



NETROPY® N91

HARDWARE GUIDE

HARDWARE VERSION 3



APPOSITE
— TECHNOLOGIES

Netropy® N91 Hardware Guide

Hardware Revision: 3

Documentation Version: 3

Printed December 2023

Apposite® Technologies LLC

4223 Glencoe Ave, Suite B121

Marina Del Rey, CA 90292 USA

1.310.477.9955

info@apposite-tech.com

www.apposite-tech.com

Copyright ©2005-2024 Apposite Technologies LLC. All rights reserved. Apposite, Linktropy, and Netropy are registered trademarks of Apposite Technologies LLC. The Apposite logo and "WAN Emulation Made Easy" are trademarks of Apposite Technologies LLC.

Part No. DOC-HG-N91-V3-3

CONTENTS

1	Overview.....	3
2	Included Items.....	4
3	Front and Rear Panels.....	5
	3.1 Front Panel.....	5
	3.2 Rear Panel.....	6
4	Capacity Limitations.....	7
5	Rack Mounting.....	8
	5.1 Ear Brackets.....	8
6	RJ45 Interfaces.....	9
7	SFP Interfaces (optional).....	10
8	Console Interface.....	11
9	Apposite Support.....	12
	Appendix A: Specifications.....	13
	Appendix B: Regulatory.....	14
	Federal Communications Commission Notice.....	14
	Canadian Notice / Avis Canadien.....	14
	CE Certification.....	14
	REACH Compliance Declaration.....	14
	RoHS Declaration of Conformity.....	15
	Appendix C: Apposite End User License Agreement.....	16

1 OVERVIEW

This *Netropy N91 Hardware Guide* describes the physical hardware of the Netropy N91 Network Emulator. The companion *User's Guide* describes the installation, configuration, and operation of the Netropy network emulation functionality. A separate *Quick Start Guide* provides a walk-through for first time configuration.



The Netropy N91 contains no user serviceable parts. Opening the chassis voids the warranty. If you believe your unit is not functioning properly, see Section 9 for information on obtaining support.

This guide is for the Netropy N91 hardware revision –3.

2 INCLUDED ITEMS

The Netropy N91 shipping carton contains the following items:

- ▶ Netropy N91 hardware unit
- ▶ Rack ear brackets
- ▶ Netropy N91 Quick Start Guide
- ▶ AC power cord (U.S.)
- ▶ RJ45 to DB9 serial cable

3 FRONT AND REAR PANELS

3.1 Front Panel



The front panel of the Netropy N91 contains, from left to right:

Power LED: Lit green when the unit is powered on.

MGMT: Gigabit Ethernet interface with a standard RJ45 connector for management of the unit over the network.

CONSOLE: Console interface using RS-232 with an RJ45 connector. See Section 8 for a pin-out of the console interface.

Reset: The small hole to the right of the console port is used to reset the system to the factory default configuration. Reset capability is only active during system boot-up. To reset the system, insert a paper clip or toothpick into the hole, reboot or power cycle the device, and continue holding the reset switch for 20-30 seconds until the system reboots again.

PORTS 1 – 8: Eight Gigabit Ethernet ports consisting of eight 10/100/1000baseT Ethernet ports with RJ45 connectors (standard), eight modular SFP ports (optional), or four each RJ45 and SFP ports (optional), used for network emulation. Interfaces support jumbo frames up to 9 KB.


The RJ45 interfaces have two LEDs. The LED on the left indicates that link has been established and flashes to indicate activity. If the link is up, the LED on the right glows amber to indicate connectivity at 1 Gbps, green for 100 Mbps, and off for 10 Mbps.

3.2 Rear Panel

The rear panel of the Netropy N91 contains:

Fan outlets: Hot air is vented through the fan outlets.

