LANTRONIX®

M/E-PSW-FX-02
Stand-Alone Media Converters
User Guide

Intellectual Property

Warranty

For details on the Lantronix warranty policy, please go to http://www.lantronix.com/support/warranty.

Contacts

Lantronix Corporate Headquarters
48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support
https://www.lantronix.com/technical-support/

Sales Offices
For a current list of our domestic and international sales offices, go to www.lantronix.com/about/contact.

Disclaimer

Revision History

Date	Rev	Notes
11-17-10	A	Initial release.
3-20-15	B	Updated Technical Specifications.
9-16-15	C	Updated Back Panel Power drawing on page 6.
10/14/20	D	Updated description, features, and specifications.
6/4/21	E	Add PEM, update M/E-PSW-FX-02(SM) optical wavelength spec, and add M/E-PSW-FX-02 Fiber Optic specs.
2/15/23	F	Initial Lantronix rebrand. Update artwork and DoC.

Table of Contents

1   Introduction

Product Description

The M/E-PSW Series is a Fast Ethernet stand-alone Mini media converter that provides cost effective media conversion between 10/100Base-TX ports and 100Base-FX ports. With its fixed configuration, deployments are just plug-and-play, and its small size makes it ideal for locations where space is limited. Operating at Layer 2, the data link layer, this converter not only converts copper to fiber, it also provides rate conversion allowing legacy 10Base-T copper devices to connect to 100Base-FX fiber.

Ordering Information

SKU	Description
M/E-PSW-FX-02	10/100Base-TX (RJ-45) [100 m/328 ft.] to 100Base-FX 1300nm multimode (ST) [2 km/1.2 mi.]* Link Budget: 11.0 dB
M/E-PSW-FX-02(SC)	10/100Base-TX (RJ-45) [100 m/328 ft.]* to 100Base-FX 1300nm multimode (SC) [2 km/1.2 mi.] Link Budget: 11.0 dB
M/E-PSW-FX-02(SM)	10/100Base-TX (RJ-45) [100 m/328 ft.]* to 100Base-FX 1310nm single mode (SC) [20 km/12.4 mi.] Link Budget: 16.0 dB
Optional Accessories (sold separately)	
SPS-2460-SA	Stand-Alone Power Supply option
WMBM	Wall Mount Bracket for Mini Media Converter option
M-MCR-01	18-Slot Powered Mini Chassis option
DRBM	DIN Rail Mount Bracket for Mini Media Converter option
RMBM	Rack Mount Bracket for Mini, use with RMS19-SA4-02 and/or E-MCR-05

* Typical maximum distance. Actual distance depends on network physical characteristics.

M/E-PSW-FX-02   M/E-PSW-FX-02(SC)   M/E-PSW-FX-02(SM)

Features

- Unit and Port LEDs allow for quick status information
- Auto-Negotiation
- Fixed Full-Duplex on fiber
- Auto-MDI/MDIX
- Automatic Link Restoration
- Far-End-Fault (FEF)
- Connect to legacy network equipment
- Eliminate Collision Domains

Specifications

The information in this user guide is subject to change.

Standards	IEEE 802.3
Data rate	10 Mbps, 100 Mbps
Max Frame Size	1632 bytes (tagged or untagged; incl. CRC)
Dimensions	Width: 1.8" [46 mm] x Depth: 3.3" [85 mm] x Height: 0.85" [22 mm]
Power Consumption	2.6 Watts
MTBF*	41,660 hours (MIL-HDBK-217F) 114,580 hours (Bellcore7 V5.0)
Power Supply	External AC/DC required; +12VDC, 0.5A min
Power Input	7.5 VDC to 13.9 VDC
RAM	1 Mb
MAC Table	8K MAC Addresses
Environment	Operating Temp.**: 0°C to +50°C (32ºF to 122ºF) Storage Temp.: -15°C to +65°C (-5ºF to 149ºF) Humidity: 5% to 95% (non-condensing) Altitude: 0 – 10,000 ft.
Weight	2 lbs. [0.90 kg]
Certifications	Safety: Wall Mount Power Supply: UL Listed, cUL Listed (Canada) FCC Class A, CISPR22/EN55022 Class A, EN55024, CE Mark
Warranty	Lifetime

* MTBF (Mean Time Between Failure) is estimated using the predictability method. The computation is based on the MIL-HDBK-217 F and Bellcore standards.

