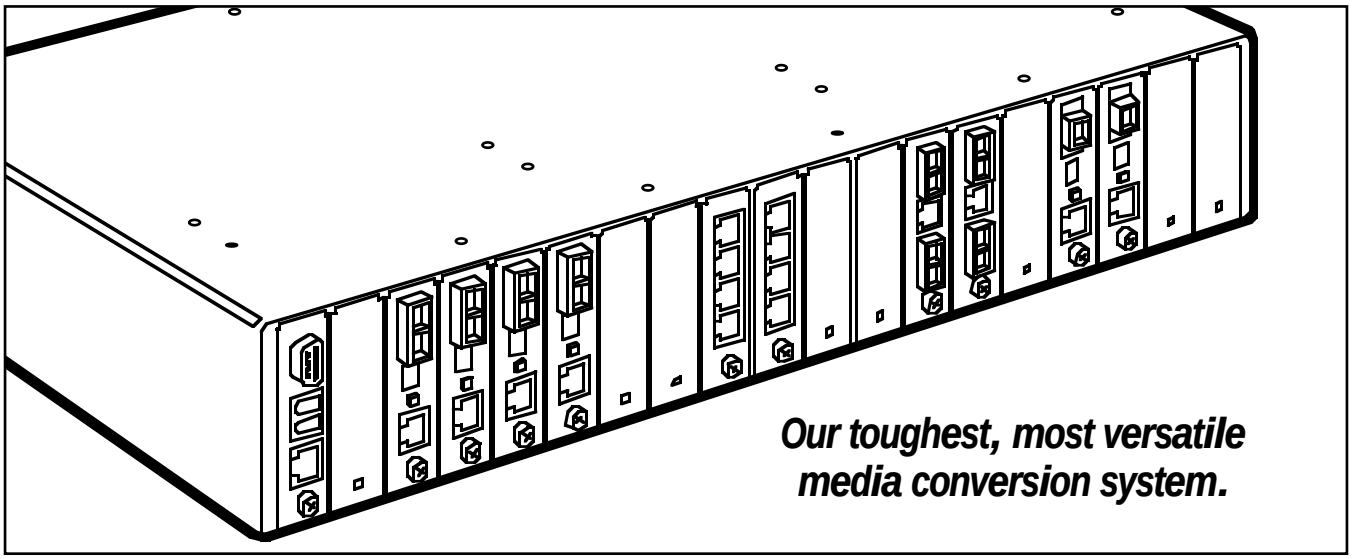
BLACK BOX®
NETWORK SERVICES

DYNAMIC FIBRE CONVERSION SYSTEM



Key Features

- ***Dynamic modular system grows with your network.***
- ***More module choices than any other media converter system.***
- ***Tough construction for hard use: most modules are NEBS Level 3 certified.***
- ***Use with or without management.***
- ***Hot-swappable modules.***
- ***Four different powered chassis to choose from.***

The Dynamic Fibre Conversion System is without a doubt the most robust media conversion system we've ever evaluated.

The system is ideally suited for fibre-based carrier-class or enterprise networks. It's built to withstand harder use than most media conversion systems and offers a far wider choice of modules—including autosensing 10/100/1000 Ethernet and switches—than any other system. Plus, it's fully SNMP manageable. You just aren't going to find a harder working, more versatile system anywhere.

Tough as nails

Most components of the Dynamic Fibre Conversion System are NEBS Level 3 certified (See *What is NEBS Level 3?* on **page 3**) and the remainder are in the process of being certified. The system is suitable for the most demanding carrier-class applications in Telco Central Offices (COs). The heavy-duty chassis stand up to hard use and each module screws solidly into place.

Fully manageable

The Dynamic Fibre Conversion System is completely SNMP manageable with the installation of one SNMP Management Module in each chassis. A stack of up to 16 chassis in one location can be managed as a single IP address.

The SNMP Management Module features a 32-bit, high-performance RISC processor. It has a serial port for initial configuration, a front-plane or back-plane Ethernet management port, and a pair of multi-chassis management ports.

The SNMP Management Module polls all converters and power supplies in its domain every second, collecting status and module information. It reports this information to the management software.

