DOUG FLEENOR DESIGN

Sixteen Output Ethernet to DMX512 Interface Configuration & Owner's Manual

model: NODE16

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Product description

NODE16 is an Ethernet to DMX512 bridging device. It accepts Streaming ACN (ANSI E1.31) or Artistic License's Art-Net protocols. There are sixteen fully isolated DMX512 output ports. The Ethernet input connector accepts standard RJ45 (8P8C) connectors as well as Neutrik Ethercon plugs.

Each of the sixteen outputs has two front panel indicators: A signal LED which illuminates if there is DMX512 data for the selected universe, and a mimic LED which mimics the output level of DMX512 slot one (channel one) of the selected universe (useful for troubleshooting). A red power indicator, a green network link indicator, and a yellow network activity indicator are also provided.

The factory default configuration covers most applications. Default configuration is editable using the front panel encoder wheel and backlit LCD.

NODE16 is powered by 100-240VAC 50/60 Hz, 30W. It fits in one unit (1.75") of 19 inch rack space.

Environmental

Operating temperature: 0-40º C (32-104° F)
Operating humidity: 10-90% non-condensing
Indoor use only

Jumper settings

Five configuration jumpers are located inside NODE16. Only JP1 has a purpose at this time. Jumpers should be set prior to installation. Jumper functions are described in the table below.

Jumper	Installed function	Removed function
JP1	Front panel encoder allows configuration changes.	Front panel encoder is disabled. Editing is locked out.
JP2	No function at this time	No function at this time
JP3	No function at this time	No function at this time
JP4	No function at this time	No function at this time
JP5	No function at this time	No function at this time

Output Port Specifications

Port circuit: Protected EIA-485 receiver (ADM2795)
Output signal: 1.5 Volts (minimum) into 120 Ohm Termination
Connectors: Sixteen 5-pin female XLRs on rear panel
Port protection: ±42V continuous, ±15KV transient
Isolation: 1,500 Volts isolation from Ethernet input and from other outputs

Network Specifications

Input circuit: 802.3 Ethernet compliant input (LAN8720)
Input signal: Art-Net or sACN (ANSI E1.31) Ethernet protocols
Input connector: Ethercon RJ45 (8P8C) on front panel
MDIX: Auto-negotiated

General Specifications

Power input: 100-240 VAC, 50/60 Hz, 30W
Indicators: 1 Red POWER indicator
                    1 Green Ethernet LINK indicator
                    1 Yellow Ethernet ACTIVITY indicator
                    16 Green MIMIC indicators mimic the level of the first channel on
                    each output (useful in troubleshooting)
                    16 Green SIGNAL indicators illuminate when DMX512 output signal
                    is present on each port
Configuration: Rotary knob with push to select switch and backlit LCD
Environmental: 0-40 °C (32-104 °F); 10-90% humidity, non-condensing
Cooling: Convection cooling, no fan required
Color: Top, bottom and sides: Silver hammer tone
                    Front and back: Black
Size and weight: 1.7"H × 6.5"D × 16.5"W, 6.5 pounds

Installation

NODE16 is a portable desktop or rack mounted unit. A front mounted RJ45 (8P8C) Ethercon jack connects the unit to the lighting control network, typically a network switch, using Category 5 or better (Cat5) cabling. Power is supplied via the attached line cord, fitted from the factory with a NEMA 5-15P connector. Alternate power connectors may be affixed by a qualified technician using the international color code of green/yellow=ground, blue=neutral, brown=line (hot). DMX512 outputs are connected using 5-pin male XLR plugs to the chassis mounted female output connectors.

System Topology

A typical network system will contain at least one console, one or more NODE16's, and an Ethernet switch. In the system shown below, the console is connected by an Ethernet cable to an Ethernet switch. An Ethernet cable is connected from the switch to each NODE16. Category 5 or higher cabling is required for 100Mb/s operation in an Ethernet network.
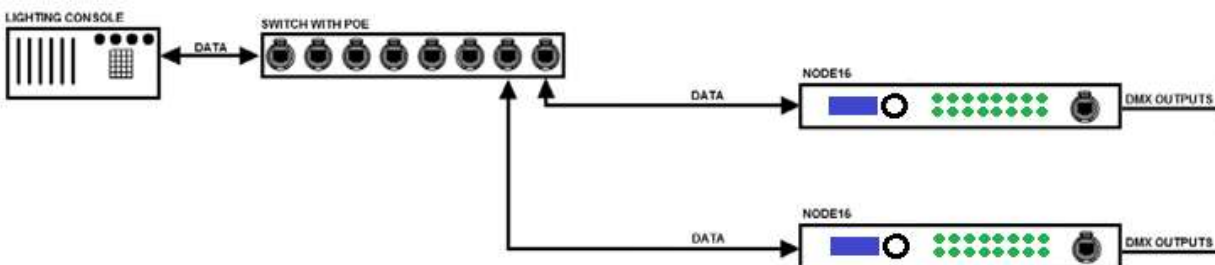
Data transport between each Art-Net or sACN capable device takes place using standard Ethernet hardware that supports multicast traffic. The diagram above utilizes a single Ethernet switch for simplicity. Any network hardware constituting a properly configured LAN may replace the Ethernet Switch blocks above.

Network Jargon

Doug Fleenor Design strives to make our products reliable and easy to use. Computer networks, and their complexity, complicate this goal. To help our users de-mystify the network side of our NODE products, Mr. Fleenor shares some of his insights.

Host. Mr. Fleenor finds this networking term misleading. To non-networking people, a host is the person that coordinates an event (or picks up the tab at a hosted bar). There is often one host, and many guests. In a computer network, the term host is used for any device connected to the network that generates or uses data; on a computer network there are many hosts (and no guests).