**Manufacturer's rated ambient temperature.

WARNING: If the media converter is an IEEE802.3-2005 Powered Device (PD) capable of receiving power via the Media Dependent Interface (MDI) leads, the power source, connector, and cable attached to the barrel power connector must meet the isolation requirement specified in IEEE802.3-2005. Failure to observe this warning could result in an electrical shock.

CAUTION: Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra- building (inside plant) link segments that are not subject to lightening transients or power faults. Copper-based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to inter- building (outside plant) link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments, or the performance of procedures other than those specified herein could result in hazardous radiation exposure.

2   Installation

Checklist

Before installing the N-FXE Series NIC, verify that the package contains these items:

- One N-FXE Series NIC
- A Product Post Card

Please notify your sales representative immediately if any of these items is missing or damaged.

Power Supply Included

To order the corresponding country specific power supply, add the extension to the end of the SKU.
For example, M/E-PSW-FX-02-NA = North America, -LA = Latin America, -EU = Europe, -UK = United Kingdom, -SA = South Africa, -JP = Japan, -OZ = Australia, -BR = Brazil.

Electrostatic Discharge (ESD)

Always observe the following ESD precautions when installing or handing the M/E-PSW-FX-02

- Do not remove the converter from its protective packaging until you are ready to install it.
- Wear an ESD wrist grounding strap before handling any module or component. If you do not have a wrist strap, maintain grounded contact with the unit throughout   any procedure requiring ESD protection.

Copper and Fiber Ports

The illustration below shows the front panel of the M/E-PSW-FX-02 media converters.
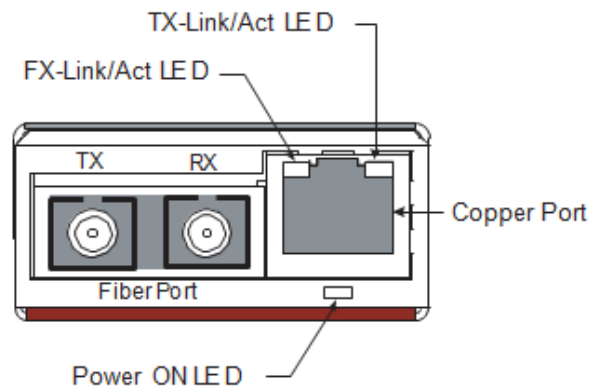
Connect the Fiber Cable

Full duplex *(always ON)* is on the fiber side only, therefore, the 512-Bit Rule does not apply. The cable lengths are constrained by the cable requirement.

1. Locate or build IEEE 803.2 compliant 100Base-FX fiber cable with male, two- stranded TX to RX connectors installed at both ends.
2. Connect the fiber cable to the M/E-PSW-FX-02 media converter as follows:
   • Connect the male TX cable connector to the female TX port.
   • Connect the male RX cable connector to the female RX port.
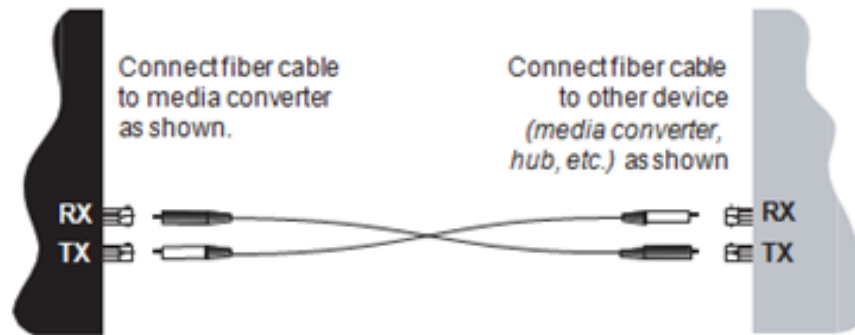3. Connect the fiber cable to the other device *(media converter, hub, etc.)* as follows:
   • Connect the male TX cable connector to the female RX port.
   • Connect the male RX cable connector to the female TX port.

Connect the Twisted-pair Copper Cable

The AutoCross feature allows either MDI *(straight-through)* or MDI-X *(crossover)* cable connections to be configured automatically, according to network conditions.

   • If half-duplex mode is used, refer to the 512-Bit Rule.
   • If full-duplex mode is used, the 512-Bit Rule does not apply. The cable lengths are constrained by the cable requirements.

