Agilent Technologies
Advisor SW Edition
Application Note 1371

Network Troubleshooting using the Advisor SW Edition

Agilent Technologies

Introduction

High-performance testing and diagnostic tools are essential for monitoring, troubleshooting, and maintaining modern data networks. These test and diagnostic tools, which can be hardware- or software-based, are indispensable for identifying and isolating problem domains within network operating systems. Just as important, these powerful diagnostic and measurement tools can be used to perform detailed analyses of network operating characteristics and performance parameters. In the past, network testing, problem diagnosis, and measurement analysis required highly specialized hardware that was primarily based on proprietary ASIC or RISC processor technology.

Advisor SW Edition is a fully-featured, software-based, portable protocol analyzer that can run on any high performance computer system using a Microsoft Windows® 98, Windows® 2000, or Windows NT® operating system. With the advent of Advisor SW Edition, network technicians and managers have available, for the first time in the industry, a tool designed to meet the test, measurement, and analysis challenges encountered on mission critical Ethernet LAN networks.

To monitor and troubleshoot complex LAN network infrastructures and services associated with the Ethernet, the Advisor SW Edition is the preferred choice. It can diagnose connections within the network, including 10 Mb/s Ethernet-based work groups and 100/1000 Mb/s Ethernet uplinks, and provide critical analysis information leading to fast, efficient restoration of network operations. It also analyzes critical full-duplex links, Oracle and Sybase frame sequences, and has the most comprehensive Voice over IP decodes in the industry.

How to Use This Application Note

This application note gives instructions on how to connect, launch, and configure the Advisor SW Edition for Ethernet LAN testing, measurement, and troubleshooting. Information is provided on how to measure and analyze typical LAN network troubleshooting situations using Advisor SW Edition features. The instructions focus on high-level test techniques. Typical LAN network problem situations are presented to demonstrate how the Advisor SW Edition can be used for efficient and effective troubleshooting.

The high level instructions presented here should be used in conjunction with information provided by the Advisor SW Edition internal on-line Help system. The on-line Help system provides more detailed procedures and important user interface reference information. Together, both information sources allow a user to quickly learn how to apply this powerful test tool in the process of LAN troubleshooting and analysis.

When to Use the Advisor SW Edition

Advisor SW Edition is the perfect tool to troubleshoot and diagnose known or suspected LAN network problems. On the other hand, Advisor SW Edition is a versatile product that gives the user the flexibility to help maintain peak network performance, even when customer resources are limited. For example, the following conditions or circumstances illustrate the extended usability of the Advisor SW Edition:

- **Proactive Network Analysis**
  Use Advisor SW Edition to see where a problem is on the network, investigate the connection, and check the corresponding node. This is a fast, effective way to troubleshoot many common network problems.

- **Proactive Network Management**
  The Advisor SW Edition easily performs routine maintenance tests. Periodically test each segment in a network and compare the results to a previously recorded baseline for that segment.

- **Reduced Cost Considerations**
  The Advisor SW Edition is significantly less expensive compared to any of the hardware-based protocol analyzer product lines, with the majority of the features and limited only by the PC and PCMCIA/NIC system. The Advisor SW Edition, however, is significantly less expensive than other software-based protocol analyzers, and has more measurement features.

- **Limited Qualified Personnel**
  Use your qualified personnel more effectively. The Advisor SW Edition is portable and easy to use. In effect, less experienced personnel can troubleshoot common network problems. This allows your qualified IT professionals to concentrate on solving more complex problems.

- **First Response**
  Definitely use the Advisor SW Edition as a first response to a network problem which cannot be resolved quickly by reasoning. Virtually anyone can run a quick measurement with the Advisor SW Edition and, with the assistance of the on-line Help system, determine the cause of the problem.

Advisor SW Edition Network Connection and Configuration

The Advisor SW Edition can be connected into any half-duplex link or full-duplex link. The various methods of connections are fully described below. Use the Advisor SW Edition on-line Help system for additional information.

NOTE

A distinction is made between configuring the Advisor SW Edition to match the physical environment and configuring the individual measurements you intend to run. These instructions center on configuring the Advisor SW Edition for the specific physical environment. Other instructions in this note, or in the on-line Help system, provide instructions on configuring for individual measurements.

Before explaining how to connect the Advisor SW Edition PC for network troubleshooting and analysis, it is important to understand the difference between hub and switch physical environments. In addition to the type of test that is run, Advisor SW Edition connection and configuration is influenced by the type of physical environment involved. Hub and switch environments are described as follows:

- **Hub Environments**
  In general, the function of a hub is to transmit any packet that arrives at one port of the hub to all other ports of the hub. This means that all nodes connected to a hub obtain traffic to and from all other nodes. Traditionally, hubs have been used in Ethernet networks because they appeared first in the industry and are easily implemented.

- **Switch Environments**
  In order to transmit traffic, a switch maps the physical addresses of the nodes localized in each segment of the network and then forwards or filters the packets depending on the destination address. When a packet reaches a switch, the switch identifies its destination address and forwards it directly to, and only to, the port with the destination node.

CAUTION

Do not connect the Advisor SW Edition PC to a switch port without first configuring it to receive mirrored traffic from another port. If you connect an improperly configured Advisor SW Edition PC directly to a switch port, only broadcast traffic will be received.

General Considerations

When troubleshooting the network, first try to identify where the problem exists. Begin by connecting the Advisor SW Edition to a suspected or logical segment of the network. Perhaps the first connection will isolate the problem. In all likelihood, however, it will be necessary to keep connecting at different points in the network and conducting tests until the problem is isolated to a specific segment. Two other configuration issues are important:

• For optimum software performance using a laptop PC system, Agilent strongly recommends that Advisor SW Edition be the only application open and running on the laptop computer.

• When a laptop computer system is not available, the software should run alone on a separate PC platform dedicated to Advisor SW Edition trouble shooting and analysis functions.

