Over the years, Ethernet networks have grown in popularity and in size. With this growth, the use of Ethernet switches in the network infrastructure has also increased. Switches have helped to solve many inherent problems in larger networks, but the majority of Ethernet switches on the market today are available only with either 10Base-T or 100Base-TX interfaces (i.e., RJ-45). If the entire network is twisted pair (either Category III or Category V), the switch can simply be plugged in.

However, the vast majority of cabling infrastructure schemes use fiber cable for one or more of the following reasons:

- Immunity to electrical interference
- Immunity to eavesdropping/interception
- Longer distances

Installers are now faced with the problem of how to interconnect disparate cabling types to the switch. Therefore, some type of ‘device' is required to convert RJ-45 to one of the fiber types in use.

Media converters have been designed to solve this problem.

**What is a Media Converter?**

A media converter is simply two MAUs (media attachment units, also known as transceivers) that can pass data to/from each other. The IMC Networks family of MediaConverters™ takes the form of modules (e.g., 10Base-T to 10Base-FL) that plug into a chassis that simply provides power. Since media converters are IEEE compliant devices, they implement IEEE data encoding rules and Link Integrity Test.

**What is Link?**

In the case of twisted pair, Link is a signal sent by the transmitter electronics when the cable is not in use. If no Link Integrity Test is received, the Link is assumed to be lost*.

With fiber optics, Link is a simple monitoring of the Link Integrity Test and the power of the light being received. If it drops beneath a certain threshold, Link is lost*.

*Lost Link = Broken cable approximately 70% of all LAN problems!
To the user, the loss of Link is normally indicated by a Link LED somewhere on the network device. If the Link LED is on, it can be assumed that the cabling is good. If the Link LED is out, the user knows there is a cable problem. The Link Integrity Test is a simple yet powerful tool for network managers to establish whether the physical cabling (either the twisted pair or fiber) is contiguous or not.

**Checking the Link**

Link can either be checked by physically observing the status of the Link LED, or more commonly in larger networks, by network management software—specifically SNMP.

For example: An SNMP management workstation can interrogate manageable switches in use and display the Link Status of a segment, either in graphical or tabular format. In addition, the SNMP manageable switch may also support the ability to be configured so that a TRAP (a type of alert within SNMP) is sent to the management workstation when Link is lost.

**Link and Media Converters**

As previously mentioned, media converters implement the Link Integrity Test feature. If the cable is broken or damaged, the Link LED on the media converter associated with that segment will go out. The following diagram shows the typical usage of a media converter.

As shown in the above diagram, a short run of twisted pair cable comes from the switch into the media converter. From the media converter, a length of fiber goes to Building "Y". The status of Link on this fiber segment is the critical Link.

Remember, media converters are two separate MAUs. As far as the twisted pair MAU is concerned, the Link is OK. What happens to Link on the fiber side is of no concern on the twisted pair side.
If the fiber cable is broken/damaged and Link is lost at the media converter, the network manager will NOT see this happening, as his management software is monitoring the Link status of the protected twisted pair cable. Net result? The fiber cable may fail but the network manager will know nothing at all about the problem until users in building "Y" report the lost connection.

The above problem can be solved if the network manager permanently stationed a person to observe the Link status of the fiber ports on the media converters in the rack— not a particularly feasible option.

The Solution

Much time and money may have been invested in a network management system that CANNOT see the most basic and useful diagnostic tool available— Link STATUS.

To solve this problem, IMC Networks is now shipping all of their low cost, fiber-based MediaConverters (10 Mbps McPIMs and 100 Mbps McLIMs) with a Link Loss Feature. This feature is especially useful during initial installation, during the "checkout" phase, to isolate cable faults.

A MediaConverter with the Link Loss Feature enabled allows the Link status of the twisted pair component to reflect the Link status of the fiber component. In other words, if fiber Link is lost at the MediaConverter, the Link Integrity Test will be disabled on the twisted pair segment. When the IMC Networks MediaConverter disables the twisted pair Link LED due to loss of Link on the fiber side, the Link LED on the switch will also be disabled. If the switch is configured to monitor Link status, it will immediately send an SNMP TRAP indicating loss of Link.

