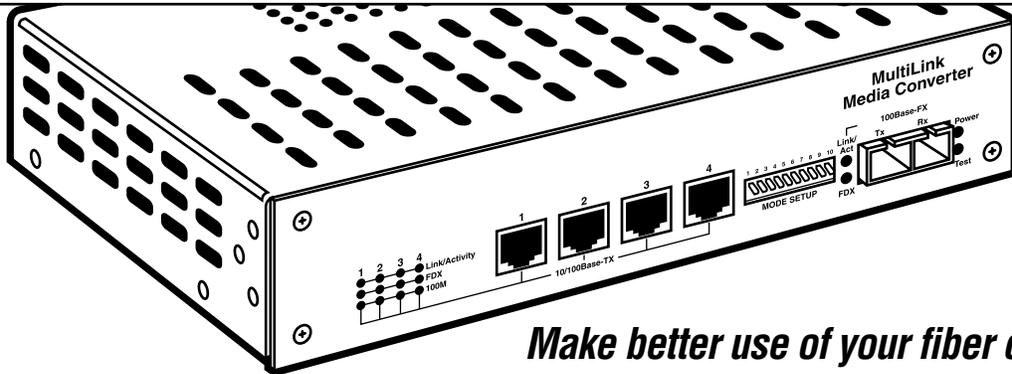


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BLACK BOX[®]

NETWORK SERVICES

MULTILINK AND MULTILINK II MEDIA CONVERTERS



Make better use of your fiber optic runs with these Layer 2 copper-to-fiber converters.

Key Features

- ▶ **Layer 2 switching media conversion with custom VLAN support.**
- ▶ **Distances up to 40 km with "SM40" models.**
- ▶ **Managed and unmanaged models.**
- ▶ **Twisted-pair ports autonegotiate for 10- or 100-Mbps speed.**
- ▶ **MultiLink aggregates multiple 10/100 copper links over a single fiber pair.**
- ▶ **MultiLink II connects two 10/100 copper links over a primary fiber pair.**
- ▶ **If the primary one fails, MultiLink II sends data via a second fiber pair.**

MultiLink

Connect three or four network 10BASE-T/100BASE-TX devices into this box for cost-effective media conversion from copper to a single pair of fiber optic cabling.

Available in 3-to-1 managed or 4-to-1 unmanaged versions with SC or ST connectors, the MultiLink aggregates your Ethernet or Fast Ethernet links over either multimode or single-mode fiber. Not only does this traffic aggregator convert 10-Mbps or 100-Mbps copper to fiber optic signals—and enables you to take advantage of longer distances of fiber optics—but it also negotiates per duplex speeds.

Use these media converters in a campus environment, for example, to connect individual departments or buildings via fiber to your enterprise switch. This way, you not only stretch your network connections but increase data security while minimizing the effects of electromagnetic interference on your data links.

It's also the ideal solution for remote locations with just a handful of workstations and no great need for a dedicated switch or hub. Or use it in fiber-to-the-home (FTTH) or fiber-to-the-desktop (FTTD) applications. You can connect four homes or workstations to a fiber optic backbone over one pair of fibers with the MultiLink.

You can operate a MultiLink device as (1) a switch, (2) a switch with built-in port aggregation and security functions, and (3) a bidirectional media converter.

By default, the MultiLink operates in the second capacity, as a secure Ethernet switch, keeping each 10BASE-T/100BASE-TX port isolated in secure VLAN-protected broadcast domains. The fiber port also has a broadcast domain, too. But it's also a "member" of the copper domains. This means users attached to the copper ports can network with resources attached to the fiber port only.

With this level of security, the MultiLink is ideal for service

providers who use a common fiber link to distribute services to multiple users but also want to keep each user port isolated from other user ports.

To deploy the MultiLink as a switch, simply flip a DIP switch on the front panel. Doing this disables port-based VLANs pre-set in the firmware and puts all ports within the same bandwidth domain. You can then operate the MultiLink as a conventional store-and-forward switch, complete with a 1K MAC address table and 300 seconds aging.

