

**Single Port NODE  
Ethernet to DMX Interface Configuration &  
Owner's Manual**

model: NODE1-A, NODE1-P



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## Overview

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The NODE1 is an Ethernet to DMX bridging device. It accepts Artistic License's Art-Net (version 3 or prior), PLASA's Streaming ACN (ANSI E1.31), draft sACN, KiNeT V1 (ColorKinetics), and ShowNet (Strand Lighting) protocols. There is one fully isolated DMX512 port. The port can be configured as either an input or as an output.

The factory default configuration covers most applications. A web interface is used for all configuration changes. Front panel LEDs show the status of the NODE1 power, network connection, and DMX512 signal.

Both versions of the NODE1 are powered by Power over Ethernet (PoE – 802.3af). The architectural version fits in many single gang wall boxes. The portable version has holes for truss mounting using a C-clamp or half-coupler. The portable version also uses a rugged Ethercon connector for its Ethernet connection.

## DMX PORT SPECIFICATIONS

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Port circuit:	EIA-485 transceiver with 120 ohm termination between Data+ and Data-
	NOTE: This product uses slew-rate-limited output drivers. Slew-rate-limited drivers minimize EMI and reduce reflections.
Input signal:	0.2 Volts minimum, 12 Volts maximum
Output signal:	1.5 Volts (minimum) into 120 Ohm Termination
Connector:	Female Neutrik DL-series gold plated 5 pin XLR (standard female connector, male on request)
Port protection:	+60V continuous, +15KV transient

## ETHERNET SPECIFICATIONS

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Ethernet circuit:	100BASE-TX Fast Ethernet, MDIX, and Auto Negotiation
Connector:	PoE RJ-45 for architectural, Neutrik Ethercon for portable
Isolation:	1500 Volts

## OVERALL SPECIFICATIONS

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Power input:	802.3af PoE (Power over Ethernet), 3W
Color:	Black
Size and weight:	Architectural: 4.5”H × 1.75”D × 2.75”W, 1 pound Portable: 2”H × 5.375”D × 4.25”W, 1 pound

## Architectural Installation

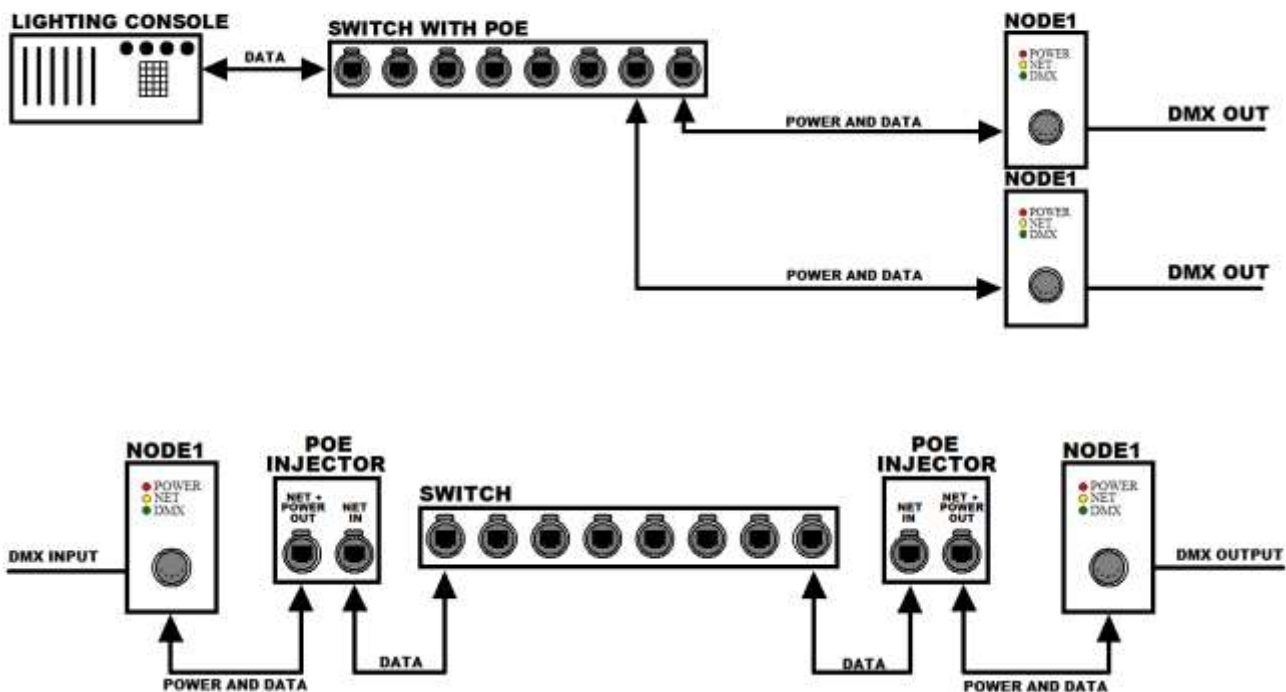
The NODE1 fits in many, but not all, single gang wall boxes. Extra depth is required to accommodate all of the electronics and to allow space for the network connection. The opening on the face of the box must be at least 2.75" tall and 1.75" wide at the most narrow points. The box must be at least 2.5" deep.