The Link Loss Feature is an extremely useful and powerful option— by simply setting a jumper on the PCB, the system manager and/or installer can determine whether to take advantage of this feature. With Link Loss enabled the Link status of the fiber segment will always be reflected by the twisted pair segment, thus allowing quick notification of fiber segment problems.
Configure your own MediaConverter with Link Loss . . .

First, select your MediaConverter chassis . . .

51-10901 MediaConverter/1x — 1-slot stand-alone chassis includes a 120/240V internal power supply; requires one McPIM or McLIM

51-10904 MediaConverter/4x — 4-slot stand-alone chassis includes a 120/240V internal power supply; requires 1 - 4 McPIMs or McLIMs

51-10908 MediaConverter/8x — 8-slot stand-alone chassis includes a 120/240V internal power supply; requires 1 - 8 McPIMs or McLIMs

51-10912 MediaConverter/12x — 12-slot, 1U rackmountable chassis includes a 120/240V Power Supply Module in rear of chassis; features an additional slot for installing a redundant Power Supply Module; requires 1 - 12 McPIMs or McLIMs

51-10913 MediaConverter/12x-DC — same as above except includes a -48VDC Power Supply Module

51-10922 MediaConverter/12y — 12-slot, 2U rackmountable chassis includes a 120/240V Power Supply Module in front of chassis; features an additional slot for installing a redundant Power Supply Module; requires 1 - 12 McPIMs or McLIMs

51-10923 MediaConverter/12y-DC — same as above except includes a -48VDC Power Supply Module

Then, select your conversion module(s) . . .

10 Mbps MediaConverter Port Interface Modules (McPIMs)

55-12526 McPIM Module, TP/FO
55-12516 McPIM Module, TP/FO-SC
55-12546 McPIM Module, TP/FO-SingleMode
55-12596 McPIM Module, TP/FO-SingleMode-SC
55-12556 McPIM Module, TP/FO-SingleMode/20
55-12566 McPIM Module, TP/FO-SingleMode/20-SC

100 Mbps MediaConverter Link Interface Modules (McLIMs)

55-12426 McLIM Module, TX/FX
55-12427 McLIM Module, TX/FX-SC
55-12436 McLIM Module, TX/FX-SingleMode
55-12437 McLIM Module, TX/FX-SingleMode-SC
55-12446 McLIM Module, TX/FX-SingleMode/20
55-12447 McLIM Module, TX/FX-SingleMode/20-SC

Or, select a preconfigured MediaConverter with Link Loss for a single conversion . . .

10 Mbps Ethernet MediaConverters

55-10326 MediaConverter, TP/FO
55-10316 MediaConverter, TP/FO-SC
55-10346 MediaConverter, TP/FO-SingleMode
55-10347 MediaConverter, TP/FO-SingleMode-SC
55-10356 MediaConverter, TP/FO-SingleMode/20
55-10366 MediaConverter, TP/FO-SingleMode/20-SC

100 Mbps Fast Ethernet MediaConverters

55-10426 MediaConverter, TX/FX
55-10427 MediaConverter, TX/FX-SC
55-10436 MediaConverter, TX/FX-SingleMode
55-10437 MediaConverter, TX/FX-SingleMode-SC
55-10446 MediaConverter, TX/FX-SingleMode/20
55-10447 MediaConverter, TX/FX-SingleMode/20-SC

Do you need a redundant power supply1 for your MediaConverter/12x or /12y chassis?

06-39040 PS/40 Power Module — 120/240 VAC
06-39450 PS/50 Power Module — -48 VDC

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For further information on IMC Networks Media Conversion products, check us out on the Web or contact our Technical Sales department (714-724-1070).

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1 IMPORTANT: Voltage of second Power Supply Module must match that of the first Power Supply Module installed in the chassis.