When used as a converter, the MultiLink device provides Layer 2 copper-to-fiber conversions while autonegotiating 10-/100-Mbps connections on the copper side and making 100-Mbps connections on the fiber side. In most cases, the copper ports automatically adapt to work at the highest possible performance (although forced operation may be required in some situations).

But it's not just any ordinary

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media conversion. MultiLink products feature sophisticated buffering technology that enables you to achieve greater distances on the connected segments as well as greater flexibility when you're planning your network.

Many 100BASE-TX to 100BASE-FX media converters use repeater technology, so they become part of the collision domain, introduce additional delay to the network, and contribute to the repeater count. With MultiLink Converters you have no such worries. They take a non-repeater, full-retiming approach by creating a Buffered Media Domain (BMD). Within this domain, you can extend a network in any network architecture—regardless of the number of repeaters present. A domain created by a pair of like MultiLink products always operates at maximum performance (100 Mbps at full-duplex) even while interconnected devices operate at different rates and modes.

For copper connections, the unmanaged model has four 10BASE-T/100BASE-TX ports with its firmware set to allow bandwidth priority for the fourth UTP port. This "preferred" port can be used for a user who needs a lot of bandwidth.

The managed model, in contrast, has three 10BASE-T/100BASE-T ports plus a front-panel console port, which enables you to control it remotely through an RS-232 management interface. You can even manage the MultiLink using full, in-band SNMP via a management station platform such as HP® OpenView® and SNMPc. To do this, just load a MIB file when configuring the device.

Using the MultiLink's terminal connection, you can override its DIP-switch settings and monitor the device. A basic text menu prompts you through all options for setting network, console, and SNMP parameters.

To make the console connection, you simply plug one end of the serial cable that's shipped with the unit into the 4-pin

DIN console port and the other end into an RS-232 terminal emulation program of your choice.

Port priority schemes on the managed model allow you to specify high or low priority to traffic it processes. This can be done on a per-port basis, in which all traffic from a specified input port is considered high priority, or through 802.1 Port Priority, in which the inbound port examines the priority field within a VLAN tag to determine high or low priority. You can set the managed MultiLink to determine outbound priority, too, through its DSCP Port Priority function.

The managed model also offers protection against broadcast storms, activity which can overload your network and slow it down. To counter this type of activity, the managed MultiLink allows you to specify the relative amount of broadcast traffic that can be forwarded by the device, as much as 25% and as little as 3%.

Each copper port on both managed and unmanaged models has three status LEDs (link/activity, duplex mode, and connection speed), and the fiber port has two status LEDs (link/activity and duplex mode). The managed models also feature two LEDs relating to management functions.

All MultiLink Converters have a Far End Fault (FEF) feature. When enabled, FEF alerts you to problems on the connected fiber optic segment. If the MultiLink detects fiber optic link loss on the remote side of the link and if the remote device supports FEF, a Far End Fault signal is relayed back to the MultiLink local device, alerting you to "silent failures" on your network through an LED.

And there's no need to use crossover cables. UTP ports on both managed and unmanaged models feature an autocross MDI/MDI-X function, so the MultiLink automatically adjusts to the type of connection, whether it's MDI or MDI-X mode of operation.

Packaged in a rugged "half-rack" enclosure, the MultiLink can be used on the desktop or shelf.

Specifications

MultiLink Converters

Approvals: UL® 1950, 1955, EN60950; FCC Part 15, Subpart A, Class A, VCCI Class; ICES; EMC; CE

Standards: IEEE 802.3u, IEEE802.1p, 100BASE-TX, 100BASE-FX, 10BASE-T, FDX flow control, HDX back pressure flow control

Distance (Maximum):
LB1350A-SC, LB1350A-ST,
LB1351A-SC, LB1351A-ST:
2 km (1.2 mi.);
LB1350A-SM15, LB1351A-SM15:
15 km (9.3 mi.);
LB1350A-SM40, LB1351A-SM40:
40 km (24.9 mi.)