1. Locate or build IEEE 803.2™ compliant 10Base-T or 100Base-TX cable, with RJ-45 connectors installed at both ends.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the M/E-PSW-FX-02.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port on the other device *(switch, workstation, etc.).*
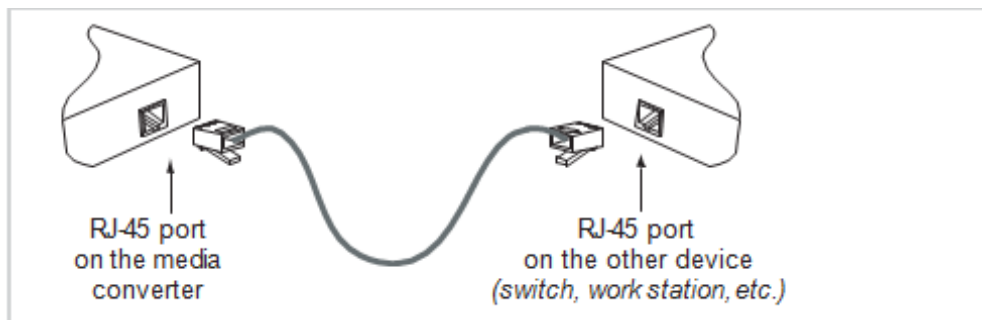
Powering the Media Converter

The power options for the M/E-PSW-FX-02 media converter are product dependent. The following shows the various power configurations associated with each model.

M/E-PSW-FX-02 Back Panel Power

Barrel Connector
7.5VDC to 13.9VDC
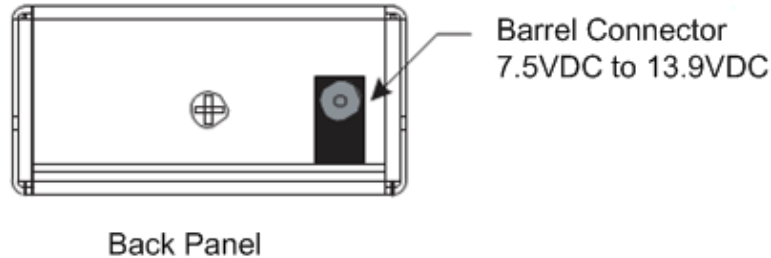
Back Panel

Power Adapter

AC Power

1. Connect the barrel connector of the power adapter to the media converter's power port *(located on the back panel of the media converter).*
2. Connect the power adapter plug to AC power.
3. Verify that the media converter is powered up by observing the illuminated LED power indicator light on the front panel.

DC Power

See the Lantronix SPS-1872-SA DC User Guide for the external power supply for powering the media converter.

3   Operation

Status LEDs

Use the status LEDs to monitor the media converter operation in the network. LED descriptions are

PWR (Power): (below RJ-45)
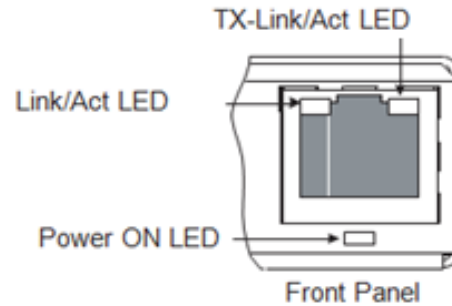ON = Link; Flashing = Activity

FX-Link/Act (Fiber Link/Activity):
(Upper Left on RJ-45)
ON = Link; Flashing = Activity

TX-Link/Act (Copper Link/Activity):
(Upper Right on RJ-45)
ON = Link; Flashing = Activity

Product Features

Feature Summary - M/E-PSW-FX-02

Auto-Negotiation	AutoCross	Link Pass-Through (LPT)	Far End Fault
Yes	Yes	No	Yes

Congestion Reduction

The M/E-PSW-FX-02 media converters do not forward collision signals or error packets from one collision domain to another, resulting in improvements in baseline network performance. In addition, the media converter filters packets destined for local devices, which reduces network congestion.

Auto-Negotiation

The Auto-Negotiation feature is ON permanently for the M/E-PSW-FX-02 media converters. Auto-Negotiation allows the media converter to configure itself automatically to achieve the best possible mode of operation over a link. It broadcasts speed *(10 Mb/s or 100 Mb/s)* and duplex capabilities *(full or half)* to the other device and negotiates the best mode of operation. Auto-Negotiation allows quick and easy installation because the optimal link is established automatically.

In a scenario where an auto-negotiation device is linked to a non-negotiating device, the negotiating device via parallel detection recognizes the speed of that second device then establishes the best operating speed *(10Mb/s or 100Mb/s)* at half- duplex.