Power input: Standard IEC C14 socket for power input. U.S. and Canadian customers should use the supplied power cord to connect the Netropy N91 to a power outlet. International customers may need to substitute a local power cord with a standard IEC C13 plug. The Netropy N91 handles AC power input from 100 to 240 V.

Power switch: To turn on or off, rock the switch onto the power icon  and hold for 5 seconds until power light turns on or off.



Please ensure the space around the fan outlets on the back panel and the air intakes on the side panels remains unblocked to provide adequate airflow and prevent overheating.

4 CAPACITY LIMITATIONS

The Netropy N91 can forward up to 1 Gbps of packets in each direction across all 8 emulation interfaces at full line rate. This capacity can be reduced depending on the classification method used.

The maximum one-way latency that the Netropy N91 supports depends on data throughput and packet size. The chart below summarizes a few typical examples for traffic in one direction on one engine. To calculate the maximum latency in each direction for traffic in both directions at the listed rate, or to calculate the maximum latency when using multiple engines at the same rate, divide these maximum one-way latencies by the number of ports through which traffic is entering. The listed values are based on actual data throughput, not path bandwidth settings. Users who need to emulate latencies close to these limits are advised to contact Apposite to discuss their specific requirements. Maximum latencies of over 20 seconds are not specifically listed, but are not limited to 20 seconds and may be much larger than 20 seconds.

	Frame Size			
Aggregate Throughput	64 bytes	500 bytes	1518 bytes	9220 bytes
10 Mbps	>20 sec	>20 sec	>20 sec	>20 sec
100 Mbps	>20 sec	>20 sec	>20 sec	>20 sec
1 Gbps	11.4 sec	>20 sec	>20 sec	>20 sec

Table 1: Maximum Round-Trip Latency

The maximum emulation bandwidth may be limited below the hardware capacity by the device's license key. See the *Netropy User's Guide* for more details on the license key.

5 RACK MOUNTING

5.1 Ear Brackets

Optional ear brackets can be used to secure the N91 to the front of the rack. Attach the ear brackets to the right and left sides of the N91 using the three supplied screws with each bracket as shown in the diagram below.



6 RJ45 INTERFACES

The standard version of the Netropy N91 includes eight RJ45 10/100/1000baseT ports for emulation and a separate RJ45 10/100/1000baseT port for management.

The ports are set by default to auto-negotiate the proper speed and duplex settings, and flow control is turned off. On the emulation ports, auto-negotiation can be disabled and the ports forced to a particular speed and duplex setting from the GUI. In nearly all cases, the default settings should be used and only changed to resolve incompatibilities with directly-connected equipment. Auto-negotiation cannot be disabled on the MGMT port.

When set to auto-negotiation, the ports are auto-MDI/MDIX and can use either crossover or straight through cables. If the interface is forced to a particular speed or duplex setting, the interfaces are MDI and require a crossover cable if connected to another MDI-only device.

7 SFP INTERFACES (OPTIONAL)

The Netropy N91 is optionally available with eight Gigabit Ethernet small form-factor pluggable (SFP) interfaces (also known as mini-GBIC) instead of the eight standard copper RJ45 ports, or with 4 each of the SFP ports and RJ45 ports.

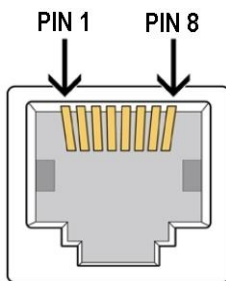
SFP interfaces are modular and support both fiber-optic and copper-based cabling depending on the installed transceiver. Standard transceivers are available from a variety of vendors or can be purchased from Apposite.

If the unit includes the optional SFP interfaces, select an appropriate transceiver type based on network and cabling requirements. Slide the transceiver into the SFP port until it clicks into place.

The SFP interfaces support 10/100/1000 Mbps auto-negotiation when using RJ45 SFP transceivers with SGMII support. Fiber SFP transceivers are only supported at 1 Gbps full duplex transfer mode.