The following connection scenarios are provided for the Free Hub Port, Free Switch Port, Hub/Switch without a Free Port (half-duplex), and Hub/Switch without a Free Port (full-duplex) environments:

1. Connecting to a Free Hub Port

In a hub environment, connect and configure the Advisor SW Edition as a node or a point-to-point connection where the Advisor SW Edition PC sees all the traffic destined for all the ports on the hub (see Figure 1). Connect a LAN cable from the Advisor SW Edition PC directly to an available port on the hub. The analyzer will monitor traffic from all the stations having the same collision domain as the hub port where the Advisor SW Edition is connected.
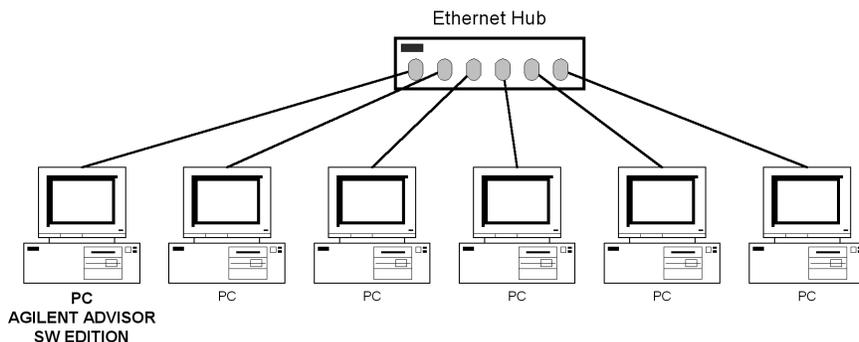
Figure 1. Advisor SW Edition Connection to a Free Hub Port

2. Connecting to a Free Switch Port

In a switch environment, connect and configure the Advisor SW Edition as a node where the Advisor SW Edition PC sees all the traffic between the switch and a server-workstation (see Figure 2). Connect a LAN cable from the Advisor SW Edition PC to an open port on the switch. Next, configure the LAN switch to mirror the traffic from the switch port to be tested to the port where the Advisor SW Edition PC is connected.
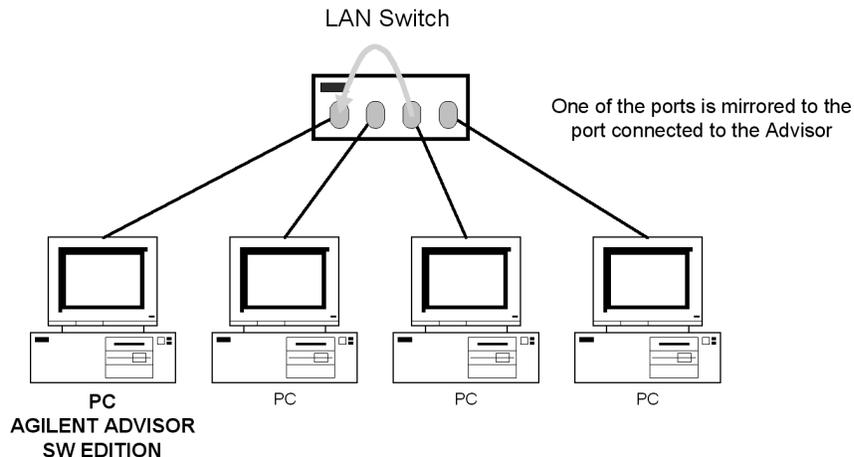
Figure 2. Advisor SW Edition Connection to a Free Switch Port

3. Connecting to a Hub/Switch without a Free Port (Half-Duplex)

To monitor a connection between two network devices, determine if the connection is a full- or half-duplex link. For a half-duplex link, the Advisor SW Edition PC must be inserted between the two network devices using a mini-hub arrangement (see Figure 3, half-duplex connection). Simply insert the mini-hub onto the segment to be analyzed, then connect the Advisor SW Edition PC and workstation to the mini-hub as shown in Figure 3.
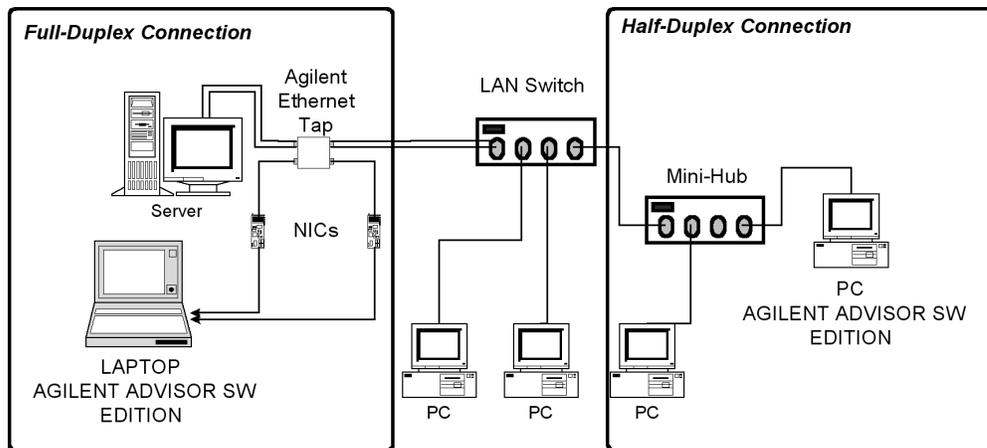
Figure 3. Advisor SW Edition Connection to a Free Switch Port (Half-Duplex)

4. Connecting to a Hub/Switch without a Free Port (Full-Duplex)

A typical full-duplex link is a switch connected to a server or network back-bone. When starting the Advisor SW Edition application intending to analyze a full-duplex connection, a second Network Interface Card (NIC) needs to be selected to run in "Dual NIC Operation" mode (refer to the Advisor on-line Help system or to the NDIS Card Selection and Setup instructions in this document for further information).

When analyzing full-duplex connections, the Advisor SW Edition PC is inserted into the transmission path using the Agilent Advisor Ethernet Tap (part of the Advisor SW Edition PC purchase package). Additionally, two NICs are required to monitor full-duplex links. The NICs capture traffic in only one direction, but the expert system in the Advisor SW Edition interprets both traffic patterns and consolidates them into a single graphic display for analysis.

