WINS server on the network but not the one configured on the PC in question.

Remedy: View the details of the WINS server by accessing the **Key Devices** list. Change the PC configuration to match.

NetBIOS

Problem: *Incorrect Workgroup or Domain configured on PC.*

Explanation: There are specific names and privileges needed for access to domains or workgroups. The name is incorrectly configured or privileges are not set up.

Remedy: Make sure what domain names and privileges are required and correct the PC configuration.

Problem: *Unable to find Primary Domain Controller (PDC) for network.*

Explanation: These domain controllers act as gatekeepers for domain access. If one of them isn't found on the network, then no access can be granted.

Remedy: Various

Problem: *xxx.xxx.xxx.xxx causing duplicate NetBIOS name.*

Explanation: Only one unique NetBIOS name is allowed on a domain.

Remedy: The name specified on the PC needs to be changed to eliminate duplication.

Problem: *PC involved in MB elections.*

Explanation: NetTool sees packets from the PC that are generating master browser elections on the network. This can be the source of excessive traffic and slow performance.

Remedy: Take preventive measures within the PC configuration to stop the PC from generating Master Browser elections.

Web

Problem: *Unable to connect to HTTP/proxy server.*

Explanation: The standard proxy port is 1080. The HTTP port is 80 on the server.

Remedy: Correct the naming or port assignments in the setup area of the web browser software.

Email

Problem: *Unable to connect to SMTP mail server.*

Explanation: The Simple Mail Transfer Protocol (SMTP) server information is either not configured or configured incorrectly on the PC. The server itself could be down as well.

Remedy: Access NetTool's **Key Devices** list to view information about this server and then make corrections within the mail setup area of the PC.

Problem: *Unable to connect to POP2 server.*

Explanation: The PC cannot find the POP2 server it is configured to find. The server itself could be down as well.

Remedy: Access NetTool's **Key Devices** list to view information about this server then make corrections within the mail setup area of the PC.

Problem: *Unable to connect to POP3 server*

Explanation: The PC cannot find the POP3 server it is configured to find. The server itself could be down as well.

Remedy: Access NetTool's **Key Devices** list to view information about this server then make corrections within the mail setup area of the PC.

Problem: *Unable to connect to IMAP server.*

Explanation: The PC cannot find the IMAP server it is configured to find. The server itself could be down as well.

Remedy: The IMAP server information is either not configured or configured incorrectly on the PC. Access NetTool's **Key Devices** list to view information about this server.

Printer

Problem: *Unable to connect to IP print spool server.*

Explanation: NetTool is detecting that the PC is not able to connect the configured IP printer server. The server itself could be down as well.

Remedy: Access NetTool's **Key Devices** list to view a list of IP printers and correct the problem in the printer setup area on the PC.

Problem: *Unable to connect to IP print spooler.*

Explanation: The print spooler configuration on the PC is either incorrect or the spooler itself is down or offline.

Remedy: Check the spooler itself and then access NetTool's **Key Devices** list to view a list of IP devices and correct the problem in the printer setup area on the PC.

Unwanted protocols (when enabled)

The purpose to the Unwanted Protocols feature is to enable you to find protocols that you do not want on the network. For example, if you have migrated away from NetWare on the network, NetTool will flag a device that still has NetWare configured on it.

Problem: *NetBEUI detected*

Problem: *WINS detected*

Problem: *NetWare detected*

Problem: *MB (master browser) election detected*

Appendices

Appendix	Title	Page
A	Specifications	A-1
B	Basic Maintenance	B-1
C	Glossary	C-1

Appendix A Specification

General Specifications

Media Access	10Base-T and 100Base-TX.
Cable Tests	Internal wiremap, cable length, opens, shorts, and split pairs.
Ports	Shielded Hub/NIC connector (RJ-45). Serial port – customized 2.5mm “stereo” input jack.
Interface	Push button navigation of icon/menu-driven view.

