Optimizing Laptop Docking Station Designs Using LAN Switches

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LAN capability is a common feature for most laptops/notebooks and docking stations. Some laptop designers use two LAN PHY for both laptop and docking stations, but only one LAN PHY is been used at a time. Using LAN switches to switch the LAN signal between the RJ-45 connectors in laptops, and in docking stations, will share the devices of 10/100/1000 base-T Ethernet Physical Layer (PHY), and the integrated Ethernet Media Controller (MAC) chips. Thus, it will reduce the redundancy cost of the PHY, MAC and other components.

The Pericom LAN switch family, including PI3L100, PI5L100, PI5L200 and PI3L301, provide a variety choices ideally suited for the sharing of PHY and MAC in laptop and docking station applications. This approach is also suitable for any application of PHY and MAC with two or more RJ-45 connectors.

Pericom LAN switches are designed with low and flat R_{ON}, and high bandwidth suitable for high speed PHY.

A typical Pericom LAN switch is located on the Laptop motherboard. The devices switch the Ethernet differential pair signals between 10/100/1000 Base-T PHY chip, and the RJ-45 LAN connectors in Laptop or in docking stations.

In the LAN switch application, an isolation-magnetic is requested for each RJ-45 connector to offset the voltage from RJ-45, and to protect the switch from the damage of a higher-voltage surge caused by ethernet lines. IEEE standards require the isolation magnetic at RJ-45. The insertion of the laptop into the docking station will be detected, and the firmware will automatically switch the PHY from the internal RJ-45 to the RJ-45 in docking station. See illustration below.
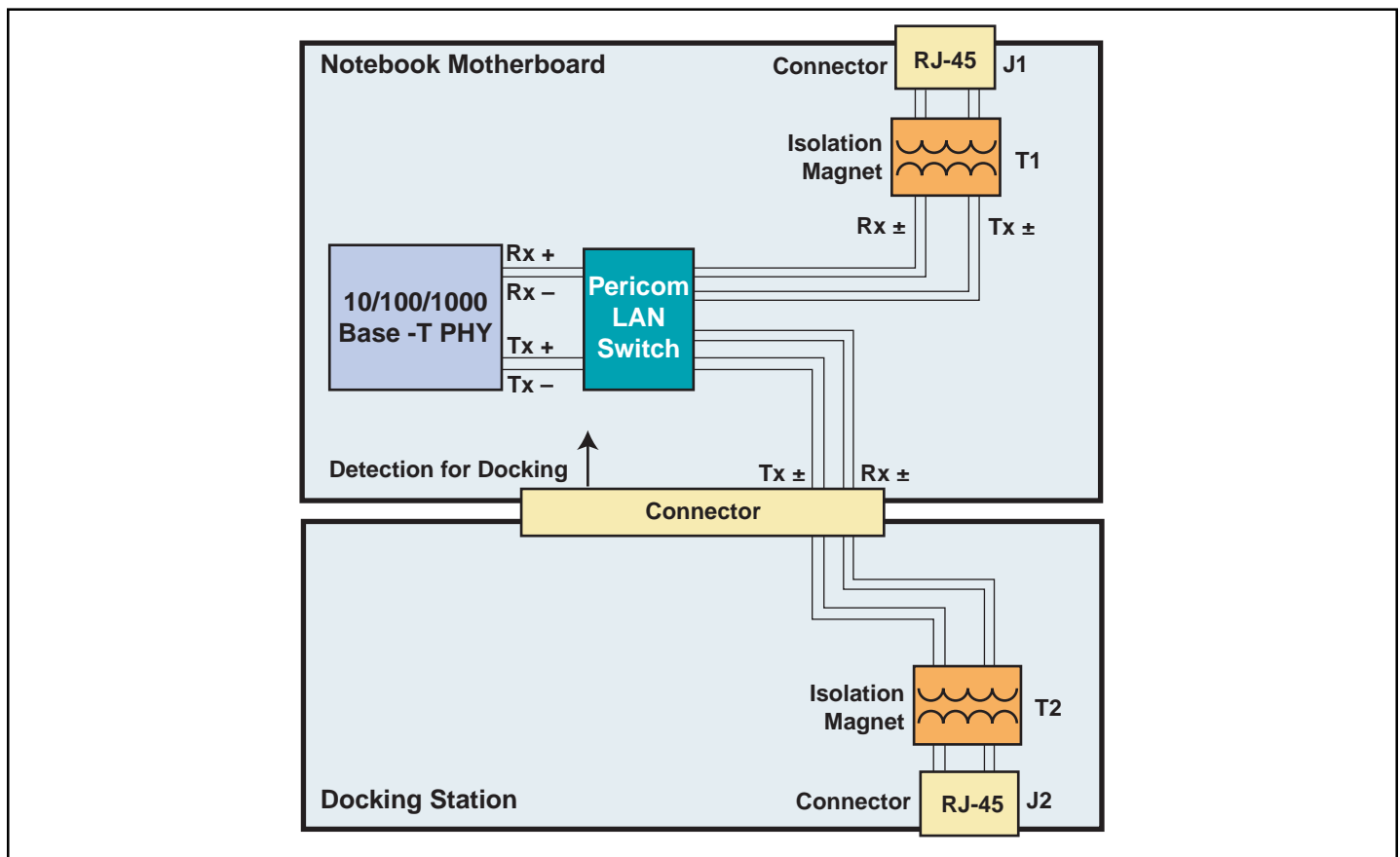
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