In order to connect a laptop computer loaded with the Advisor SW Edition between the server and the switch, disconnect the cable from the server and connect the cable to a the Agilent Advisor Ethernet Tap (see figure 4, full-duplex connection). To connect cables to the tap, follow Figure 4 and the connection diagrams provided on the tap itself.
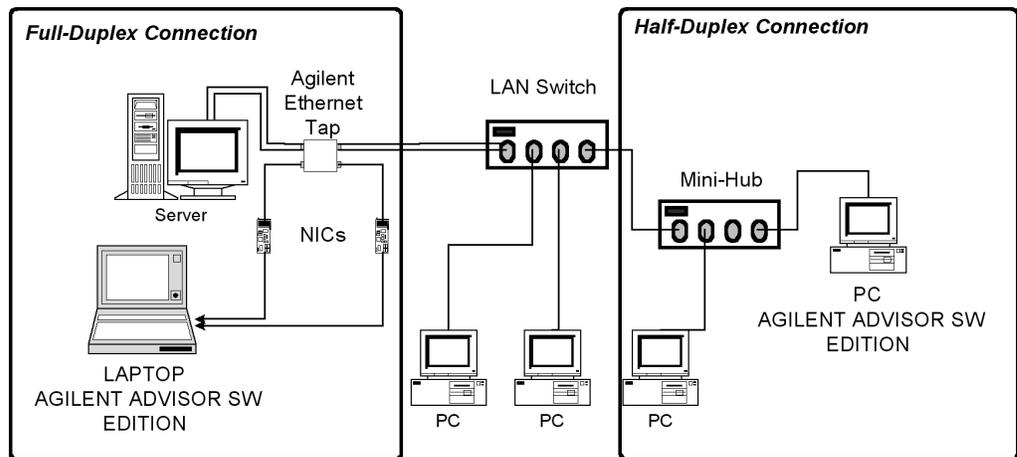
Figure 4. Advisor SW Edition Connection to a Free Switch Port (Full-Duplex)

Advisor SW Edition Software Launch and Configuration

Once the Advisor SW Edition PC is connected to the network, launch the software application and start the analysis. This process is briefly covered here, but a more detailed presentation is available in the Agilent Advisor SW Edition Getting Started Guide. Refer to this supporting document as necessary. Software launch and configuration is a four-step process. Proceed as follows:

1. Launch Advisor SW Edition

On a PC, the Advisor SW Edition is launched like any other software application using the Programs option on the start bar. From Start, select:

- Programs
- Agilent Advisor option
- Advisor SW Edition NDIS Ethernet

Launching the Advisor SW Edition on the Agilent Advisor hardware platform is similar to launching the off-line analyzer, with only one new start menu item to consider. The command sequence is:

- Start
- Internet Advisor
- LAN Analysis
- Advisor SW Edition NDIS Ethernet

2. Configuring the Advisor SW Edition

Preparing to run Advisor SW Edition measurements requires certain sequential configuration steps. These steps are described below:

A - Physical Interface Configuration

Configure the physical interface to match the physical connection being monitored. The Advisor SW Edition automatically displays the options available, based on the NIC/PCMCIAs installed. Simply select the appropriate details to properly identify the correct configuration being monitored for measurement (see Figure 5).

As indicated in Figure 5, Advisor SW Edition tool bars for configuring filters and logging features are also available. These configuration options are explained later on in more detail.
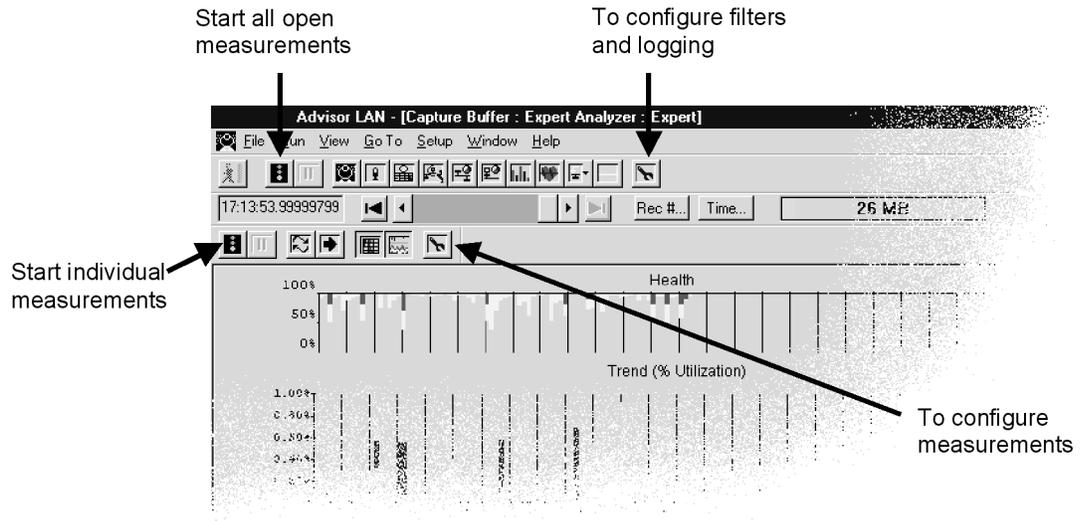
Figure 5. Advisor LAN Tool Bar Buttons for Selecting Configuration

B - NDIS Card Selection and Setup

Upon software launch, the Advisor SW Edition automatically detects any NDIS driver installed and optionally prompts the user to select a compatible NDIS adapter card to run from. The possible screen prompts at software launch include:

- **NO NDIS card found**
  (the Advisor SW Edition executes in Offline mode)

- **One "compatible" (technology) NDIS card found**
  (the Advisor SW Edition displays that card; the word "compatible" relates to the interface type selected from the start menu, i.e., Fast Ethernet will look for the Ethernet- and Fast Ethernet-compatible cards only)

- **More than one "compatible" NDIS card found**
  (the Advisor SW Edition prompts the user with a list of cards to select from)

  Only Ethernet variants are supported in the first release of Advisor SW Edition. It is expected that all setup interface parameters will be available based on the capability of the NDIS card. For example, if the card supports Fast Ethernet auto-negotiation, then that setup option should be available. Other options that are purely software-based, like capture buffer size, are expected to always be available. The supported NDIS cards and other limitations/restrictions are:

- Supported NDIS PCI cards are: HP, AMD cards that come in Kayaks, Intel, and 3Com
- Supported NDIS PCMCIA cards are: Xircom, 3Com, Megahertz.
- Setup speed and other configuration options are dependent on NDIS interface support for a specific card.
- Capture buffer size is limited to ~240MB, which is the off-line limit.
- Minimum PC Requirements: 133 MHz Pentium with 32MB of memory running on Windows 98/2000/NT 4.x with at least 40MB of free disk space available. Note that the word "minimum" is equivalent to the C model of the Agilent Advisor.