The use of a two-gang square electrical box with a single-gang "mud ring" will allow for easy installation and wiring space.

Care must be taken to insure that no part of the electronics are touching the box. Do NOT attempt to install the NODE1-A while power is applied. If necessary, protect the NODE1 electronics with a large diameter piece of heat-shrink tubing.

## Powering the NODE1

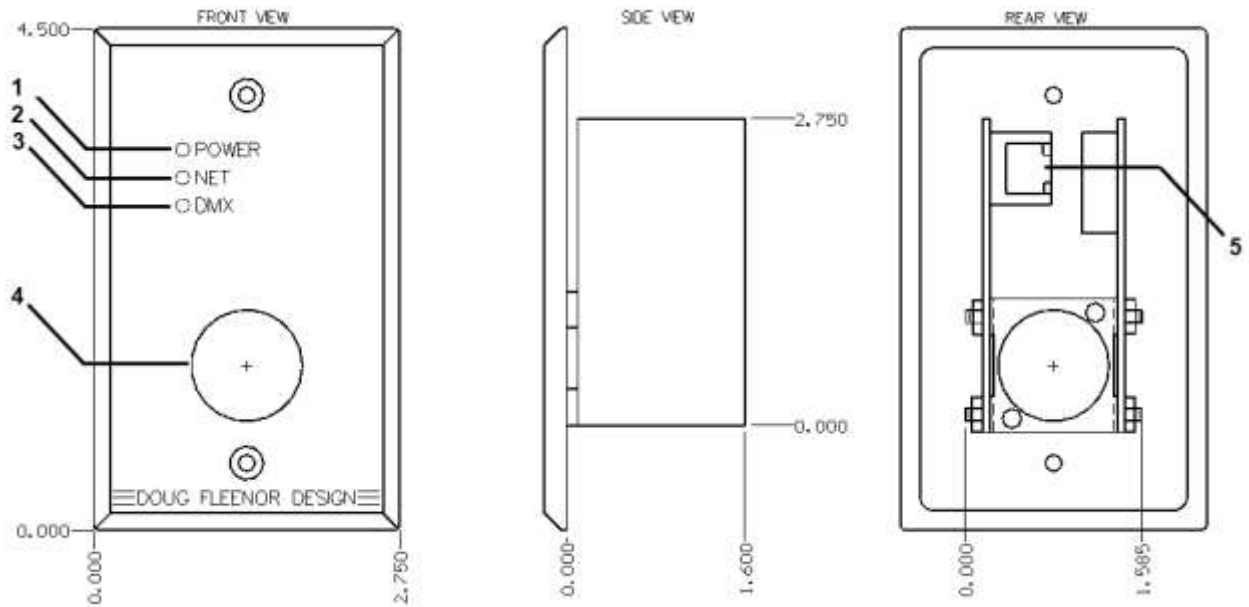
The NODE1 is powered using Power over Ethernet (PoE). This simplifies installation by allowing the installer to pull a single CAT5 cable to the NODE1. The cable provides power and Ethernet signals. A PoE switch or a PoE power injector must be used to provide the power to the NODE1. The diagrams below illustrate both methods of powering the NODE1.



## Setup and Operation

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### Connections and Indicators



**1) POWER LED:** This indicator illuminates when the unit is powered and running. It will blink while the NODE1 is in boot loader mode.

**2) NET LED:** This indicator illuminates when the unit has established a link with another network interface such as an Ethernet switch or computer.

**3) DMX LED:** When the DMX512 port is configured as an output, the DMX LED illuminates when the NODE1 is receiving network data on its configured universe. When the DMX512 port is configured as an input, the DMX LED illuminates when a DMX512 signal is applied.

**4) DMX512 Port:** This connector is used to send or receive DMX512 signals (depending on the configuration).

**5) RJ45:** This connector is for PoE power and network data.

## Using a web browser to configure the NODE1

The NODE1 has a built-in web server that allows remote configuration of a unit across the network. It allows for configuration of all aspects of the NODE1 including the name, unit description, network settings, and port options available for the current network protocol.