AutoCross™

The AutoCross feature allows using either straight-through (MDI) or crossover (MDI-X) copper cables when connecting to 10Base-T or 100Base-TX devices. AutoCross determines the characteristics of the connection and automatically configures the device to link up, regardless of the copper cable configuration, MDI or MDI-X.

Automatic Link Restoration

The media converter will automatically re-establish the link when connected to switches if the link is lost, even with Auto-Negotiation and Link Pass-through *(both directions)* enabled.

Full-Duplex Flow Control

In a full-duplex network, maximum cable lengths are determined by the type of cables used. The 512-Bit Rule does not apply in a full-duplex network. **Note:** Full duplex is ON permanently for the fiber port only.

Half-Duplex Flow Control *(512-Bit Rule)*

In a half-duplex network, the maximum cable lengths are determined by the round- trip delay limitations of each Fast Ethernet collision domain. *(A collision domain is the longest path between any two terminal devices; e.g., a terminal, switch, or router.)* The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good.

Flow Control

The process of adjusting the flow of data from one device to another ensures that the receiving device can handle all the incoming data. This is particularly important where the sending device is capable of transmitting data much faster than the receiving device can accept it.

Distance Extension

The M/E-PSW-FX-02 media converters can segment one (1) 10Base-T copper Ethernet and/or 100Base-TX copper Fast Ethernet, and one (1)100Base-FX fiber Fast Ethernet collision domain:

• In a half-duplex Ethernet or Fast Ethernet environment, the M/E-PSW-FX-02 media converters extend network distances by segmenting collision domains so that the 512-Bit Rule applies separately to each collision domain.

• In a full-duplex Ethernet or Fast Ethernet environment, the M/E-PSW-FX-02 media converters extend network distances to the physical cable limitations imposed by the selected twisted-pair copper fiber cables.

Rate Conversion

The M/E-PSW-FX-02 media converters allow connection of 10Mb/s terminal devices on a 10Base-T legacy Ethernet copper network to 100Mb/s terminal devices on a 100Base-TX Fast Ethernet copper network and/or to 100Mb/s terminal devices on a 100Base-FX Fast Ethernet fiber network.

Far-End Fault

When a fault occurs on an incoming fiber link (1), the media converter transmits a Far-End Fault signal on the outgoing fiber link (2). In addition, the Far-End Fault signal also activates the Link Pass-Through, which in turn, disables the link on the copper portion of the network (3) and (4).
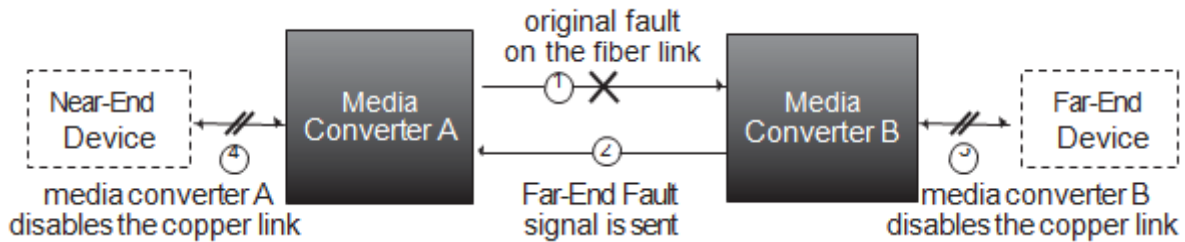
Optic and Cable Specifications

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

Fiber Optic Specs

Bit Error Rate:	$<10^{-9}$	
Single mode fiber (recommended):	9 µm	
Multimode fiber (recommended):	62.5/125 µm	
Multimode fiber (optional):	100/140, 85/140, 50/125 µm	

M/E-PSW-FX-02	1300nm multimode (ST)	
Fiber Optic Transmitter Power:	min: -19.0 dBm	max: -14.0 dBm
Fiber Optic Receiver Sensitivity:	min: -30.0 dBm	max: -14.0 dBm
Link Budget:	11.0 dB	

M/E-PSW-FX-02 (SC)	1300 nm multimode	
Fiber Optic Transmitter Power:	min: -19.0 dBm	max: -14.0 dBm
Fiber Optic Receiver Sensitivity:	min: -30.0 dBm	max: -14.0 dBm
Link Budget:	11.0 dB	