Connectors: LB1350A:
(4) RJ-45, (1) pair SC or ST;
LB1351A: (3) RJ-45, (1) pair SC
or ST, (1) 4-pin DIN (RS-232);
All: (1) 3-prong IEC power

Hardware Type: Store-and-forward,
wire-speed, non-blocking switch

MIBs Supported: Managed models
only: MIB II (RFC 1213, 1215), RFC
2474 (DSCP), private MIBs

Conversion Method: Buffered Media
Domain (BMD)

Speed (Maximum):
Switching fabric: 1.4 Gbps;
On UTP and fiber optic ports:
10 or 100 Mbps (half-duplex),
20 or 200 Mbps (full-duplex)

Indicators: All: (12) LEDs: (3) per
each 10/100 port:
Link/Activity, FDX, 100M;
(2) on fiber optic port:
Link/Activity, FDX;
(1) Power; (1) Test;
LB1351A models also have
(1) RCV and (1) Ready LED

Protocol: Transparent, auto-learning
switch

Temperature Tolerance: Operating:
32 to 113°F (0 to 45°C);
Storage: -4 to +176°F
(-20 to +80°C)

Humidity Tolerance: 10 to 90%
noncondensing

Power: 100–240 VAC, 50–60 Hz,
autosensing internal power
supply

Size: 1.7"H x 8.8"W x 5.9"D
(4.3x 22.4 x 15 cm)

Weight: 1.3 lb. (0.6 kg)

MultiLink II Converters

Approvals: UL® 1950; FCC Part 15,
Class A; CE

Standards: IEEE 802.3u, IEEE802.1p,
100BASE-TX, 100BASE-FX,
10BASE-T, FDX flow control, HDX
back pressure flow control

Distance (Maximum):
LB1301A-SC, LB1301A-ST,
LB1302A-SC, LB1302A-ST:
2 km (1.2 mi.);
LB1301A-SM15, LB1302A-SM15:
15 km (9.3 mi.);
LB1301A-SM40, LB1302A-SM40:
40 km (24.9 mi.)

Connectors: LB1301A: (2) RJ-45,
(2) pair SC or ST;
LB1302A:
(2) RJ-45, (2) pair SC or ST,
(1) 4-pin DIN (RS-232);
All: (1) 3-prong IEC power

Hardware Type: Store-and-forward,
wire-speed, non-blocking switch

MIBs Supported: Managed models
only: MIB II (RFC 1213, 1215), RFC
2474 (DSCP), private MIBs

Conversion Method: Buffered Media
Domain (BMD)

Speed (Maximum):
Switching fabric: 1.4 Gbps;
On UTP and fiber optic ports:
10 or 100 Mbps (half-duplex),
20 or 200 Mbps (full-duplex)

Indicators: All: (12) LEDs: (3) per
each 10/100 port:
Link/Activity, FDX, 100M;
(2) on fiber optic port:
Link/Activity, FDX;
(1) Power; (1) Test;
LB1302A models also have
(1) RCV and (1) Ready LED

Protocol: Transparent, auto-learning
switch

Temperature Tolerance: Operating:
32 to 113°F (0 to 45°C);
Storage: -22 to +149°F
(-30 to +65°C)

Humidity Tolerance: 10 to 90%
noncondensing

Power: 100–240 VAC, 50–60 Hz,
autosensing internal power
supply

Size: 1.6"H x 8.7"W x 5.9"D
(4.1 x 22.1 x 15 cm)

Weight: 2 lb. (0.9 kg)



MultiLink II

These media converters offer managed or unmanaged 10BASE-T/100BASE-TX-to-100BASE-FX media conversion and fail-safe options for keeping your fiber optic connections intact.