To access the web server, the computer to be used must be physically connected to the same network as the NODE1. It must be in the same Subnet, have the same Subnet Mask, have a unique IP address, and have a web browser installed.

To start the web server, open a web browser (Internet Explorer, Mozilla Firefox, Google Chrome, Safari, etc....).

Type the IP address of the NODE1 in the address bar of the browser. After the address has entered, press Enter on the computer keyboard. The **Status Page** from the NODE1 will be displayed.

Since the NODE1 has no display, determining the IP address and configuration of a device can be a challenge. The NODE1 is shipped with DHCP enabled, a default IP address in the range of 10.X.X.X, and the subnet mask set to 255.0.0.0.

Before deploying the NODE1 into the field, it is recommended that each NODE1 is connected to an isolated network for configuration. This will allow configuration while the computer and the NODE1 are in close proximity to one another.

If DHCP is enabled in the test network, the NODE1 will be assigned an address. To determine what address has been given to the NODE1, the DHCP server's client table can be referenced. Alternately, a utility program can be used to locate all Doug Fleenor Design Ethernet nodes on the network. The node discovery program can be downloaded at:

<http://www.dfd.com/NodeDisc.html>

If no DHCP server is present, the NODE1 will use its default IP address which is printed on a label on the back of the device. However, if the default IP address has been overwritten by previous configuration attempts, the NODE1 will use the user-created address.

To set the NODE1 to its default configuration settings (including the IP address):

- Remove power from the NODE1
- Remove jumper JP1 (near the Ethernet connector)
- Re-apply power, wait about 10 seconds
- Remove power from the NODE1
- Re-install jumper JP1
- Re-apply power

The NODE1 will now have DHCP enabled and the IP address will be the default as shown on the label on the back of the unit.

The current status of the NODE1 can be on the **Status Page**. The uptime, number of power cycles, software version, DHCP status, IP address, Subnet Mask, MAC Address, DMX512 port Universe selection, and DMX512 port input/output status are shown. A menu bar at the top of the page has links to access the network settings and the DMX512 port settings. In addition, there is a check box to identify the NODE1. While checked, the three LEDs on the currently selected NODE1 will blink.

**NODE1**

Identify Node:

Status	Network Configuration	Port A
<b>Identification</b>		
<b>Device Name:</b> NODE1		
<b>Description:</b> Use this description text to identify the unit on the network		
<b>Network Status</b>		
<b>DHCP:</b> Enabled		
<b>IP Address:</b> 192.168.1.119		
<b>Subnet Mask:</b> 255.255.255.0		
<b>MAC Address:</b> 00:04:A3:56:8B:13		
<b>Port Status</b>		
<b>Network Protocol:</b> Streaming ACN		
<b>Port A Direction:</b> Output		
<b>Port A Universe:</b> 1		
<b>General Status</b>		
<b>Up time:</b> 1 Minutes		
<b>Power Cycles:</b> 47		
<b>About NODE1</b>		
<b>Firmware Label:</b> Full		

The **Network Configuration** page lets you set the Device Name, Description, IP Address, Subnet Mask, DHCP settings, and Network Protocol. Be sure to click the Save Settings button on the bottom right of the page before navigating away from this page. If another page is selected before saving, all changes will be lost. If the IP, Subnet, or DHCP settings have been changed, care must be taken to ensure it will still be possible to connect to the NODE1 after saving the settings. The NODE1 may reboot after saving your new settings.

**NODE1**

Identify Node:

Status Network Configuration Port A

### Identification

The NODE1's Device Name is the text displayed on the home screen. This can be used for easy identifying of particular units.

The Description is used to describe the NODE1 to other nodes and controllers on the network.