Battery	Removeable alkaline batteries or optional rerechargeable NiMH batteries.
Dimensions	12.5 cm x 7.8 cm x 4.3 cm
Weight	0.21 kg (0.46 lbs).
Warranty	One year. (Extended warranty available).
LED Indicators (4)	2 on each side (Link, Utilization, Collision, and Error).

Environmental Requirements

Operating Temperature	10 °C to 30 °C with up to 95 % Relative Humidity 10 °C to 40 °C with up to 75 % Relative Humidity
Non-Operating Temperature	-20 °C to +60 °C
Approvals	The Fluke NetTool has the following approvals: European Standard EN 60950, CSA/CAN C22.2 No. 950, and UL 1950.
Approvals (Accessories)	The optional Universal AC Adapter for NetTool has UL, CSA, and TÜV approvals or other approvals valid in the USA, Canada, and Europe.
Electromagnetic Interference	The Fluke NetTool complies with European standard EN 61326 Class B.
Certifications	Complies to European CE directive: EMC directive 89/336/EEC and low voltage directive 73/23/EEC.
Connection to public telephone network	NetTool should never be connected to the public telephone network.

Appendix B Basic Maintenance

Service and Repairs

To have the NetTool serviced or repaired, call one of the numbers listed below:

USA : 1-888-99-FLUKE (1-888-993-5853)

Canada: 1-800-36-FLUKE (1-800-36-5853)

Europe: +31 40-267-8300

Japan: +81-3-3434-0181

Singapore: +65-★-737-2922

Anywhere in the world: +1-425-356-5500

Or visit Fluke's website www.fluke.com.

Maximizing Battery Life

The life of batteries is strongly influenced by the care that they receive.

The greatest enemy of batteries is heat. When using the optional rechargeable batteries, avoid charging them when they are hot.

The battery life will also be shortened if you frequently leave the NetTool in a hot place, such as a car on a warm day, and then charge the batteries immediately upon returning to your office.

Cleaning the Display

Clean the screen by wiping it gently with a soft cloth or tissue moistened with isopropyl alcohol.

Appendix C Glossary

10BASE2

Sometimes called ThinLAN or CheaperNet, 10BASE2 is the implementation of the IEEE 802.3 Ethernet standard on thin coaxial cable. The maximum segment length is 185 meters.

10BASE5

Sometimes called ThickLAN, 10BASE5 is the implementation of the IEEE 802.3 Ethernet standard on thick coaxial cable. The maximum segment length is 500 meters.

10BASEF

A point-to-point fiber link. This is the draft specification for IEEE 802.3 Ethernet over fiber optic cable.

10BASE-T

10BASE-T is the implementation of the IEEE 802.3 Ethernet standard on unshielded twisted-pair wiring. It is a star topology, with stations directly connected to a multi-port Hub, and it has a maximum cable length of 100 meters.

100BASE-TX

100BASE-TX is the implementation of the IEEE 802.3u Ethernet standard on two pairs of unshielded twisted-pair wiring. It is a star topology with a maximum cable length of 100 meters. The maximum network diameter is 205 meters with two class II repeaters.

802.2

This IEEE standard specifies Logical Link Control (LLC), which defines services for the transmission of data between two stations at the data-link layer of the OSI model.

802.3

Often called Ethernet, this IEEE standard governs the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) networks. Typical cabling standards are 10BASE-T, 10BASE2, and 10BASE5.

Access Method

The set of rules by which the network determines what node has access to the network. The two most popular access methods are Collision Sense Multiple Access/Collision Detection (Ethernet) and token passing (Token Ring and ARCNET).

Anomaly

An impedance discontinuity causing an undesired signal reflection on a transmission cable.

AppleTalk

AppleTalk is a networking protocol primarily used for communications between Macintosh computers and Apple printers. The AppleTalk network is segmented into zones.

ARP (Address Resolution Protocol)

A member of the TCP/IP protocol suite, ARP is the method by which a station's MAC address is determined given a station's IP (Internet Protocol) address.

