

Interpretation Number: 2-07/05
Topic: Auto-Negotiation
Relevant Clause: 37 and 40.5.1
Classification: Unambiguous

Interpretation Request

I am debating with a colleague the validity of configuring a 10/100/1000 Ethernet port for fixed 1000Mb full-duplex operation. Is this permissible? I have seen interpretations that it is permissible to configure a port for fixed 1000Mbps operation and interpretations that if auto-negotiation is disabled, fixed speed can only be set to 100Mbps or 10Mbps.

Standard: IEEE Std 802.3(tm)-2002

Section(s): 37 and 40.5.1 Support for Auto-Negotiation

Conditions: A physical Ethernet port is capable of operation at 10Mbps, 100Mbps, or 1000Mbps. Full-duplex operation is possible at all speeds. Half-duplex operation is available at 10 and 100Mbps. It is also possible to configure the port for auto-negotiation.

The question is, Is it permissible to configure a 10/100/1000 capable port for fixed, full-duplex operation at 1000Mbps when auto-negotiation is disabled?

Interpretation for IEEE Std 802.3-2002

This interpretation is asking two specific questions, one pertaining to 1000BASE-X operation and one pertaining to 1000BASE-T operation.

Duplex configuration during 1000BASE-X operation can be handled either through Auto-Negotiation or through manual selection using the defined registers in clause 22. If manual configuration is used by disabling Auto-Negotiation in MII register 0.12, the duplex operation mode would be selected by bit 0.8. If Auto-Negotiation is enabled duplex configuration is controlled by the exchange of /C/ ordered sets. By definition speed selection is not possible through Auto-negotiation in 1000BASE-X operation.

Speed, Duplex, and MASTER/SLAVE configuration during 1000BASE-T operation, are determined through the Auto-Negotiation process. Clause 40.5.1 states:

“All 1000BASE-T PHYs shall provide support for Auto-Negotiation (Clause 28) and shall be capable of operating as MASTER or SLAVE. Auto-Negotiation is performed as part of the initial set-up of the link, and allows the PHYs at each end to advertise their capabilities (speed, PHY type, half or full duplex) and to automatically select the operating mode for communication on the link. Auto-negotiation signaling is used for the following two primary purposes for 1000BASE-T:

a) To negotiate that the PHY is capable of supporting 1000BASE-T half duplex or full duplex transmission.

b) To determine the MASTER-SLAVE relationship between the PHYs at each end of the link.

This relationship is necessary for establishing the timing control of each PHY. The 1000BASE-T MASTER PHY is clocked from a local source. The SLAVE PHY uses loop timing where the clock is recovered from the received data stream.”

Clause 40.5.2 MASTER/SLAVE states that the MASTER/SLAVE relationship shall be determined using Auto-Negotiation:

“The MASTER-SLAVE relationship shall be determined during Auto-Negotiation using Table 40–5 with the 1000BASE-T Technology Ability Next Page bit values specified in Table 40–4 and information received from the link partner. This process is conducted at the entrance to the FLP LINK GOOD CHECK state shown in the Arbitration state diagram (Figure 28–13.)”

This indicates that although operating speed is allowed to be manually selected by disabling Auto-Negotiation in Control Register 0, selecting 1000BASE-T mode of operation still requires that Auto-Negotiation be used. This can be accomplished by continuing to use Auto-Negotiation while limiting the advertising to 1000BASE-T capabilities.