### IP Settings

### DMX over Ethernet

**Device Name:**

**Description:**

**DHCP:**

**IP Address:**  .  .  .

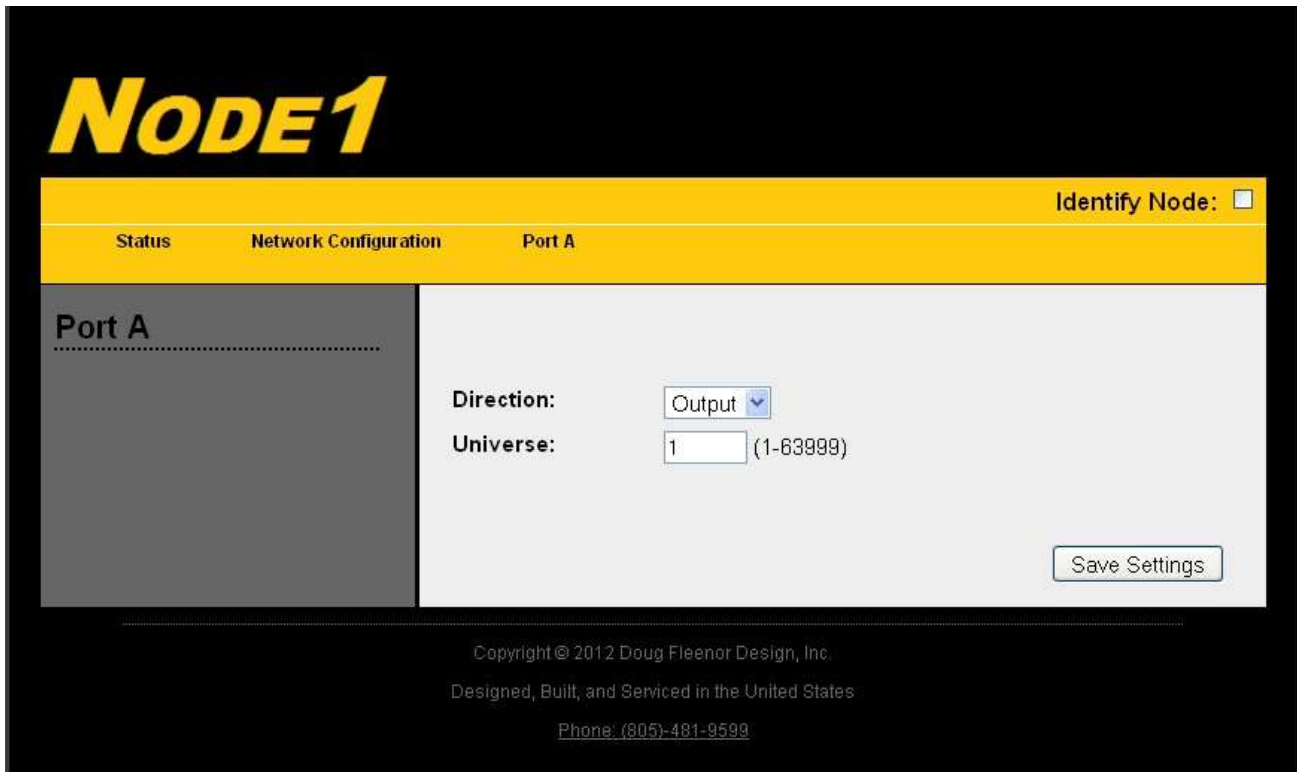
**Subnet Mask:**  .  .  .

**MAC Address:** 00:04:A3:56:8B:13

**Network Protocol:**

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The **Port A** page allow setting of the attributes of the DMX512 port. Be sure to click the Save Settings button before selecting another page.



## Operation of the NODE1

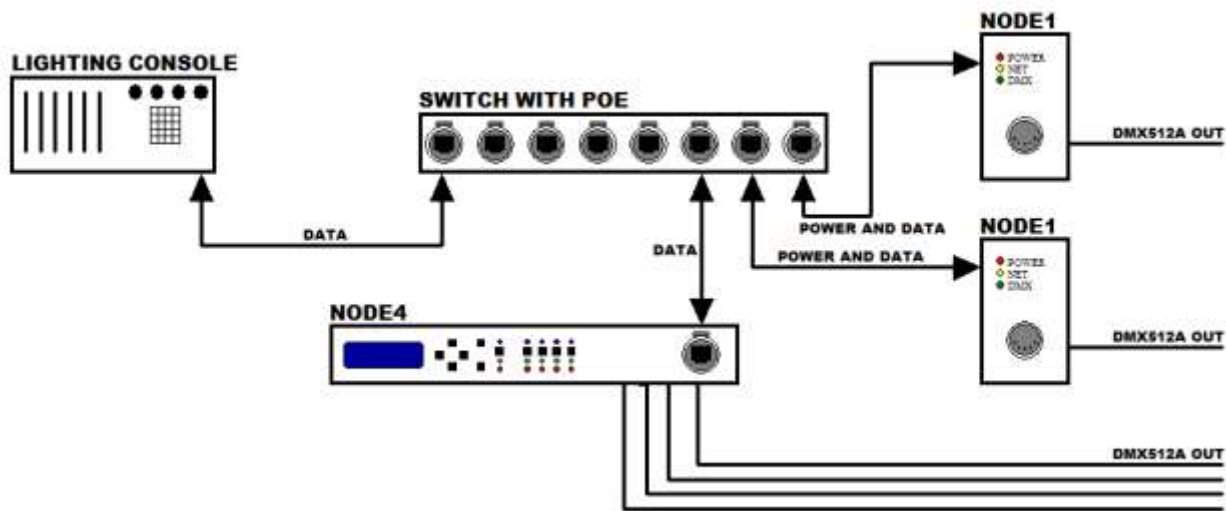
Upon **Loss of DMX512** from the network, the NODE1 will continue to transmit its last received DMX512 data for three seconds. It then stops transmitting DMX512 and disables the the DMX512 line driver allowing moving lights and dimmers to reset or to let a Preset10 take control of the line.

