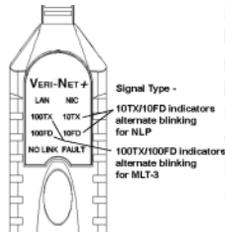## LINK SIGNAL TYPE

Three different signals can be used to establish a Link: a Link Code Word, an NLP or an MLT-3 waveform. The Link Code Word is specific in both Link speed

and duplex mode. The NLP is specific in speed (10Mbps) but ambiguous in duplex mode (half or full). The MLT-3 waveform is also specific in speed (100Mbps) but ambiguous in duplex mode. Duplex modes for equipment that use NLP or MLT-3 signaling must be carefully managed to ensure proper Link operation.

Example: Most 10/100 switches when configured to either 100Mbps full duplex or half duplex mode use the same MLT-3 signal to setup a Link. If a switch port that is set to 100Mbps full duplex is connected to a NIC set for Auto-negotiating, the NIC will establish a half duplex Link based on the MLT-3 signal from the switch. The duplex configuration mismatch will cause the Link to perform poorly due to high error rates and collisions.

The Veri-Net+ indicates an MLT-3 signal by alternately blinking the 100TX and 100FD indicators. An NLP signal is indicated by alternately blinking the 10TX and 10FD indicators. When this condition exists, the Link Partners must be configured as follows:

   -same speed and duplex mode
   -one in half duplex mode and one in Auto-
    negotiation mode
   -both in Auto-negotiating mode

for the Link to operate properly. Duplex mismatch is a common network problem. For improved network management, the Veri-Net+ warns the user when ambiguous duplex mode Link signals are detected.

BATTERY LIFE

Auto Power Down - The Veri-Net+ will automatically turn off after approximately 12 minutes of operation.
Low Battery - When the battery is below the level required for the Veri-Net+ to operate properly, the "FAULT" indicator blinks on and off.

APPLICATIONS

Network Planning - Identify capabilities of installed equipment for LAN upgrades without opening the case.
Installation - Verify physical layer connectivity to the far end. Link activation signals verify two way continuity and identify connected hub/switch port.
Trouble Calls - Reduce troubleshooting time by ensuring the Link is active and no faults are detected. Locate physical layer problems with built-in tone generator and standard tone probe.
Moves, Adds and Changes - Identify correct wire pair with tone generator feature and verify Link is operating after punching down new connections.
Network Management - Test current configuration of installed equipment to determine if modes have been configured manually and type of Link signaling used.

VERI-NET+ Link Tester

BOX CONTENTS
- Veri-Net+ Link Tester
- 9 Volt Alkaline Battery
- RJ-45 Coupler
- User Guide

BATTERY

The Veri-Net+ operates on one 9 volt alkaline battery.

Remove the battery cover at the bottom of the unit and insert the battery with the terminal orientation as shown. Battery polarity is marked on the back of the battery cover and inside the battery well for reference.

TECHNICAL OVERVIEW

The IEEE 802.3u Standard for 100BaseTX (Fast Ethernet) requires LAN equipment to use a signaling system to establish a Link between two devices called Link Partners. Standard Ethernet uses a single Normal Link Pulse to establish the Link. Fast Ethernet equipment (and some recent 10baseT products) use a burst of Fast Link Pulses(FLPs) to transmit a Link Code Word defining the configured capabilities of the device and to report faults . If both Link Partners have Auto-negotiation capability, a Link is established based on the following priority:
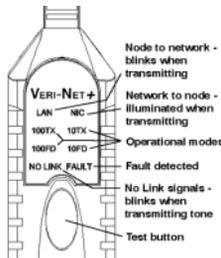
1. 100BaseTX Full Duplex
2. 100BaseT4
3. 100BaseTX Half Duplex
4. 10BaseT Full Duplex
5. 10BaseT Half Duplex

The IEEE 802.3u Standard does *not* require Fast Ethernet equipment to support Auto-negotiation or more than one 100baseT mode of operation. A second type of signaling called Parallel Detection (a continuous MLT-3 waveform) can also be used to establish a Fast Ethernet Link. Parallel Detection signaling does *not* differentiate between half duplex and full duplex mode which can lead to poor network performance if both Link Partners are not properly configured. Most Ethernet LAN equipment can be manually configured to a specific mode of operation. Equipment in this "commanded" mode of operation may establish a Link with either a Link Code Word, an NLP or a Parallel Detection (MLT-3) signal. Knowing the type of signaling used on a Link is critical to optimizing system performance. The Veri-Net+ detects and decodes the different Link signals on Standard and Fast Ethernet networks and displays the equipment configuration, signaling type and reported faults. The Veri-Net+ does not test 100BaseT4.

OPERATION

The Veri-Net+ test consists of three steps: detecting Link signals, transmitting Link signals and Auto-negotiating.

Node to network - blinks when transmitting

Network to node - illuminated when transmitting

Operational modes

Fault detected

No Link signals - blinks when transmitting tone

Test button

Insert the Veri-Net+ plug in to the RJ-45 port of a hub, switch, network interface card, wall outlet, or attach to a UTP or STP cable with the RJ-45 coupler.

Press and release the "TEST" button. The first wire pair (from node to network) is scanned for two seconds. If Link signals are detected, the indicator(s) for the operational modes or fault condition are illuminated. After one second, the Veri-Net+ automatically transmits a pattern of Link signals to the Link Partner. The "LAN" indicator blinks on and off as the signals are transmitted. The Link indicator on the hub or switch at the far end will also blink indicating which port is connected to the Veri-Net+. (Hubs/switches have different Link indicator time delays. The blink rate of the equipment may not exactly match the blink rate of the Veri-Net+. Determine the blink pattern directly at a hub/switch port prior to running tests from a remote outlet.) When no signals are detected on the first wire pair, the unit scans the second wire pair (from network to node) for two seconds. Link signals are decoded and the indicator(s) for the modes or fault are lit. After one second, the Veri-Net+ transmits Link signals continuously to the NIC. The Link light on the NIC will light verifying two-way Link communications.

If no signals are detected, the "NO LINK" indicator is illuminated and the Veri-Net+ automatically transmits a tone pattern on both wire pairs. The "NO LINK" indicator blinks when the tone is being transmitted. A standard tone probe can be used with the Veri-Net+ to locate the physical layer problem.
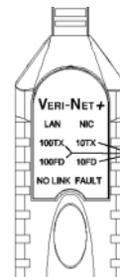
The Veri-Net+ also detects Links with incorrectly installed reversed polarity pairs and displays "NO LINK" for this condition. (Links using NLP or FLP signaling only.)

AUTO-NEGOTIATION

When two or more operational mode indicators are

Operational modes - two or more lit means Link Partner is in Auto-negotiation mode

lit, the Link being tested is capable of Auto-negotiating to the highest common level of operation with a Link Partner.

After the Veri-Net+ begins transmitting Link signals, the Link Partner will Auto-negotiate to the 10TX mode and the Veri-Net+ indicators for the negotiated mode will light verifying the Auto-negotiation function.

(Note: Auto-negotiation timing varies greatly therefore not all equipment will complete Auto-negotiation with the Veri-Net+. For equipment with long time constants, the capabilities are displayed but the negotiation to the 10TX mode does not occur. Test a known good port to determine equipment response time.)