8 CONSOLE INTERFACE

Console access to the Netropy N91 is through the RJ45 interface on the front panel labeled "CONSOLE." An RJ45 to DB9 cable is included with the unit to connect the device to a standard PC serial port. The pin-out for the RJ45 interface is shown below:



Pin	Definition	Pin	Definition
1	CTS/RTS	2	DTR
3	TxD	4	GND
5	GND	6	RxD
7	DSR	8	CTS/RTS

To connect to the console, use a terminal or a computer running terminal emulator software such as HyperTerminal or PuTTY, and set the following parameters:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit
- Disable flow control

9 APPOSITE SUPPORT

Netropy units with a product license receive support and maintenance for the term of the license, including hardware warranty, firmware updates, and customer support. The license expiration date for limited term product licenses is shown in the Netropy GUI on the Administration window License Key tab.

For units with an unlimited term license (purchased prior to August 2017), one year of maintenance is included with purchase, after which a yearly maintenance renewal is required for ongoing support. License and maintenance renewals are available from Apposite or your Netropy reseller.

If you believe your unit is not functioning properly and is under warranty, please upgrade to the latest firmware release. If the problem persists, please contact Apposite Support at:

support@apposite-tech.com
1.310.477.9955 ext. 2

When contacting Apposite Support, please include the following information:

- ▶ Netropy model
- ▶ Serial number
- ▶ Your e-mail address and phone number
- ▶ Installed firmware version
- ▶ A detailed description of the problem



Do not attempt to fix any hardware problem yourself. The Netropy N91 contains no user serviceable parts. Opening the chassis voids the warranty.

APPENDIX A: SPECIFICATIONS

Capacity		
Max. Emulation Rate		Up to 1 Gbps in each direction on each port (depending on license)
Max. Throughput		8 Gbps aggregate
Max. Packet Rate		1.488 million packets per second per port (full line rate) 11.9 million packets per second aggregate
Max. Frame Size		9 KB
Interfaces		
Network		8 x 10/100/1000baseT copper Gigabit Ethernet (standard) or 8 x SFP Gigabit Ethernet (optional) or 4 x copper Gigabit Ethernet + 4 x SFP Gigabit Ethernet
Management		1 x Gigabit Ethernet (10/100/1000baseT)
Console		1 x RS-232
Environmental and Physical		
AC Input Voltage		Auto ranging 100 VAC to 240 VAC
AC Input Frequency		50 to 60 Hz
AC Input Current		1.0 A
Power Draw		300 Watts
Dimensions	Product	17.2" D x 11.8" W x 1.75" H (1 RU) 44 cm D x 30 cm W x 4.4 cm H (1 RU)
	Shipping	22" W x 20" D x 8" H 54 cm W x 50 cm D x 20 cm H
Weight	Product	11.5 lbs. (5.2 kg)
	Shipping	18 lbs. (8 kg)
Temperature	Operating	32° to 104°F (0° to 40°C)
	Storage	-4° to 158°F (-20° to 70°C)
Humidity		5% to 95% (non-condensing)
Certifications		FCC Class A, CE, RoHS
Warranty and Support		
Hardware warranty		included with product license
Support and Maintenance		included with product license

APPENDIX B: REGULATORY

Federal Communications Commission Notice

This equipment has been tested and verified to comply with the limits for a Class A digital device, pursuant to Part 15 of 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 instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause harmful interference, in which case the user will be required to take whatever measures may be required to correct the interference at their own expense.

Canadian Notice / Avis Canadien

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CE Certification

The product described in this manual complies with all applicable European Union (CE) directives, including EU Directives on Radio Equipment and Telecommunications Terminal Equipment and Restriction of Hazardous Substances (RoHS).

REACH Compliance Declaration

The European REACH Regulation 1907/2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH), Annex XVII entered into force in June 2009, and affects all companies producing, importing, using, or placing products on the European market. The aim of the REACH regulation is to ensure a high level of protection of human health and the environment from chemical substances.