Attenuation

A reduction in the strength of a signal; the opposite of gain.

Bandwidth

Bandwidth is the rate at which data can be transmitted over a channel, measured in bits per second. For example, Ethernet has a 10 Mbps bandwidth and FDDI has a 100 Mbps bandwidth. Actual throughput is almost always less than the theoretical maximum.

BPS

Bits per second. A measure of speed or raw data rate. Often combined with metric prefixes as in kbps (for thousands of bits per second) or Mbps (for millions of bits per second).

Bridge

A device that links two or more networks that use the same OSI Data Link protocol. A bridge evaluates source and destination addresses to pass only frames that have a destination on the connecting network.

Broadcast

A message that is addressed to all stations on a network. For Ethernet networks, the MAC broadcast address is FFFFFFFF.

Broadcast Storm

A situation in which a large number of stations are transmitting broadcast packets. This typically results in severe network congestion. This problem is usually a result of a misconfiguration.

Bus Topology

A bus topology is a network architecture in which all of the nodes simultaneously receive network traffic. Ethernet is a bus topology.

Byte

A collection of bits. A byte usually contains 8 bits.

Characteristic impedance

Characteristic impedance is the opposition (resistance and reactance) to signal propagation on a cable. It depends on the physical properties of a cable, which are determined at the time of manufacture. Manufacturing variations can cause slight differences in characteristic impedance for the same cable type.

Client

A client is a computer that make requests of a server. A client has only one user; a server is shared by many users.

Collision

A collision is the result of two or more nodes transmitting at the same time. Excessive collisions are most often caused by a problem with the physical media.

Crossed Pair

A wiring error in twisted pair cabling in which a pair on one connector of the cable is wired to a different pair on the other end of the cable.

Crosstalk

Crosstalk is electrical interference generated by signal coupling between wires in a multiwire cable.

CSMA/CD (Carrier Sense, Multiple Access with Collision Detection)

In CSMA/CD, each node or station has equal access to the network. Before transmitting, each station waits until the network is not busy. Since each node has equal access to the network, a collision (two stations transmitting at the same time) can occur. If a collision occurs, the affected nodes will wait a random time to retransmit. Ethernet uses the CSMA/CD access method.

dBm

Decibels below 1 mW (1 milliwatt). The logarithmic measure of the ratio of the output power of a signal to an input signal of 1 mW.

DECnet

Digital Equipment Corporation's set of communication protocols for networking computers.

Destination Address

The address of the station receiving a frame.

DNS

Domain Name Services provides a mechanism that allows users to remember logical machine names rather than IP addresses. DNS provides mapping between a machine name (e.g., www.fluke.com) and its IP address (e.g., xxx.xxx.xxx.xxx).

EIA568

Electronic Industries Association Commercial Building Telecommunications Wiring Standard. Specifies maximum cable lengths, installation practices, and performance specifications for generic building wiring.

Encapsulation

Encapsulation is the method of placing one protocol into another protocol's format. For example, in a Novell Ethernet environment there are four different methods to encapsulate IPX in Ethernet/802.3 frames: 802.3 raw, 802.2, Ethernet II, and SNAP.

Ethernet

Ethernet is a 10 Mbps topology that runs over thick coax, thin coax, twisted-pair, and fiber-optic cabling systems.

EtherTalk

EtherTalk is the AppleTalk network protocol running over the Ethernet network transport.

Fast Ethernet

Industry standard terminology for 100Base-T. Industry groups do not agree on using the term to refer to 100VG-AnyLAN; some call 100VG-AnyLAN a Fast Ethernet technology while others do not.

FCS (Frame Check Sequence)

A field transmitted in LAN frames that encodes error checking information.

Frame

A frame is a unit of data transmission divided into groups of bits. The header and a check sequence form the frame.