The next step is to select to proper NDIS adapter configuration. The NDIS selection screen is shown in Figure 6. Simply click the connection to be monitored and the correct configuration. The full-duplex option is activated if an additional NIC and an Ethernet tap are installed.
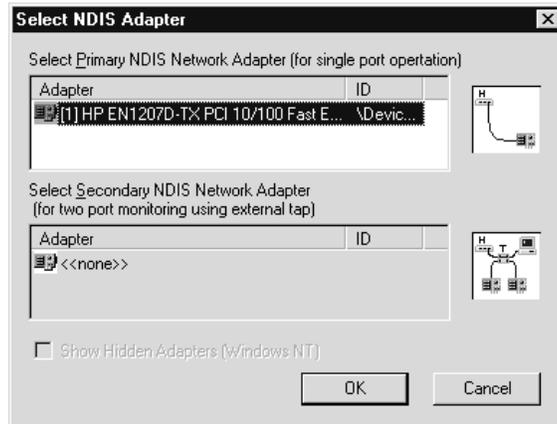
Figure 6. Select NDIS Adapter Screen

After choosing the proper NDIS adapters, select OK to open Advisor SW Edition and begin test and measurement analysis.

C - Measurement Configuration and Measurement Run Start

Depending upon the analysis you intend to perform, you can now configure the measurement itself (see Figure 7). This is done by selecting the configure measurements tool bar button on the Advisor LAN screen.
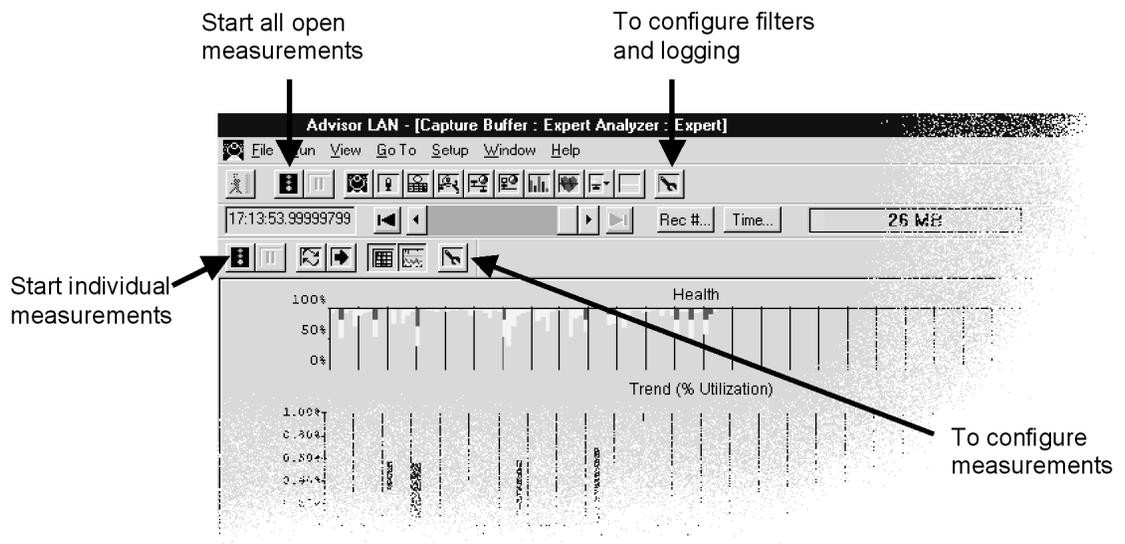
Figure 7. Advisor LAN Selection Screen (Measurement Configuration)

In a manner similar to configuring the Advisor SW Edition, there are two ways to start an analysis run (see Figure 7). The user can select the "start all open measurements" tool bar once the application has been launched. In this instance, each measurement needs to be opened explicitly. The other option is to make a single measurement by using the "start individual measurements" tool bar.

Advisor SW Edition Network Analysis Using Expert Analyzer

The capability of the Advisor SW Edition to demystify network troubleshooting into a simple, straightforward process is due to Expert Analyzer. Using this intelligent software capability, not a single configuration setting has to be performed in order to receive measurement results and statistics in real time.

Expert Analyzer is an integral part of the Advisor SW Edition. It makes it possible to graphically display an immediate overview of the overall state of the network on one simple screen presentation. Expert Analyzer (see Figure 8) automatically detects problems on any active connection in the network.
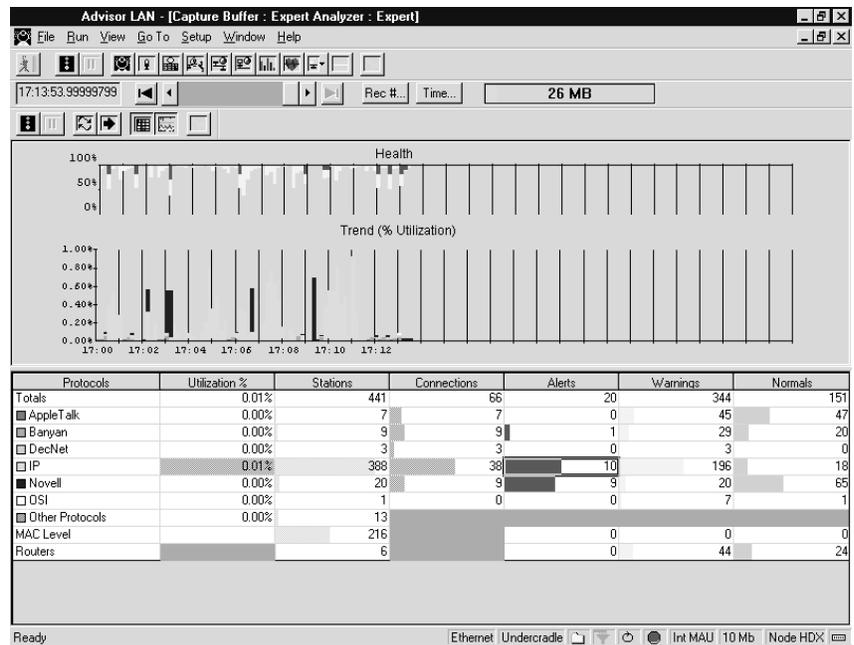
Figure 8. Expert Analyzer Display