You can use any standard SNMP management software to manage the system using in-band or out-of-band SNMP and Telnet.

Optional Management Software is customised to work with the Dynamic Fibre Conversion System. It can operate as a standalone application in Windows® 9x/Me/XP/NT/2K. Or you can integrate it into a management program such as HP® OpenView®.

Management Software features an intuitive GUI interface which provides real-time monitoring, configuration, alarms, and event/trap management.

The software monitors chassis power, voltage, current, and temperature. It enables you to remotely and selectively monitor and configure the chassis,

modules, and ports. Many settings, such as Speed and Link Propagate, are switch selectable at the module but can be over-ridden through the management software. (See *Management Features* on **page 3**.)

Modules may be grouped together for mass configuration, and they maintain settings even in the event of a power outage.

Backplane links

Many modules—in particular, the Switch Module—can be linked to other modules in the chassis through the backplane, enabling multiple modules to act as one. The backplane link can be made through a DIP switch on the module or through the management software.

Modules that support backplane links are the Switch Module (LMC3050C), some Gigabit modules (LMC3058C–LMC3063C), and some copper/fibre converters (LMC3033C–3042C).

Choose from four different powered chassis

The *19-Slot Power Chassis* holds up to 19 converter modules or 18 converter modules plus a management module. For extra power redundancy, it holds up to three AC or DC power supplies in any combination, each cooled with an integral fan. The chassis occupies 2 U (3.5") of rack space and comes complete with rackmount ears.

The *5-Slot Power Chassis* enables you to put five modules into only 1U (1.75") of rack space. It accommodates one or two AC or DC power supplies.

The *2-Slot Power Chassis* is intended for desktop use and has one AC or DC power supply.

The 19-, 5-, and 2-Slot Chassis are manageable with the addition of SNMP Management modules. The chassis report the voltage, current, and temperature of each power supply.

Use the unmanaged *1-Slot Power Chassis* in non-critical remote locations. It's intended for desktop use and is available only with an AC power supply.

Many hot-swappable modules to choose from

The Dynamic Fibre Conversion System gives you more module choices than any other we offer, including multimode fibre, single-mode fibre, single-strand fibre, 10/100/1000 Ethernet, Gigabit Ethernet, a 4-port switch module, ATM, and T1/E1.

All modules are hot swappable and manageable.

UTP to Multimode Duplex Fibre Modules

These modules convert Ethernet from twisted-pair to standard duplex multimode fibre optic cable. They're available in 10-Mbps, 100-Mbps, and 1000-Mbps, as well as autosensing 10-/100-Mbps and 10-/100-/1000-Mbps modules.

UTP ports are autosensing for half or full duplex. An MDI/MDI-X switch eliminates the need for crossover cable. Link Fault Detection (Link Propagation) is user-selectable.

UTP to Single-Mode Duplex Fibre Modules

Single-mode fibre optic cable is the preferred choice for long-distance applications, and the Dynamic Fibre Conversion System offers many single-mode fibre choices, supporting ranges of up to 80 km (that's about 50 miles!).

10-/100-Mbps and 10-/100-/1000-Mbps modules are autosensing for speed on the UTP side. UTP ports on all modules are autosensing for half or full duplex. All modules have switch-selectable MDI/MDI-X and Link Fault Detection (Link Propagation).

UTP to Single-Mode Single-Fibre Modules

These modules enable you to save on cabling costs by transmitting and receiving over one single-mode fibre strand (See *Single-strand fibre WDM*, on **page 3**.) Like our UTP to Single-Mode Duplex Fibre Modules (**left**), single-fibre modules are autosensing for speed on 10-/100-Mbps and 10-/100-/1000-Mbps modules and are autosensing for half or full duplex. They also have switch-selectable MDI/MDI-X and Link Fault Detection (Link Propagation).

Mode Converters

Mode Converters enable you to interconnect multimode and single-mode fibre optic cable. All have Link Fault Detection (Link Propagation) for remote troubleshooting.

Redundant Modules

These modules convert a single 100BASE-TX UTP link to dual 100-Mbps fibre optic or dual 10-/100-Mbps copper links. They provide hot backup for your vital connections, switching to the redundant link within 100 microseconds if the primary link goes down.