Full-Duplex

10Base-T and 100Base-TX network operation using a switching Hub to establish a point-to-point connection between LAN nodes that allows simultaneous sending and receiving of data packets. Full-duplex performance is twice that of half-duplex performance. A 10Base-T full-duplex network is capable of 20 Mb/s data throughput, while a full-duplex 100Base-TX network is capable of 200 Mb/s throughput.

Half-Duplex

Network operation is one direction at a time only; either sending or receiving data packets, but not both at the same time.

Hops

Most commonly defined as the number of routers traveled by a frame to reach its destination.

Hub

Today, most often referred to in 10BASE-T networks. A 10BASE-T Hub is essentially a multiport repeater Hub with each segment dedicated to a single 10BASE-T connection.

ICMP (Internet Control and Message Protocol)

A communication protocol used by every device that uses IP. ICMP reports errors that occur during the delivery of packets on the network.

IP (Internet Protocol)

IP is the network layer protocol for the TCP/IP suite.

IP Address

An IP address is a series of four numbers separated by dots ("."), each of which is between 0 and 255. An IP address must be unique to a machine or the network will not be able to properly deliver network information to that machine. The address is made up of a network number, a subnet number, and a node number.

IP Network Number

The network number consists of the first two numbers of a device IP address on a network.

IPX (Internetwork Packet Exchange)

IPX is the network layer protocol for Novell's NetWare protocol suite.

Jabber

A frame greater than the maximum legal size (greater than 1518 bytes) with a good or bad frame check sequence. In general, you should not see jabbers. The most likely causes of jabbers are a faulty NIC/driver or perhaps a cabling problem.

LAN (Local Area Network)

A physical network technology used over short distances (up to a few thousand meters) to connect many workstations and network devices using a communication standard (Token Ring or Ethernet, for example).

Late Collision

A collision that occurs after the first 64 bytes in a frame. In 10BASE-T networks, late collisions will be seen as frames with a bad FCS. Causes of Late Collisions are a faulty NIC or a network that is too long. A too-long network is one in which the end-to-end signal propagation time is greater than the minimum legal sized frame.

Layer

One of seven levels in the Open Systems Interconnection (OSI) reference model. See OSI.

Link Pulse

A single-bit test pulse that is transmitted at least every 150 milliseconds during idle periods on 10BASE-T link segments to verify link integrity.

Manufacturer Prefix

The standard partial address used to identify a particular manufacturer. The prefix of the address is predefined uniquely for each manufacturer, while the remainder of the address uniquely identifies the station.

Master Browser

The Master Browser maintains the browse list, a list of all servers in the master browser's domain or workgroup.

MBPS

Millions of bits per second. See BPS.

Multicast

Packets that are directed to a group of nodes rather than to a single node or all nodes. This is contrasted to a broadcast packet, which is directed to all nodes.

NEXT

Near-end crosstalk; crosstalk between two twisted pairs measured at the same end of the cable as the disturbing signal source.

NIC (Network Interface Card)

A network interface card is the adapter card that plugs into a computer to provide a network connection.

Node Number

Node number identifies the device of interest.

NVP (Nominal Velocity of Propagation)

The speed that a pulse travels along a cable, expressed as a percentage of the speed of light in a vacuum.

Packet

A group of bits in a defined format, containing a data message that is sent over a network.

Ping

Packet Internet Groper (ping) is a common method of accessing devices on a network to see if they are active. Ping sends a packet from one device, attempts to "bounce" it off another device, and "listens" for a reply. A successful ping indicates that the network path to that device (including the routers in between) are up and functioning.

Protocol

A "language" that a device uses to communicate on a network. Examples of protocols are: TCP/IP or AppleTalk.

Primary Domain Controller

A device that manages the common security policy and user account databases for a group of NetBIOS servers. The election protocols are such that the primary domain controller has a tendency to become the master browser.

Remote Collision

A collision that occurs on the other side of a repeater. Since a 10BASE-T Hub is a multi-port repeater with a "segment" dedicated to each station, 10BASE-T collisions are remote collisions.