The product is considered article as defined in REACH Article 3 (3). The product/article under normal and reasonable conditions of use do not have intended release of substances. Therefore

the requirement in REACH Article 7 (1) (b) for registration of substances contained in the product/article does not apply.

In addition we confirm that the product delivered by Aposite do not contain Substances of Very High Concern (SVHC) with more than 0.1% w/w as defined by REACH Article 57, Annex XIV, Directive 67/548/EEC. Hence the requirement in REACH Article 7 (2) to notify ECHA if a product /article contains more than 0.1% w/w of an SVHC and tonnage exceeding 1 tone per importer per year is not applicable.

We hereby declare, by all we know, that the information is real and integrity. We promise that the Product Name: Netropy N91 series meets the standard of REACH on SVHC and latest chemical regulation. The SVHC are still according to the publication on EU's website, please refer to the SVHC official webpage. [HTTPS://ECHA.EUROPA.EU/CANDIDATE-LIST-TABLE](https://echa.europa.eu/candidate-list-table)

RoHS Declaration of Conformity

Aposite is committed its products are in compliance with all applicable laws and regulations identified as RoHS Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and the modified EU Directive 2015/863/EU.

We hereby declare that for the products and parts supplied by our company, the hazardous substances indicated below are restricted according to the RoHS standard.

Restriction substance list:

No	Restricted Substances	Limits (wt% or ppm)	Directive
1	Lead (Pb)	0.1% (<1000 ppm)	2011/65/EU
2	Cadmium (Cd)	0.01% (<100 ppm)	
3	Mercury (Hg)	0.1% (<1000 ppm)	
4	Hexavalent Chromium (Cr6+)	0.1% (<1000 ppm)	
5	Poly Brominated Biphenyls (PBB)	0.1% (<1000 ppm)	
6	Poly Brominated Diphenyl ethers (PBDE)	0.1% (<1000 ppm)	
7	Bis (2-ethylhexyl) phthalate (DEHP)	0.1% (<1000 ppm)	2015/863/EU
8	Butyl benzyl phthalate (BBP)	0.1% (<1000 ppm)	
9	Dibutyl phthalate (DBP)	0.1% (<1000 ppm)	
10	Diisobutyl phthalate (DIBP)	0.1% (<1000 ppm)	

All product or material will also follow the expiring exemption clause detail in the Annex under RoHS Directive. Compliance is evidenced by written declaration from our suppliers, assuring that any potential trace contamination levels of the substances listed above are below the maximum level set by 2011/65/EU and 2015/863/EU directive or are exempt due to their application.

APPENDIX C:

APPOSITE END USER LICENSE AGREEMENT

THIS END USER LICENSE AGREEMENT (“AGREEMENT”) IS A LEGAL AGREEMENT BETWEEN YOU AND APPOSITE TECHNOLOGIES LLC (“APPOSITE”). BY DOWNLOADING, INSTALLING, COPYING, ACCESSING OR USING THIS SOFTWARE, YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS, ARE NOT AT LEAST 18 YEARS OF AGE, OR DO NOT HAVE AUTHORITY TO ENTER THIS AGREEMENT, DO NOT DOWNLOAD, INSTALL, COPY, ACCESS OR USE THIS SOFTWARE, AND PROMPTLY RETURN THIS SOFTWARE AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED THEM.