All ports support full or half-duplex operation; UTP ports autonegotiate duplex, and fibre ports can only be set manually. All UTP ports support MDI/MDI-X, eliminating the need for crossover cables. All ports support Link Loss Carry Forward (Link Propagation).

Switch Module

Not a converter, but a welcome addition to the Dynamic Fibre Conversion System, the Switch Module features four 10-/100-Mbps Ethernet ports. The switch is autosensing for both speed and duplex with hardware control available for two ports and software control available for all four ports.

The switch supports MDI/MDI-X crossover; port 1 has a manual crossover switch, ports 2, 3, and 4 feature automatic crossover detection.

ATM OC3 Modules

These modules support OC3 over ATM or SONET and convert duplex multimode fibre optic cable to duplex single-mode fibre optic cable. They enable you to use single-mode cable to add up to 28 km (17.4 mi.) of distance to your OC3 network. Plus, you get another 5 km (3.1 mi.) of distance on the multimode side.

For fault detection, the modules feature Line Propagate, Link Segment, and Remote Fault Detection modes.

T1/E1 Modules

Convert copper T1 lines with RJ-48 connectors to single- or multimode fiber for long-range transmission. The modules support AMI or B8ZX/HDB3 modes. A DCE/DTE switch eliminates the need for crossover cable when connecting to devices such as PBXs and CSUs. Test modes include Local Loopback, Force 1s to Copper, Force 1s to Fibre, and Fibre Test.

Single-strand fibre WDM.

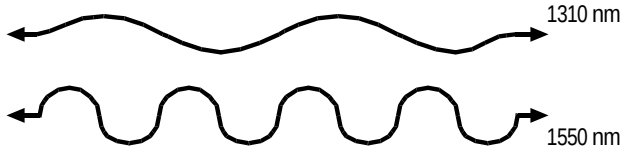
Traditional fibre optic media converters perform a useful function but don't really reduce the amount of cable needed to send data on a fibre segment. They still require two strands of glass to send transmit and receive signals for fibre media communications. Wouldn't it be better to combine these two logical communication paths within one strand?

That's exactly what single-strand fibre conversion does. It compresses the transmit and receive wavelengths into one single-mode fibre strand.

The conversion is done with the emerging Wave Division Multiplexing (WDM) technology. WDM technology increases the information-carrying capacity of optical fibre by transmitting two signals simultaneously at different wavelengths on the same fibre. The way it usually works is that one unit transmits at 1550 nm and receives at 1310 nm. The other unit transmits at 1310 nm and receives at 1550 nm. The two wavelengths operate independently and don't interfere with each other. This bidirectional traffic flow effectively converts a single fibre into a pair of "virtual fibres," each driven independently at different wavelengths.

Although most implementations of WDM on single-strand fibre offer two channels, four-channel versions are just being introduced, and versions offering as many as 10 channels with Gigabit capacity are on the horizon.

WDM on single-strand fibre is most often used for point-to-point links on a long-distance network. It's also used to increase network capacity or relieve network congestion.



What is NEBS Level 3?

Network Equipment Building System (NEBS) standards set requirements for telco equipment. The standards are maintained by Telcordia Technologies, Inc., formerly Bellcore. Bellcore Special Report, SR-3580 defines three distinct functional levels of NEBS compliance. The third of these levels, NEBS Level 3, is the most stringent, certifying carrier-class equipment intended for long-term use in variable environments.

NEBS Level 3 certifies that a piece of equipment can be safely used in an extreme environment. To become certified at NEBS Level 3, a device must meet strict physical, electrical, and environmental requirements to prove it will operate safely and reliably in extreme conditions. It must pass a series of tests that include extreme heat, humidity, fire, earthquakes (Zone 4), light, and noise.