Repeater

A repeater is a layer-1 device that regenerates and retimes frames.

Router or Gateway

A router is a device that connects subnets together. Any packets destined for a device on a different subnet are given the subnet's router. Routing between subnets can involve multiple routers. A user's machine must be configured to know the IP address of the router for its subnet in order to communicate with machines on other subnets. Mis-identified gateways are a common problem for manually configured IP settings.

RJ-45 Connector

A modular connector used for UTP wiring. The RJ-45 connector has eight conductors to accommodate four pairs of wires, and it has become the dominant connector used in Ethernet and Token Ring UTP installations.

Router

A router is a network-layer device that connects networks using like network-layer protocols. Routers can span different network topologies. For example, a router can interconnect two IP subnets. For a router to pass traffic, unlike a bridge, it must be configured for the desired protocol. Routers are more difficult to configure but offer greater security.

Runts

Typically defined as a Ethernet frame which is less than 64 bytes. Depending on what device is counting the runts, the frame check sequence may be good or bad.

SAP (Service Advertising Protocol)

A NetWare protocol used to request and broadcast information about file servers, print servers, and other services on a network.

Short Frame

A frame less than the minimum legal size (less than 64 bytes) with a good frame check sequence. In general, you should not see Short Frames. The mostly likely cause of a Short Frame is a faulty adapter card or driver.

Signal/Noise Ratio

The ratio of worst-case received signal level to noise level measured at the receiver input (expressed in dB). The S/N ratio may be expressed as NEXT(dB) - Attenuation(dB), provided idle channel background noise is low. Higher S/N ratios provide better channel performance.

SNAP (Subnetwork Access Protocol)

An IP protocol that is an extended version of the IEEE LAN logical link control (LLC) frame. SNAP provides access to additional protocols and allows vendors to create their own protocol sub-types.

SNMP (Simple Network Management Protocol)

Designed by the Department of Defense and commercial TCP/IP implementors, SNMP is part of the TCP/IP protocol suite. SNMP operates on top of the Internet Protocol and can manage virtually any network type.

Source Address

The address of the station originating a frame.

Split Pair

The error of using wires from two different twisted pairs. This error cancels the crosstalk elimination characteristics of twisted pair wiring and produces crosstalk. Use a single twisted pair for Transmit and another twisted pair for Receive to minimize crosstalk.

Subnet

A subnet is a section of the TCP/IP network. Each subnet has a unique subnet number and is connected to a router which enables connection to other subnets.

Subnet Number

The subnet number is programmed into the subnet router and follows the network number in an IP address.

TCP/IP (Transmission Control Protocol/Internet Protocol)

TCP/IP is the protocol suite originally developed by the Advanced Research Projects Agency (ARPA) to interconnect a research network. It later evolved into the Internet. The TCP/IP is an open standard not owned by any particular organization. The term TCP/IP is often used to refer to the entire suite of related protocols that includes IP, FTP, Telnet, RIP.

Topology

Topology is the organization of network components. The topology of Token Ring network components is a ring.

Transport

Transport refers to the physical method by which data is transmitted (e.g., Ethernet, Token Ring, etc.). Different physical network hardware and cable layout are required for different transports.

Uptime

The amount of uninterrupted time that a resource (such as a print server) has been available.

Transceiver

In Ethernet networks, a transceiver is used to couple electrical signals to and from an adapter to the transmission media. In ThinLAN and 10BASE-T networks, the transceiver is integrated directly onto the network adapter card.

Twisted Pair

A pair of wires that are twisted together to minimize crosstalk. Crosstalk is minimized with twisted pair wiring by canceling the magnetic fields generated in each of the twisted wires. Twisted pair cable (UTP or STP) is typically made up of several twisted pairs of wires.

UTP (Unshielded Twisted Pair)

Cable that is twisted by pairs but not shielded. This minimizes crosstalk by canceling the magnetic fields generated in each of the twisted wires, but only when a single twisted pair is used for Transmit or Receive

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