The Expert Analyzer display provides the core network statistics necessary to determine the overall health of the network by showing:

- Potential and/or existing errors/events in the network health bar; and reported by protocol in the Alerts, Warnings, and Normals columns.
- An overall picture of bandwidth utilization, color-coded by protocol.
- Bandwidth utilization used per protocol as a percentage value in the % utilization column.
- The number of station/nodes per protocol in use.
- The number of active connections per protocol in use.
- Percent utilization, number of stations, number of connections, and events; reported in column format for the MAC level.
- Stations and events for routers, displayed in column format.

Expert Analyzer is the heart of the Advisor SW Edition. The display screen presentation gives you access to all of the test and measurement features of the analyzer. In addition to the variety of information provided by Expert Analyzer, it provides rapid access to all performance measurement features in one consolidated view. Furthermore, it isolates or filters data for the user, so time is not wasted on irrelevant information.

As previously stated, not a single configuration setting has to be performed in order to get essential details on network performance. The reason is the built-in intelligence of Expert Analyzer's graphical user interface. It is an intuitive, drill down software feature that automatically filters the measurement information for quick display. In turn, this makes troubleshooting fast and efficient.

To illustrate, Expert Analyzer is intelligent enough to realize that if a user double-clicks on a colored bar in the health graph, which is graphed over time, it displays only the events associated with that specific instance in time. In another example, let's say you double-click on the cell within the table that corresponds to alerts for a certain protocol. In response, Expert Analyzer displays only the events associated with that protocol.

As a further boost to user efficiency, check what happens when the user "hovers" the mouse over any cell in the table. Immediately, help text is displayed to explain what information will be obtained by double-clicking within that cell. In addition, this same intuitive drill down application feature is available by double-clicking anywhere within the Expert Analyzer screen, using the same automatic filtering techniques.

Instead of troubleshooting each of the layers of the protocol stack, Expert Analyzer can be used to isolate a problem that could originate from any number of places on the network. This saves troubleshooting time because Expert Analyzer collects information from the network, analyzes it, and alerts the user to error conditions. Even more important, it recommends possible solutions to the problem.

Let's look at some typical network conditions or troubleshooting situations that are easier to handle using Advisor SW Edition with Expert Analyzer.

Overall Network Usage exceeds 35%

If the network is experiencing average traffic rates of above 35%, it might be necessary to redesign the network or a segment of the network. From the Expert Analyzer screen, you can determine which protocol is using the majority of the bandwidth. You can then drill down into the specific protocol to view the active nodes and their connections. Specifically, you are now in a position to determine the nodes transferring extensive amounts of data and which nodes are receiving the data. If two nodes converse frequently, the network would benefit from placing those nodes within the same domain.

Unexpected Increases in Node Transmission Activity

To determine if a node has increased in transmission activity, you can run a measurement and compare it to the baseline for that segment. In effect, this is Proactive Network Analysis, or "baselining." The advantages of Proactive Network Analysis are explained in more detail a little later. Suffice it to say that you want to be in a proactive mode when dealing with network maintenance and management issues.

Regular Network Health Checks

In another instance, before thinking about installing and implementing a new device on the network, you want to be sure that the problem is not a slow server, workstation, router, bad cable, or bad NIC. These errors are more common when looking at increased utilization of network bandwidth. The Expert Analyzer gives you the measurement information you need to get out front on these common network errors, and may prevent premature commitment of money and other resources on supposed "network fixes" that are poorly supported by analyses based on inadequate network measurement.

Advisor SW Edition Troubleshooting with Expert Analyzer

Troubleshooting with Expert Analyzer begins with investigating abnormal events on the network. Most likely, these events have caused or contributed to decreased network health. These events are reported in the Alarm, Warnings, and Normal columns of Expert Analyzer as shown in Figure 9 on the next page. The Warning and Alarm events are of primary interest. A warning event means that there is a possible error on the network. Alarm events are those that are truly errors and need immediate attention.

To investigate these events, double-click on any row depicting an error (an IP Broadcast Storm event is depicted in Figure 9). Expand the "Display All Events" tree to see the types of events occurring on the network.

IP Broadcast Storm Event

One cause of IP Broadcast Storm (see Figure 9) may be related to the BOOTP program used by some diskless workstations to obtain temporary IP addresses. If the BOOTP timeout value is not configured properly, an IP Broadcast Storm may result. An IP Broadcast Storm may also indicate that multicast addresses on an Ethernet network are not properly configured, or that multicast addressing should be implemented on the network.