Management Features

Chassis Information
- Part Number
- Serial Number
- Revision
- Description

Chassis Status
- Power Status
- Power Output Voltage
- Chassis Temperature
- Chassis Reset

Port Information
- Name
- Type
- Speed
- Slot Occupied
- Port Number

Port Status
- Administrative
- Operational
- Link

Module Status
- Module Power
- Link Status
- Activity
- Active Port
- Diagnostic Status
- Management
- Redundancy
- Media Converter Type
- Slot Occupied
- Part Number
- Serial Number
- Configuration
- Revision
- Ports on Module

Alarms
- Cold Start
- Warm Start
- Link Up
- Link Down
- Authentication Failure
- Configuration Change
- Backplane Failure
- Temperature Out of Range
- Power Supply On/Off
- Power Supply Inserted
- Power Supply Removed
- Chassis Reset
- Module Reset
- Port Reset
- Module Insertion
- Module Removal
- Module Unknown
- Module Failure
- Port Link State Change
- Redundant Switchover

Active Control
- Link Propagate
- Remote Fault Detection
- Port Name
- Module Name
- Chassis Name and Location
- IP Address
- Disable Management Port
- Alarm Threshold Setting
- Download Software via FTP
- Reset Chassis
- Subnet Mask
- Default Gateway
- Telnet to Console Commands

Management Module Statistics
- In Bytes
- Out Bytes
- In Errors
- Out Errors
- In Discards
- Out Discards

Specifications/Chassis

CE Approval: Yes

Power: LMC3004A–LMC3005A,
LMC3010A, LMC3080A,
LMC3014A: 110/230 VAC,
50/60 Hz, autosensing, internal;
LMC3007A–LMC3008A,
LMC3012A,
LMC3081A–LMC3082A: ± 48 VDC,
internal;
LMC3016A: 110 VAC, 60 Hz,
external (220-VAC power
supply available on request)

Size: 19-Slot Chassis: 3.5"H (2U) x 17.2"W x 14"D (8.9 x 43.7 x 35.6 cm);
5-Slot Chassis: 1.75"H (1U) x 17.2"W x 9"D (4.4 x 43.7 x 2.9 cm);
2-Slot Chassis: 1.9"H x 6.7"W x 5.5"D (4.8 x 17 x 14 cm);
1-Slot Chassis: 1"H x 3.8"W x 5.5"D (2.5 x 9.7 x 14 cm)

Weight:
19-Slot Chassis:
Single power supply: 16 lb. (7.3 kg);
Dual power supplies: 18.5 lb. (8.4 kg);
5-Slot Chassis:
Single power supply: 7.5 lb. (3.4 kg);
Dual power supplies: 9 lb. (4.1 kg);
2-Slot Chassis: 2.5 lb. (1.1 kg);
1-Slot Chassis: 1.5 lb. (0.7 kg)

Specifications/Modules

CE Approval: Yes

Connectors — LMC3000A: (1) DB9 serial, (2) RJ-45 Ethernet, (2) Proprietary multi-chassis management ports;
Converter Modules: See ordering information, **pages 6–7**

Indicators: LEDs:
LMC3000A: (1) Power, (3) Power Supply, (1) UTP Link, (1) Master, (1) Slave, (1) Management Poll;
LMC3018C–3022C: (1) Power, (1) Fibre Link, (1) UTP Link;
LMC3023C & LMC3026C, :
(1) Power, (1) Fibre Link, (1) UTP Link, (1) Auto, (1) Half-/Full-Duplex;
LMC3033C–LMC3036-37C: (1) Power, (1) Fibre Link, (1) UTP Link, (1) Auto, (1) UTP Half-/Full-Duplex, (1) Fibre Half-/Full-Duplex, (1) 10/100;
LMC3051C & LMC3054C: (1) Power, (1) Fibre Link, (1) UTP Link, (1) Fibre Half-/Full-Duplex;
LMC3058C–LMC3060C: (1) Power, (1) Fibre Optic Link, (1) Auto, (1) Fibre, (1) Half-/Full-Duplex, (1) 10/100/1000
LMC3064C & LMC3066C & LMC3069C: (1) Power, (2) Fibre Optic Link;
LMC3044C & LMC3047C: (1) Power, (1) Fibre Optic Link, (1) UTP Link, (1) Select, (1) Auto, (1) Half-/Full-Duplex;
LMC3050C: (1) Power, (4) UTP Link; (4) 10/100;
LMC3074C–LMC3075C: (1) Power, (2) Fibre Optic Link.