The term host, in computer networks, stems from the days when computers took up entire rooms or floors. Remote terminals, similar to mechanical typewriters, allowed multiple users to access the computer. The computer hosting these dumb terminals, was the host. Later these host computers were connected together to form a network, and the term host, for a computer on the network, stuck.

Node. Every device connected to a computer network is a node: Switches, hubs, routers, computers, interface devices... Mr. Fleenor likes this term, thus the name of our network interfaces. Fun fact: All hosts are nodes, but not all nodes are hosts.

Address. A unique address is required for every device on a lighting control network. sACN (and Art-Net) use IPv4 addressing which is a 32-bit number, typically written in "dot-decimal" form (four decimal numbers separated by dots) such as 10.0.1.1. There are two parts to the Address: the *network-part* and the *host-part*. To talk to each other, all devices in the network must have the same network-part and a unique host-part. Doug Fleenor Design recommends users use Network 10 (address 10.X.X.X), which is intended for private (dedicated) networks that are not connected to the internet. Another private network number is 192.168 (address 192.168.X.X). (Author's note: sACN sends DMX512 data on network address 239.255.X.X regardless of the Node's address or mask. Thus, some aspects of a sACN network may work even if the address and/or mask do not match.)

Subnet mask. A 32-bit IPv4 address has two parts: the network-part and the host-part. The number of bits dedicated to each part varies by application and is historically represented by the subnet mask. The subnet mask is a 32-bit binary number starting with a series of ones, followed by series of zeros, such as 11111111 00000000 00000000 00000000, with ones representing network-part bits and zeros representing host-part bits. The subnet mask is typically written in dot-decimal form such as 255.0.0.0. Although the parts of the IPv4 address can be split in 31 ways, the two most common in lighting are: 8 bits for network, 24 bits for host (subnet mask 255.0.0.0) and 16 bits for each (255.255.0.0).

DHCP. The Dynamic Host Configuration Protocol is a tool used to automatically assign addresses and subnet masks. A device that runs the DHCP is called the DHCP server. Not all networks have a DHCP server, in which case the addresses and subnet masks are set manually (DFD products ship with a default address and mask that work in most applications). Note that DHCP is an app that runs on a computer, router, console, or other

device on the network; it is not a separate piece of equipment.

Network Setup

N_{ODE}16 ships with default settings that will work in most applications:

> DHCP: enabled
> IP Address: 10.X.X.X (where X.X.X is unique to each unit)
> Subnet Mask: 255.0.0.0
> Protocol: sACN
> Lockout: No Lockout

N_{ODE}16 provides a Liquid Crystal Display (LCD) and a rotary knob to edit settings. When the "page select" icon [<>] is highlighted, rotating the knob scrolls through the following configuration pages. A configuration page is selected by depressing the knob.

> Software version: Informative only, not editable.
> DHCP: Enabled/Disabled
> IP Address: Displayed in dot-decimal form. Four editable fields.
> Subnet Mask: Displayed in dot-decimal form. Four editable fields.
> Protocol: sACN/Art-Net
> Lockout: No Lockout/All Lock/Network Lock
> Output 1: One editable field: Universe number. Factory default is universe 1
> Output 2: One editable field: Universe number. Factory default is universe 2
> .
> .
> .
> Output 16: One editable field: Universe number. Factory default is universe 16
>
> (For Art-Net, the outputs have three editable fields: Universe, Subnet, and Net)

Once a configuration page is selected, the knob is rotated to change the selected parameter. Depressing the knob accepts the change.

DHCP Doug Fleenor Design recommends against using DHCP in an entertainment lighting control network; it typically adds an unnecessary level of complexity. That said, N_{ODE}16 ships with DHCP enabled in case a server is being used. N_{ODE}16 does not save DHCP assigned parameters and requests them (from the server) each time power is applied. If, upon power-up, no DHCP server is present, N_{ODE}16 will use its stored address and mask.

IP ADDRESS The network address is edited here for use when DHCP is disabled or unavailable. Each of the four fields is edited separately to a value between 0 and 255.

SUBNET MASK The subnet mask is edited here for use when DHCP is disabled or unavailable. Each of the four fields is edited separately to a value between 0 and 255.

PROTOCOL Provides selection between sACN and Art-Net.

LOCKOUT The NODE16 offers three different lockout configurations to prevent unwanted adjustment to the unit. The default setting is "NO LOCKOUT", where all of the NODE16's settings are configurable. The second setting is "ALL LOCK", where all of the NODE16's settings are locked out from configuration. The last setting is "NETWORK LOCK", where only the NODE16's network settings (DHCP, IP Address, and Subnet Mask) are locked out from configuration and all of the other fields can be adjusted.

OUTPUTS 1-16 When sACN is selected in the "PROTOCOL" menu, an sACN universe can be selected for each of the 16 outputs. Available sACN universes range from 1 to 63,999. The default starting universe for the first output is universe 1, the second output is universe 2, etc. Each output's universe can be altered in these menus.

When Art-Net is selected in the "PROTOCOL" menu, Art-Net configuration bits can be selected for each of the 16 outputs. Available Art-Net universes range from 0 to 15, subnets from 0 to 15, and nets from 0 to 127. For each output, the universe is denoted as "U", the subnet as "S", and the net as "N". The default configuration for the first output is U: 0 S: 0 N: 0, the second output is U: 1 S: 0 N: 0, the sixteenth output is U:15 S: 0 N: 0.

LIMITED MANUFACTURER'S WARRANTY

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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