These troubleshooting indications, the definition of an IP Broadcast Storm, and the probable solutions, are included in the on-line Help system for the Advisor SW Edition. Refer to the Help system for additional information.
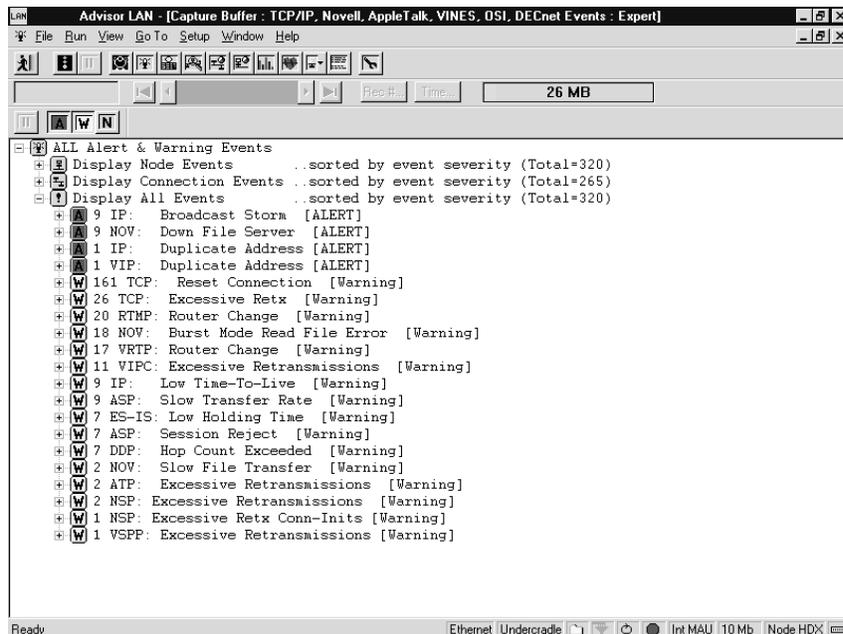
Figure 9. Advisor LAN Alert and Warning Event Display (Broadcast Storm Event)

Novell Burst Mode Read File Error

Another example of events in this analysis is the Novell Burst Mode Read File Error (also shown in Figure 9). This is a "warning" event that indicates that an error occurred on a file read process in burst mode. The situation can occur when a user does not have file read privileges for a specific file. Another reason is when the server is out of disk space. Again, this in-depth information is available in the on-line Help system.

Specifying an IP Broadcast Storm (Expert Analyzer Advanced Feature)

To specify the number of broadcasts per second as a storm in the IP Broadcast Storm (#/sec) field of the Configuration dialog box:

• Configure the IP broadcast address in the Configuration dialog box.
• Setup the Broadcast address in the configuration.

The default is all routes broadcast of 255.255.255.255. This may be edited to examine specific subnet broadcasts. When set to 255.255.255.255, the older style broadcast of 0.0.0.0 is also considered a broadcast address in storm determination. The criteria (broadcast/seconds) and IP addresses the analyzer uses to detect broadcast storms are user-configurable and are described in the on-line Help system.

Perform a Network Checkup

To evaluate the overall health of the network, begin by connecting, launching, and configuring the Advisor SW Edition as described earlier. Refer to the Advisor SW Edition, Getting Started Guide, and the on-line Help system as necessary. Open the Expert Analyzer by clicking the Expert Analyzer tool bar button and then start the measurement. The resulting display (see Figure 10) depicts network utilization as low — about 1%; however, the colored bars depicting network health indicate traffic events are affecting the network.
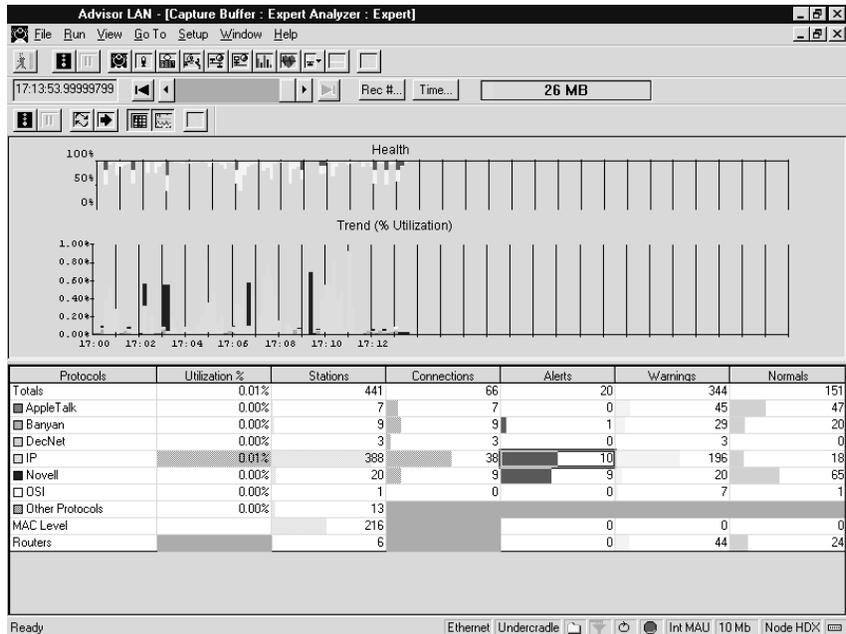
Figure 10. Expert Analyzer Display (1% Utilization)

To define the events that occurred on the network, click on the colored bar in the graphical health display. The specific errors or potential errors corresponding to that instant are displayed in a text format, including a help reference. More than likely, this is the information necessary to isolate and solve the network problems, and it's the easiest information to obtain.

As shown in Figure 10, there are currently 441 stations and 66 connections. The predominant protocol in use on the network is IP. The majority of traffic utilization, stations, and connections is associated with the greatest numbers within the table, and are listed in the row for the IP protocol. To learn more about the TCP/IP traffic on the network or, more specifically, to find out about the protocols and traffic carried by the IP packets, double-click the IP row of the protocol column.