Power: From the Interface

Size: 2.8"H x 0.9"W x 4.5"D (7.1 x 2.3 x 11.4 cm)

Weight: 0.5 lb. (0.2 kg)

Why Buy From Black Box? Exceptional Value. Exceptional Tech Support. Period.

Recognise any of these situations?

- You wait more than 30 minutes to get through to a vendor's tech support.
- The so-called "tech" can't help you or gives you the wrong answer.
- You don't have a purchase order number and the tech refuses to help you.

According to a survey by Data Communications magazine, 90% of network managers surveyed say that getting the technical support they need is extremely important when choosing a vendor. But even though network managers pay anywhere from 10 to 20% of their overall purchase price for a basic service and support contract, the technical support and service they receive falls far short of their expectations—and certainly isn't worth what they paid.

At Black Box, we guarantee the best value and the best support. You can even consult our Technical Support Experts before you buy if you need help selecting just the right component for your application.

Don't waste time and money—call Black Box today.

Ordering Information

ITEM	CODE
Dynamic Fibre Conversion System	
First, order the chassis…	
19-Slot Power Chassis (Managed, Rackmount)	
with (1) AC Power Supply	LMC3004A
with (2) AC Power Supplies	LMC3005A
with (1) DC Power Supply	LMC3007A
with (2) DC Power Supplies	LMC3008A
5-Slot Power Chassis (Managed, Rackmount)	
with (1) AC Power Supply	LMC3010A
with (2) AC Power Supplies	LMC3080A
with (1) DC Power Supply	LMC3012A
with (2) DC Power Supplies	LMC3081A
2-Slot Power Chassis (Managed, for Desktop Use)	
with (1) AC Power Supply	LMC3014A
with (1) DC Power Supply	LMC3082A
1-Slot Power Chassis (Unmanaged, for Desktop Use)	
with (1) AC Power Supply	LMC3016A
If you want to manage your system, order a management module…	
SNMP Management Module	LMC3000A
…then software…	
Management Software	LMC3003A
…then converter modules.	
UTP to Multimode Duplex Fibre Modules	
10BASE-T/10BASE-FL	
850 nm, 2 km	
ST®	LMC3018C
1310 nm, 5 km	
ST®	LMC3019C
100BASE-TX to 100BASE-FX	
1310 nm, 5 km	
ST	LMC3023C
SC	LMC3026C
10/100BASE-T to 100BASE-FX, 1310 nm, 5 km	
ST	LMC3033C
SC	LMC3036C
1000BASE-T to 1000BASE-SX, 850 nm, 220 m	
SC	LMC3051C
MT-RJ	LMC3054C
10/100/1000BASE-T to 1000BASE-SX, 850 nm, 220 m	
SC	LMC3058C

Ordering Information

ITEM	CODE
UTP to Single-Mode Duplex Fibre	
10/100BASE-T to 100BASE-FX, 1310 nm	
30 km, SC	LMC3037C
10/100/1000BASE-T to 1000BASE-LX	
1310 nm	
12 km, SC	LMC3059C
34 km, SC	LMC3060C
Mode Converters	
100BASE-FX Multimode Duplex to 100BASE-FX Single-Mode Duplex	
1310 nm/1310 nm, Multimode, 5 km /Single-Mode 20 km	
ST	LMC3064C
SC	LMC3066C
1000BASE-SX Multimode Duplex to 1000BASE-LX Single-Mode Duplex, 850 nm/1310 nm, Multimode, 220 m/Single-Mode	
....12 km, SC	LMC3069C
Redundant Modules	
UTP to Dual Multimode Duplex Fiber	
(1) 100BASE-TX to (2) 100BASE-FX, 1310 nm, 5 km	
ST	LMC3044C
SC	LMC3047C
UTP to Dual UTP	
(1) 100BASE-TX to (2) 10/100BASE-T, 100 m	LMC3043C
Switch Module	
4-Port 10/100 Ethernet Switch, (4) RJ-45	LMC3050C
ATM OC3 Modules, Duplex Multimode to Duplex Single-Mode, 1310 nm/1310 nm, 5 km/28 km	
ST	LMC3074C
SC	LMC3075C