Available in managed (LB1302A) and unmanaged (LB1301A) versions, the BLACK BOX® MultiLink II provides shared Layer 2 conversion between its two copper ports and two fiber ports. The twisted-pair ports, which are buffered, offer VLAN protection between them.

Along with providing bidirectional copper-to-fiber conversion, the MultiLink II can be used for redundancy of your fiber optic links or as a basic store-and-forward, nonblocking switch within a ring or string topology.

When used to establish a redundant link, the MultiLink II is ideal for a mission-critical application. It gives you peace of mind when you want to be sure that the connection between your network devices and fiber infrastructure is always available.

In a typical redundant-link application, a pair of MultiLink IIs are installed between network devices and the fiber optic cable, with each unit having two ports connected between them—one for primary communications and the other for standby. If the primary fiber link fails, the MultiLink II units recognize the loss of link signals and automatically switch communications from the primary to the backup fiber link. When link signal is restored to the primary link, communications are automatically switched back to it.

(NOTE: You can also use a single MultiLink II to establish a backup fiber optic link, but you must first ensure that the fiber devices attached to its ports support this type of configuration.)

Set up to operate as a 4-port switch, the MultiLink II Media

Converter can operate as an add-drop multiplexor (ADM) access device for interconnecting dozens of network devices within a ring or string architecture.

Setting up your network with ring or string configurations enables you to do a lot more with less fiber. It's particularly useful in highway or railway control or video surveillance applications where you want to interlink control or surveillance stations over fiber optic.

Specifically, you can place a MultiLink II at each station in the ring or string, with one 100BASE-FX port on each unit devoted to an upstream MultiLink II connection and the other 100BASE-FX port linked to the downstream MultiLink II connection. At each station, you can then connect control and monitoring equipment via twisted-pair cable to the MultiLink II's two 10BASE-T/100BASE-TX ports.

As with the original MultiLink Converters (LB1350A–LB1351A), the MultiLink II products feature buffering technology that enables you to communicate across greater distances and provide greater flexibility for planning a network. Because the devices rely on non-repeater, full-retiming technology, they won't contribute to your network's repeater count or clutter the network's collision domain and, in turn, contribute to any possible delay. By creating a Buffered Media Domain (BMD), the MultiLink II enables you to extend a network in any network architecture—no matter how many repeaters are present—and still see maximum performance. You can expect this performance even in a network where your interconnected devices operate at different rates and modes.

Because the MultiLink II puts the two twisted-pair ports in separate VLAN-protected broadcast domains, there's security between ports. The fiber optic port, along with having its own broadcast domain, is also

a "member" of the twisted-pair domains. So users attached to the copper ports can network with resources attached to the fiber port only. This way, a service provider can distribute its services to multiple users via a common fiber link while keeping each user port isolated from other user ports. This security feature, which is enabled and disabled using front-panel DIP switches, remains transparent to other attached networks. When it's disabled, the MultiLink II operates as a basic 4-port switch.

When used as a media converter, the MultiLink II provides Layer 2 twisted pair-to-fiber optic conversions while autonegotiating connection speeds on the copper side and making 100-Mbps connections on the fiber side. Autonegotiating, the twisted-pair ports (in most instances) adapt automatically to the highest performance possible, whether it's 10- or 100-Mbps speeds or half- or full-duplex.

Front-panel diagnostics inform you of every port's operating mode. Each copper port has three status LEDs (link/activity, duplex mode, and connection speed) and each fiber port has two status LEDs (link/activity and duplex mode).

If there's a problem transmitting to a remote device across the fiber optic segment, you're alerted to it with the MultiLink II's built-in Far End Fault feature (as long as the remote device supports this feature). When a loss is detected, the local device's link LED shows it. An LED on the MultiLink II shows you when the FEF feature is enabled.

The MultiLink II also has an autocross function on its copper ports, so there's no need to swap out straight-through cables for crossover ones. The MultiLink II configures its copper termination for either MDI or MDI-X operation.