This is another example of the intuitive drill down technique of the Expert Analyzer. The resulting pie chart (see Figure 11) indicates that the HTTP protocol (shown as WWW in the pie chart) is used the most, followed by TELNET and FTP. This might be normal in a segment that contains WEB servers. On the other hand, if it is a production segment of a sales office, it might indicate that users are surfing the Web.
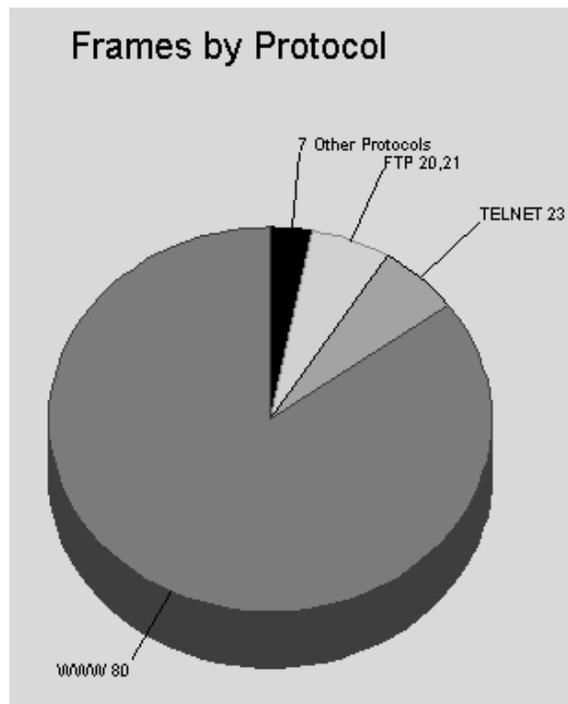
Figure 11. Frames by Protocol Expert Analyzer Display

To learn more about the utilization and to determine which user(s) are causing the excess HTTP traffic, return to the main Expert Analyzer view by clicking its icon on the toolbar. Double-click the corresponding cell for the utilization column and IP row in the table to show all the nodes using HTTP or the WWW 80 TCP port. As Figure 12 shows, the "surfer" in the network is identified by the IP node 209.38.71.209 and the visited Web sites include those concerned with games and the Olympics.
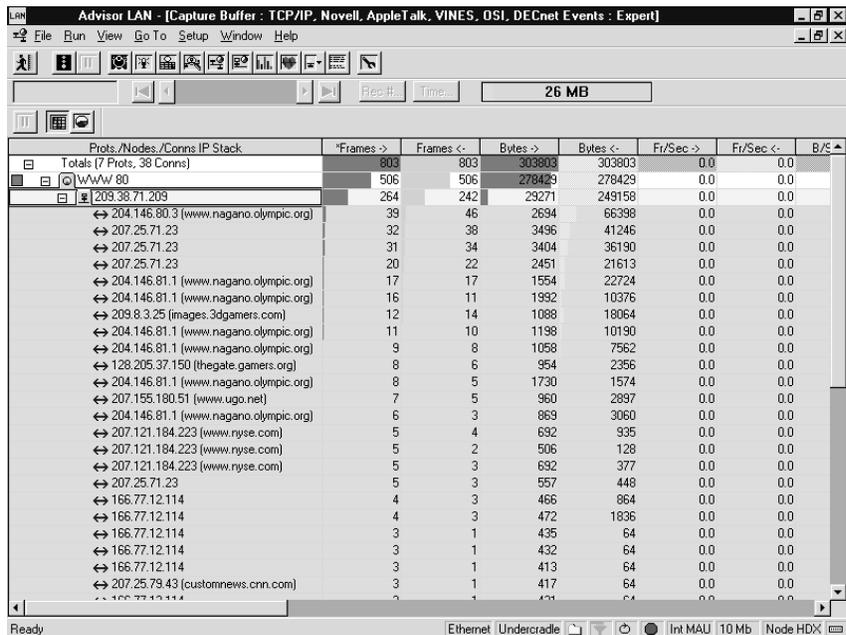
Figure 12. Identification of Offending IP Node

Troubleshooting a Slow Connection

Many potential causes of a slow connection exist. For this reason, isolating the cause of slow network response can be difficult. There could be excessive traffic from other nodes that affect the performance of the communication. On the other hand, there could be physical problems like defective network interface cards (NICs) or loose cables. Often the problem is in the node itself, due to protocol and application configuration problems. Expert Analyzer can provide the means to quickly determine the cause. To isolate a slow connection problem, connect, launch, and configure Advisor SW Edition. Open the Expert Analyzer view and start the measurement to get an overview of network health and to isolate the problem.

Drilling down to the details of Warning events as described in the previous section, you will obtain a screen similar to that shown in Figure 13. As depicted in the figure, a specific node (address 15.6.72.20) has 24 warnings consisting of 22 TCP Reset Connections and 2 TCP Low Window events. The TCP Reset Connection message is considered a "warning" event since it is the result of an abnormal termination of the TCP connection. This might occur when a server drops a connection because of improperly configured resources or because of router problems. Another possibility is when a user aborts a Web connection due to slow response from a server. Many older Web browsers use Reset Connection to shut down their HTTP connections; however, newer browsers are better at complying with the TCP disconnection procedures. Due to the fact that many older browsers are still in use, TCP Reset Connection events are very common in many of today's LANs.

```
⊟ Ⓦ 15.6.72.20        A=0    W=24    N=0      VE4740
  ⊞ Ⓦ 22 TCP:  Reset Connection  [Warning]
  ⊟ Ⓦ 2 TCP:  Low Window  [Warning]
    ⊞ ◈ TCP:  Low Window [Warning] Jan 22, 98 13:16:10.118634000
    ⊟ ◈ TCP:  Low Window [Warning] Jan 22, 98 13:16:22.189413900
          │   15.6.72.20      ---> 15.42.144.14
          ├   Port: 1182            8088
          ├   Window Value: 0    Duration 22.0
          └   Frame Number: 3665131
```
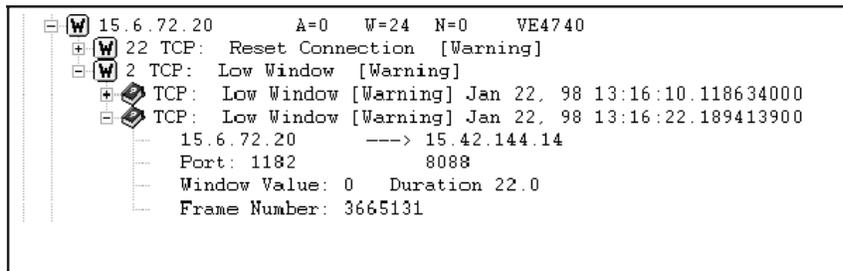
Figure 13. Node-Specific Information