1. DEFINITIONS.

- a. “Documentation” means published user manuals and other explanatory materials provided by Apposite relating to the Software or the Hardware.
- b. “Hardware” means the Apposite-branded hardware product on which the Software is designed to run.
- c. “Software” means the computer software (regardless of format or media in which distributed) designed to run on the Hardware.
- d. “Modifications” means any applicable upgrades, modified versions, updates, bug fixes, patches, or other modifications to the Software made generally available by Apposite to its customers.
- e. “Product” means the Apposite-branded product comprised of the Hardware, the Software, and the Documentation.
- f. “Legacy Product” means any Product purchased prior to August 1, 2017.
- g. “License Period” means for any Product that is not a Legacy Product, the license period identified on the relevant order form or receipt upon your purchase of the Product or the Software, including any purchased extension thereto.
- h. “Warranty Period” means (a) for any Legacy Product, the period during which you maintain a continuous, active subscription to Apposite maintenance services, or (b) for any Product that is not a Legacy Product, the License Period, unless such Product has a perpetual license, in which case the Warranty Period shall be five (5) years from the date of purchase of the Product from Apposite unless extended by purchase of maintenance services.

2. LICENSE GRANT. Conditioned upon compliance with the terms and conditions of this Agreement, Apposite hereby grants you the following licenses (collectively, the “License”):

- a. With respect to any Product that is not a Legacy Product, for the relevant License Period, a nonexclusive, nonsublicensable, nontransferable license to use the Software and Modifications solely as embedded in the Hardware, and to use the Documentation solely in conjunction with the Software, Modifications, and Hardware; and
- b. With respect to any Legacy Product, a perpetual, nonexclusive, nonsublicensable, nontransferable license to use the Software solely as embedded in the Hardware, and to use the Documentation solely in conjunction with such Software and Hardware, and to use any Modifications released by Apposite and installed on the Hardware during the Warranty Period.

This license is not a sale. The Software may contain open source or third-party software, subject to separate license terms. Acknowledgements, licensing terms and disclaimers for such materials are contained in the Documentation, and your use of such material is governed by their respective terms and not by the License.

3. **OWNERSHIP.** Apposite and its licensors retain ownership of all intellectual property rights in and to the Software and Documentation, including any copies, improvements, enhancements, derivative works and modifications thereof. The Software and Documentation are protected by United States and international copyright and other intellectual property laws and international trade provisions. Your rights to use the Software and Documentation are limited to those expressly granted by this Agreement. No other rights with respect to the Software or any related intellectual property rights are granted or implied.
4. **RESTRICTIONS.** Except as otherwise expressly provided under this Agreement, you shall not directly or authorize any third party to:
 - (i) copy the Software, except as necessary for archival or backup purposes only;
 - (ii) transfer, assign, sublicense, rent, lease, lend, or otherwise transfer your license rights to any other person or entity;
 - (iii) install or use the Software on any computing device other than the Hardware;
 - (iv) modify or adapt the Software or Documentation or create derivative works based upon the Software or Documentation;
 - (v) reverse engineer, disassemble, decompile, decrypt, or otherwise attempt to derive the source code of the Software, except to the extent otherwise expressly permitted under applicable law notwithstanding this restriction; or
 - (vi) remove, alter, cover or obfuscate any of the trademarks, trade names, logos, patent or copyright notices or markings, or add any other notices or markings to or on the Software, Documentation, or Hardware without the express written authorization of Apposite.
5. **SUPPORT.** Apposite shall have no obligation to support the Software except as provided in Apposite's Customer Support Terms and Conditions, which is incorporated by reference into this Agreement.
6. **LIMITED WARRANTY.** Apposite warrants that, for the duration of the Warranty Period, the Hardware will be free of any defects in materials and workmanship under normal use and the Software will perform substantially in accordance with the Documentation. This limited warranty extends only to the original user of the Product. This limited warranty is void if failure of the Hardware or Software to conform to the warranty has resulted from improper installation, testing, misuse, neglect, accident, fire or other hazard, a virus, or any breach of this Agreement. Apposite and its suppliers' entire liability and your sole and exclusive remedy shall be, at Apposite's sole discretion, to: (i) repair the Software or Hardware; (ii) provide replacement Hardware or Software; or (iii) refund the purchase price and terminate this Agreement. This limited warranty applies only if the Product is returned to Apposite, freight and insurance prepaid, in accordance with Apposite's Return Material Authorization (RMA) procedures. Any repaired or replaced Software or Hardware will be subject to this same limited warranty for the remainder of the original Warranty Period or thirty (30) days, whichever is greater. THE FOREGOING LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, AND APPOSITE DISCLAIMS ANY AND ALL IMPLIED WARRANTIES OR CONDITIONS, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF TITLE, NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY BY JURISDICTION.
7. **LIMITATION OF LIABILITY.** REGARDLESS WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT WILL APPOSITE OR ITS SUPPLIERS BE LIABLE FOR ANY DAMAGES, INCLUDING WITHOUT LIMITATION, ANY LOST PROFITS, BUSINESS INTERRUPTION, LOSS OF INFORMATION, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY OR WHETHER ARISING OUT OF THE USE OF OR INABILITY TO USE THE PRODUCT AND EVEN IF APPOSITE OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL APPOSITE OR ITS SUPPLIERS' LIABILITY, WHETHER IN CONTRACT, TORT (INCLUDING