**Merging** on the NODE1 is done automatically. Six network sources per port are allowed on the NODE1. This means that a single port on the NODE1 set for universe one can automatically merge six different sources which are generating universe one. In Streaming ACN mode, priorities of the stream are also taken into account. For example, the NODE1 will automatically merge six sources with the same priority. If a new source with a higher priority is received, the other sources will be rejected until the higher priority source has timed out. If a port is set up to input DMX512 in Streaming ACN mode, that port will be transmitted on the network with a priority of 100. This is the default priority for Streaming ACN.



## Typical Layout

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A typical network system will contain at least one console, one or more NODE1s, and an Ethernet switch. In the system shown above, the console is connected by an Ethernet cable to an Ethernet switch. An Ethernet cable is connected from the switch to each NODE1. CAT5e or higher cabling is required for 100Mbps operation in an Ethernet network.

### Network Setup

There are a number of considerations when connecting and configuring a lighting control network. The first option to consider is whether the system IP addresses will be dynamically assigned by a DHCP server or if static assigned IP addresses will be used. Doug Fleenor Design's NODE1 is capable of either DHCP or static IP addressing schemes. Doug Fleenor Design recommends using static IP addresses in an entertainment lighting control network. In a static IP environment, the user will manually set the IP address of each unit in the network. Care must be taken to make sure that each NODE1 has the same subnet mask and that each unit has a unique IP address in that subnet. The NODE1 comes from the factory with a static IP in the range of 10.X.X.X, which is based on its MAC address. Note that when DHCP is enabled and no DHCP server is available (such as when physically connected to the console), the NODE1 will use its currently programmed static IP address. On loss of the Ethernet link (such as when the network cable is unplugged from the unit), the NODE1 will revert back to its programmed static IP. In a DHCP environment, IP address and Subnet Masks for the NODE1 are configured automatically from the DHCP server. Most routers have a built-in DHCP server.

The other major consideration is what network protocol to use. Doug Fleenor Design highly recommends the use of ANSI E1.31 Streaming ACN in networks for its scalability and higher performance characteristics. Streaming ACN has no restrictions on IP whereas an Art-Net IP must be in the range 2.X.X.X or 10.X.X.X with a subnet of 255.0.0.0.

## **Other things to consider when designing and configuring a network.**

- 1) Avoid mixing network protocols (For example: do not use Art-Net and Streaming ACN in the same network if it can be avoided.)
- 2) When selecting of an Ethernet switch, a managed switch must be used. Most Ethernet switches now have broadcast storm control which must be disabled to allow entertainment lighting protocols to pass through.
- 3) Use the same subnet mask on all network devices, but be sure it is big enough to fit the number of devices on the network.
- 4) Doug Fleenor Design strongly recommends that lighting control networks should not be connected to the Internet. It is recommend that the lighting network is a completely separate network with no Internet access.
- 5) Be aware of the rules for Art-Net IP addresses. Art-Net requires the IP to be in the range of either 2.X.X.X or 10.X.X.X and the subnet must be 255.0.0.0. These must be followed for the NODE1 to inter-operate completely with other Art-Net Gear.
- 6) If there will be more than 100 network universes in a connected network, a managed Layer 3 network should be considered.

## **Limited Manufacturer's Warranty**

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Products manufactured by Doug Fleenor Design (DFD) carry a five-year parts and labor warranty against manufacturing defects. It is the customer's responsibility to return the product to DFD at the customer's expense. If covered under warranty, DFD will repair the unit and pay for return ground shipping. If a trip is necessary to the customer's site to solve a problem, the expenses of the trip must be paid by the customer.

This warranty covers manufacturing defects. It does not cover damage due to abuse, misuse, negligence, accident, alteration, or repair by other than by Doug Fleenor Design.

Most non-warranty repairs are made for a fixed \$50.00 fee, plus shipping.

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