Next, click to expand the tree for the Low Window Warning. Double-click the book icon to open the on-line Help or Commentator as shown in Figure 14. With the information described in the Commentator, you can begin to isolate and solve the problem.
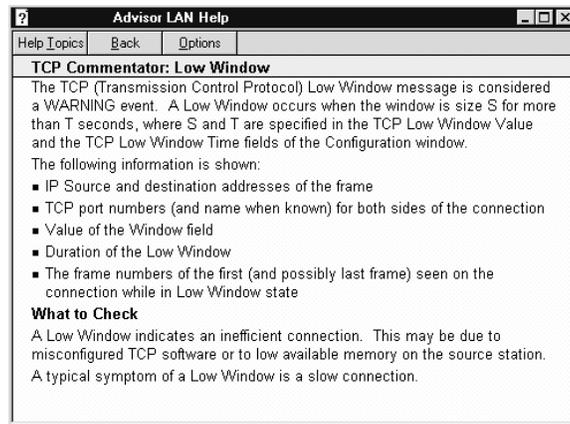
Figure 14. On-Line Help Screen

Troubleshooting a Duplicate IP Address

A duplicate IP address is a conflict between logical addresses that occur when two physical MAC addresses erroneously share the same logical IP address. Sometimes, when changes are made in a network, or when the network administrator does not have strict control of assigned IP addresses, errors in configuration can occur resulting in this type of duplication. A typical symptom of duplicate IP addresses is a user complaining of erratic TCP connection losses.

The easiest way to corroborate a duplicate IP address is to use ARP to see if more than one MAC station on your network is using the suspect IP address. Typically, this is accomplished by pinging the suspected IP address using ping commands on a network workstation or by using the Advisor SW Edition's ping utility. Figure 15 shows a duplicate IP address displayed in the Advisor SW Edition's Expert Analyzer.

The information shown is the IP Network Address, the conflicting MAC Addresses, and the frame numbers (as assigned by the Advisor SW Edition) of the two captured frames. When the Advisor SW Edition identifies routers, these routers are excluded from the duplicate IP reporting. An erroneous duplicate IP address, however, may be reported for a short time span if a router has not yet been identified. Router MAC addresses are ignored as sources of duplicates. The IP Duplicate Address Delay parameter in the TCP/IP folder of the Commentator configuration allows the system to learn about IP routers (via RIP, IGRP, and OSPF) before any IP duplicate event is generated. Setting this value too low may result in false duplicates due to router packet load balancing algorithms.
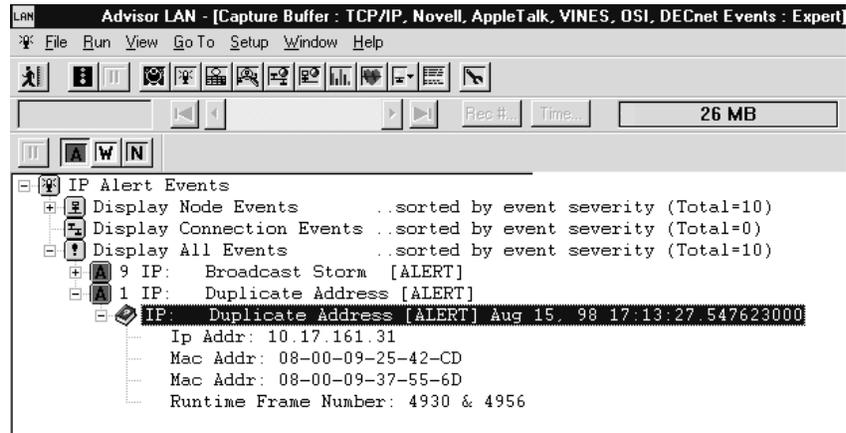
Figure 15. Duplicate IP A

Advisor SW Edition Proactive Network Analysis

Because of the combination of distributed systems and network based applications, and the use of 10/100BaseT to replace the coaxial infrastructures of the mid-eighties, network administrators are less worried about catastrophic network failures than they were in the past. A bigger concern now is the optimization of network performance and efficiency that can result in real increases in user productivity. In addition, network administrators cannot spend their time "fighting fires". This is a stressful activity that consumes the administrator's time without providing any value-added service to their customers.

Proactive network analysis, also known as "baselining," is when you use the protocol analyzer to measure networks under normal operating conditions. Proactive analysis, if done regularly, can expose trends and potential problems before they become critical — that is, it provides a method to both increase the network's performance and to avoid problems that contribute to crisis management. Proactive network analysis allows you to understand the current usage of the network in order to eliminate inefficiencies, optimize the network performance, plan network growth, and reduce network downtimes. The following discussions explain how proactive network analysis can make troubleshooting more successful and describe a general process that can be used to actively fine-tune a network and avoid problems.

Collecting Information for a Baseline

To collect information for a baseline, you connect the Advisor SW Edition to the network under test and start gathering traffic statistics and decodes to be saved and examined later. A comprehensive baseline should contain information for all segments of the network. This might also include WAN and ATM links if the network has a wide area component. Mission critical server or communications segments are of particular importance. Various types of measurements ranging from physical or data link layer analysis to statistical and decode analysis should be performed to get a complete view of how the network behaves.

In addition to the location and scope of data gathering, a consistent schedule should be used when performing network characterizations in order to expose short and long term trends and time-dependent network behavior. Critical segments should be measured more often. When a modification in the network is scheduled, it is recommended to create a baseline of the network before and after the change.

Troubleshooting using Baseline Analysis

Suppose that an end user of a network is complaining of poor response time from the file server, and the Advisor SW Edition is used to determine the errors on the network. Errors were found and remedied; but the problem of poor response time still exists. A little creative troubleshooting is necessary. Perhaps another network device was added and an additional user is consuming 30% of the network's bandwidth. By simply looking at error statistics, this new user would not have been detected and the problem would have remained.

Consider, on the other hand, if the troubleshooting scenario above also included an examination of previous network baselines. In this case, a trend comparison between the old baseline and recently measured utilization statistics would have shown that the level of activity in the network increased, thereby slowing down communication. Note that an old baseline of the network would not have existed had not a network administrator gone about the task of proactively measuring the network during times of normal operation. This is an example of how proactive network analysis, in the form of baselining, can increase the likelihood of solving network problems on the first attempt.

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