NEGLIGENCE), BREACH OF WARRANTY, OR OTHERWISE, EXCEED THE PRICE PAID FOR THE PRODUCT. SOME STATES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. YOU HEREBY WAIVE CALIFORNIA CIVIL CODE SECTION 1542, WHICH SAYS "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH, IF KNOWN BY HIM MUST HAVE MATERIALLY AFFECTED HIS SETTLEMENT WITH THE DEBTOR."

8. **TERM AND TERMINATION.** This Agreement takes effect upon your use of the Software and remains effective until terminated. You may terminate it at any time by destroying all copies of the Software and Documentation in your possession. The licenses granted by Apposite herein will terminate immediately if you fail to comply with any term or condition of this Agreement. You agree on termination of the licenses to cease all use of the Software and Documentation. In addition, the provisions of the sections "U.S. Government Restricted Rights" and "Export" shall survive termination of this Agreement.
9. **EXPORT.** The Product, including the underlying technology, is subject to U.S. export control laws, and may be subject to export or import regulations in other countries. You may not export or import the Product and the underlying technology, directly or indirectly, in violation of these laws. You agree to comply strictly with all such laws and regulations and acknowledge that you have the responsibility to obtain such licenses to export, re-export, or import as may be required.
10. **U.S. GOVERNMENT RESTRICTED RIGHTS.** All Software and Documentation provided pursuant to this Agreement qualifies as "commercial computer software" and "commercial computer software documentation" pursuant to FAR 12.212 and DFAR 227.7202. The Software and Documentation are being licensed to U.S. Government end users only as commercial items and with only those rights as are granted to all other end users pursuant to the terms and conditions of this agreement.
11. **GENERAL PROVISIONS.** This Agreement will be governed by and construed in accordance with the laws of the State of California without reference to its conflicts of law provisions. Any dispute arising out of or relating to this Agreement shall be subject to the exclusive jurisdiction and venue of the courts sitting in Los Angeles, California. This Agreement shall not be governed by either the Uniform Computer Information Transactions Act (UCITA) or the United Nations Convention on Contracts for the International Sale of Goods (CISG), the application of which is expressly excluded. If for any reason a court of competent jurisdiction finds any provision of this Agreement, or any portion thereof, to be unenforceable, the remainder of this Agreement shall continue in full force and effect. This Agreement constitutes the entire agreement between the parties with respect to the Product and supersedes all prior or contemporaneous understandings regarding such subject matter, whether written or oral, and supersedes any conflicting or additional terms contained in any purchase order or elsewhere, all of which terms are excluded. No amendment to or modification of this Agreement are binding unless in writing and signed by Apposite.

Apposite® Technologies LLC

4223 Glencoe Ave, Suite B121

Marina Del Rey, CA 90292 USA

1.310.477.9955

info@apposite-tech.com

www.apposite-tech.com