Link Pass-Through Maintaining a Transparent Copper-Ethernet to Fiber Solution

perle.com/supportfiles/link-passthrough.shtml

Perle Systems Technical Notes

Ethernet Media Converters provide a great solution for connecting copper ethernet connections across fiber. Various products are offered by different vendors. Rudimentary implementations offer a simple transceiver pair. However, while this is a lower cost option, there is a serious drawback. The end to end connection will always appear as if it is up and running even though the fiber connection may be broken or disconnected. The end devices, such as switches, continue to see the connection as healthy and never report a problem to an enterprise network management system.

For mission-critical links, it is important that these connections behave like a real copper to copper connection. This is accomplished through an onboard processor in the media converter that continuously monitors the status of the links connected to its transceiver ports. If there is a break or failure in the link, both end devices become aware and react accordingly. An application on a server or a switch can then take the appropriate action should a link fail. A number of Link Pass-Through features are available to provide this link transparency troubleshooting capability.

Fast Ethernet Media Converters & 10/100 Media Converters

Perle's Fast Ethernet Media Converters combine an existing 802.3 standard along with its own Link Pass-Through feature in order to accomplish a transparent link.

With **Link Pass-Through**, the state of the 100BASE-TX copper receiver is passed to the 100BASE-FX fiber transmitter. A typical scenario may be that the cable to an important remote file server is accidently disconnected from its Ethernet interface. The media converter detects that the copper link is now lost and then drops the fiber connection. In conjunction with the Far-End Fault feature, the remote media converter connected to a fast Ethernet switch can now pass the failed state of the file server connection along the switch which can then send an SNMP alert to its enterprise NMS system so that corrective action can take place.

Far-End Fault (FEF) is an IEEE 802.3u standard that is designed to assist fiber gear in detecting link faults on the fiber link. Should the link on the fiber receiver connection fail, the media converter will transmit a Far-End Fault signal pattern over its 100BASE-FX fiber transmit connection. The media converter continuously monitors the100BASE-FX fiber connection for a valid signal. Once the fiber problem has been corrected, the media converter ceases to transmit the FEF.

The action the media converter takes on receiving a Far-End Fault Indication is dependent on the Link Pass-Through switch setting. With Link Pass-Through enabled, the FEF signal received on its fiber receiver will cause the media converter to drop the copper link so that the end device gear

knows that the fiber link is not completely functional.

Therefore when considering a Fast Ethernet Media Converter for important network links, it is very important that the media converter be able to present conditions on the entire fiber connection transparently.

Gigabit Media Converters & 10/100/1000 Media Converters

Dual Gigabit transceiver chips used by media converters will normally disable the fiber interface using auto-negotiation with a remote fault status condition should the 1000Base-T side be disconnected, but should the fiber port go down, the copper port will remain active. This means that devices connected to the 1000Base-T port will not know that there is a fault on the fiber link. Media converters with onboard processors such as Perle's Gigabit media converters can provide the necessary signaling with the remote peer ensuring that there is always end-to-end transparency.

A Link Mode switch provided on the media converters, defines the behavior of the copper and fiber ports under various conditions. In the default "Normal" position, the media converter will operate as per the natural auto-negotation behavior of the Gigabit transceiver (with Fiber Auto-negotiation enabled) described above. If the user desires to have the copper port reflect the state of the fiber port , the Link Mode switch can be placed into **Smart Link Pass-Through** mode an advanced feature that provides a true reflection on what is happening on the other port. Smart Link Pass-Through will perform this whether Fiber Auto-Negotiation is enabled or disabled.

Even though most Gigabit fiber equipment support fiber negotiation, some equipment was deployed in the early days before the Gigabit standards were fully ratified. In order to accommodate this equipment and still maintain link transparency, Perle Gigabit Media Converters also provide a **Fiber Fault Alert** feature.

With Fiber Auto-Negotiation, disabled and **Fiber Fault Alert** switch enabled, should the fiber receiver link fail, the Fiber transmitter will be turned off alerting the remote peer of a fiber failure

Summary

If your Ethernet to fiber media conversion project involves links that are mission critical to your operation, it is important that the media converters used are intelligent enough to properly reflect conditions on all parts of the link and provides complete link transparency to network equipment end points.