The managed models also have a front-panel RS-232 console port. Through this 4-pin mini-DIN

connection, you can connect a serial management terminal with the included serial cable and manage the MultiLink II from a remote location while using basic text menus. If you want to use an SNMP platform, such as HP® OpenView® and SNMPc, just import the product's MIBs into the platform after assigning IP settings through the RS-232 interface.

The managed models also allow you to set port priority schemes. You can specify high or low priority to traffic on a per-port basis. All traffic from a specified input port can be designated as high priority. This port-priority feature makes the MultiLink II useful in IP phone applications in which IP data traffic shares communication ports with other types of data. In this instance, you could assign highest priority to the IP phone traffic.

Or set the MultiLink II up to process data by VLAN tag headers. Using this 802.1 Port Priority method, the unit's inbound port examines the priority field within a VLAN tag to determine the data's priority. The MultiLink II also supports DSCP Port Priority, which enables you to determine outbound priority, too.

Use the managed MultiLink II to also guard against broadcast storms. To curb this type of activity, you can specify a relative amount of broadcast traffic that the converter is able to forward. This can be as much as 25% and as little as 3%.

Install the MultiLink II in a 19" rack or cabinet or simply use it as a desktop device. Three mounting holes enable the unit to be installed either horizontally or vertically on a wall.



Ordering Information

ITEM	CODE	ITEM	CODE
MultiLink Media Converters		MultiLink II Media Converters	
Managed, (3) 10BASE-T/100BASE-TX to		Unmanaged, (2) 10BASE-T/100BASE-TX to	
(1) Multimode, 1310 μm, 2 kilometers		(2) Multimode, 1310 μm, 2 kilometers	
SC	LB1350A-SC	SC	LB1301A-SC
ST	LB1350A-ST	ST	LB1301A-ST
(1) Single-Mode, 1310 μm, 15 kilometers		(2) Single-Mode, 1310 μm, 15 kilometers	
SC	LB1350A-SM15	SC	LB1301A-SM15
(1) Single-Mode, 1310 μm, 40 kilometers		(2) Single-Mode, 1310 μm, 40 kilometers	
SC	LB1350A-SM40	SC	LB1301A-SM40
Unmanaged, (4) 10BASE-T/100BASE-TX to		Managed, (2) 10BASE-T/100BASE-TX to	
(1) Multimode, 1310 μm, 2 kilometers		(2) Multimode, 1310 μm, 2 kilometers	
SC	LB1351A-SC	SC	LB1302A-SC
ST	LB1351A-ST	ST	LB1302A-ST
(1) Single-Mode, 1310 μm, 15 kilometers		(2) Single-Mode, 1310 μm, 15 kilometers	
SC	LB1351A-SM15	SC	LB1302A-SM15
(1) Single-Mode, 1310 μm, 40 kilometers		(2) Single-Mode, 1310 μm, 40 kilometers	
SC	LB1351A-SM40	SC	LB1302A-SM40
<i>For optimum performance, order...</i>			
Duplex Fiber Optic Cable, PVC, ST-ST			
Custom Lengths.....			EFN062-CC
Multimode Duplex Fiber Optic Cable, PVC			
SC-SC, Custom Lengths.....			EFN4025
Single-Mode Duplex Fiber Optic Cable, PVC			
SC-SC, Custom Lengths.....			EFN5010
CAT5 Patch Cable, 100-MHz, 4-Pair, Straight-Pinned, PVC, Beige, 10-ft. (3-m).....			
			EVMSL05-0010

MultiLink I and II Packages Include:

- Media converter unit
- Strip of (4) adhesive plastic feet for anti-skid desktop placement
- (1) AC power cord
- User manual
- *Managed models only:* (1) 6 foot (1.8-m) 4-pin DIN male to DB9 female console cable
- *Managed models only:* Floppy diskette with MIBs



Black Box offers the best warranty program in the industry—Fido Protection®. For more information, request **FaxBack 22512**.

