

# **Application Note**

## **LanMaster 25 Link Tests on Network Equipment Set to a Commanded Mode of Operation**

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### Introduction

IEEE Specification 802.3u provides clear guidelines for the type and use of Link Signaling in the Auto-negotiation mode of operation. Unfortunately, the specification does not provide the same information for "Commanded" or "Forced" modes of operation set by the user either through software commands or hardware switches on the equipment. Manufacturers have not been consistent in how Link Signaling is implemented for commanded modes and this has caused confusion on the part of users when they are installing and maintaining systems and in many cases resulted in poor LAN performance.

Two Link Partners set to the "Auto-negotiation" mode always arrive at the correct speed and duplex by exchanging Link Code Words which exactly describe the full capabilities of both partners. Links can also be established by exchanging two other types of signals; the Normal Link Pulse (NLP) and the Parallel Detection Waveform (PDW). When a network device receives an NLP it knows that the Link Partner is a 10baseT device but there is no indication if the transmitting device is using a half duplex or a full duplex mode for data transmission. Similarly if the Link Partner receives a PDW, the Link Partner knows it will receive data in a 100baseT format but it must guess at which duplex mode to use. NLPs and PDWs correctly indicate the network speed but are ambiguous as to which duplex mode to use.

The majority of 10/100 hubs, switches and NICs currently on the market use NLP and PDW signaling when set to a Commanded mode of operation. These same hubs, switches and NICs in the Auto-negotiate mode will default to the half duplex mode when they receive an NLP or a PDW. The problem occurs when one Link Partner is set to a "Commanded" full duplex mode, it transmits a NLP or PDW Link Signal which does not identify the duplex mode and the other Link Partner is in the Auto-negotiate mode which defaults to the half duplex mode for these Link Signals. The result will be poor network performance due to timing errors and excess collisions.

The LanMaster 25 alerts the user when an NLP or PDW is detected. The instrument will alternately blink between the 10TX and 10FD indicators when an NLP is detected and between the 100TX and 100FD indicators when the PDW is detected.

### EXAMPLE

A switch port is set to 100BaseT, half duplex operation and a test is run with the LanMaster 25. The indicators blink between 100TX and 100FD showing that the Link Partner is using a PDW to indicate the speed of 100 mbps but the duplex mode is ambiguous. This same switch port is next set to 100baseT, full duplex operation and the test is run again with the LanMaster 25. Again the indicators blink between 100TX and 100FD because the same duplex ambiguous PDW Link Signal is used by the Link Partner. When PDW or NLP signals are detected, it is important for the user to ensure both Link Partners are set to identical modes of operation. Both devices should be set to a Commanded half duplex mode or both should be set to a Commanded full duplex mode. System maintainability will be enhanced if both devices are set to the Auto-negotiate mode.