M/E-PSW-FX-02 (SM)	1310 nm single mode	
Fiber Optic Transmitter Power:	min: -15.0 dBm	max: -8.0 dBm
Fiber Optic Receiver Sensitivity:	min: -31.0 dBm	max: -8.0 dBm
Link Budget:	16.0 dB	

The fiber optic transceivers on this device meet Class I Laser safety requirements per IEC825/CDRH standards and comply with 21 CFR1040.10 and 21CFR1040.11

Copper Cable Specs

Category 3: Minimum requirement for 10 Mbps Operation

Gauge: 24 to 22 AWG
Attenuation: 11.5 dB/100m @ 5-10 MHz
Maximum Cable Distance: 100 meters

Category 5: Minimum requirement for 10 Mbps Operation

Gauge: 24 to 22 AWG
Attenuation: 22 dB/100m @ 100 MHz
Maximum Cable Distance: 100 meters

- Straight-through or Cross-over twisted-pair cable may be used.
- Shielded (STP) or unshielded (UTP) twisted-pair cable may be used.
- Pins 1 & 2 and 3 & 6 are the two active pairs in an Ethernet network.
- Use only dedicated wire pairs for active pins (e.g., blue/white, orange/white & white/orange, etc.)
- Do not use flat or silver satin wire.
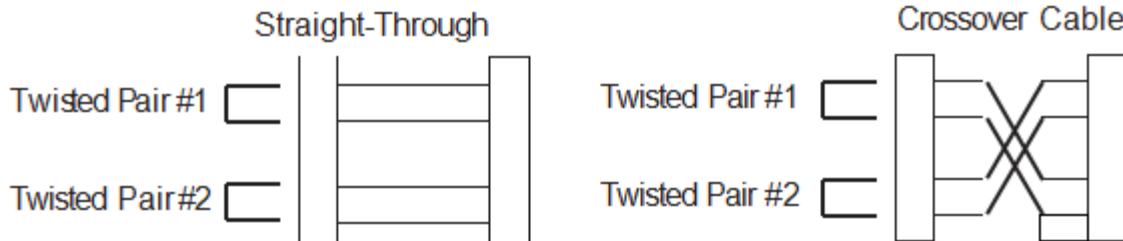
4   Troubleshooting

If the media converter fails, isolate and correct the failure by determining the answers to the following questions, and then taking the indicated action:

1.   Is the power LED illuminated and did the TX and FX LEDs turn ON and then turn OFF?

    NO

    - Is the power adapter the proper type of voltage and cycle frequency for the AC outlet?
    - Is the power adapter properly installed in the media converter and in the outlet?
    - If PoE, is the RJ-45 jack receiving power from the input device?
    - Contact Technical Support: see Contact Us below.

    YES

    - Proceed to step 2.

2.   Are the TX and FX-Link/ACT LEDs lit on the RJ-45 port ?

    NO

    - Check the copper cables for proper connection.
    - Check the fiber cables for proper connection.
    - Contact Technical Support: see Contact Us below.

    YES

    - Contact Technical Support: see Contact Us below.

Contact Us

- Lantronix website : https://www.lantronix.com
- Product Index : https://www.lantronix.com/resources/product-index/
- Application Notes : https://www.lantronix.com/resources/app-notes/
- Tech Support : https://www.lantronix.com/technical-support/
- How to buy : https://www.lantronix.com/buy/
- Online store : http://store.lantronix.com/
- Contact Us : https://www.lantronix.com/about-us/contact/

Note that this manual may provide links to third party websites for which Lantronix is not responsible.

Compliance Information

Declaration of Conformity

Manufacture's Name: Lantronics, Inc.
Manufacture's Address: 48 Discovery, Suite 250, Irvine, California 92618 USA

Declares that the product(s):

M/E-PSW-FX-02, M/E-PSW-FX-02(SC), and M/E-PSW-FX-02(SM)

Conform to the following Product Regulations:
FCC Part 15 Class A, EN 55032:2012, EN 55024:2010
Directive 2014/30/EU, Directive 2015/863/EU
Low-Voltage Directive 2014/35/EU
IEC /EN 60950-1:2006+A2:2013
2011/65/EU EN 50581:2012

With the technical construction on file at the above address, this product carries the CE Mark

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).
Place: Irvine, California
Date: April 27, 2022
Signature: *Fathi Hakam*
Full Name: Fathi Hakam
Position: Vice President of Engineering

FCC Regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fäll is der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées.

In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Lantronix will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EGMitgliedstaaten

verstösst gegen die jewelligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

LANTRONIX®

Lantronix Corporate Headquarters
48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

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