



This installation guide describes the requirements for and the steps involved in the permanent installation of Pathway C-series, D-series and R-series two-port Pathport® nodes, and Uno single-port nodes. Some familiarity with DMX512 and Ethernet lighting networks is assumed.

## PRE-CONFIGURATION

Pathport® nodes hold their IP and patch configuration in non-volatile memory. Significant on-site time savings can be attained by configuring the node name and network information in the shop. To do so, use the network requirements below to create a mock-up installation. Configure the nodes using Pathport Manager software. Put temporary labels on the nodes showing their fit-up location, then repackage them for shipping.

## ON-SITE CONFIGURATION

If nodes are not pre-configured, configuration can be done after installation, on-site. The configuration process will involve recording the IP address of each node, and then using Pathport Manager software.

## NETWORK REQUIREMENTS - WIRING & LAYOUT

All network wiring should follow standard Ethernet wiring rules and be installed by a qualified person. Category 5 wiring or better is required. Pathway recommends following the Entertainment Services and Technology Association (ESTA) publication *Recommended Practice for Ethernet Cabling Systems in Entertainment Lighting Applications* and its supplement. Both documents are available on-line at [www.esta.org](http://www.esta.org).

As part of the installation, all Ethernet wiring should be certified under the TIA/EIA-568 standard. Pathway may limit the technical support provided to nodes installed on non-certified systems.

Good wiring practice does not allow terminating building wire with a male RJ45 plug or the hard-wiring of data lines to end devices. To facilitate proper practice, Pathport 2-port nodes ship with an in-line female RJ45 mini-jack, similar to a punchdown connector, as well as a short male-to-male RJ45 jumper to connect the jack to the node. The in-line jack can be installed by finger-pressure alone, although pliers are recommended. A crimping tool is not needed. The jumper and jack are available as an accessory package for the Pathport Uno.

To install the in-line connector, first determine if the installation is using TIA568A or TIA568B wiring scheme. Strip back the outer insulation jacket no more than 3/4". Untwist the pairs, trim them to the same length but do not remove insulation from the individual wire. Following the applicable color coding scheme on the sticker, slip the individual wires into the clear plastic guide piece. Position the guide piece onto the connector half of the jack, and press down or gently apply pressure with a pair of pliers until the two pieces click together. The mini-inline connector is removable, if necessary.

## NETWORK REQUIREMENTS - POE

Pathport nodes are designed to take advantage of the IEEE 802.3af standard, commonly called Power-over-Ethernet (PoE). PoE-enabled switches are readily available, and their use is strongly recommended to simplify installation and prevent the need for separate power cabling. Please note that the Pathport Uno can only be powered using PoE and cannot be hooked up to an auxiliary supply.

## NETWORK REQUIREMENTS - ETHERNET SWITCHES

For entertainment lighting networks, unmanaged or plug-and-play switches are preferable to managed or enterprise switches. However with larger networks, sometimes the only switches available with the number of ports required will be managed. There are two issues commonly encountered with managed switches. First is broadcast storm control.

DMX-over-Ethernet protocols are multi-cast or broadcast protocols where one source (the console) sends all the information to all the nodes and each node determines what part of the data stream to use. However the management features of most switches are intended for the unicast or one-to-one environment of an office. A continual broadcast transmission looks like an error – a broadcast storm – which the switch will try to block. In a show situation, this would be disastrous. Broadcast storm features must be disabled.

The other issue is multi-cast filtering. Managed switches attempt to direct traffic in an intelligent manner by learning what devices are on what port. Although useful in the unicast environment of an office, this feature can bog down the lighting network and lead to lost packets. The 'snooping' done to facilitate multi-cast filtering is known to cause issues with broadcast protocols and so

this feature, often called Inter Group Management Protocol (IGMP) should be turned off.

Other security features of the managed switch should be examined. Most will not be necessary on a lighting network and should be disabled. At the very least, this will help keep the through-put speeds of the switch as high as possible.

One feature that managed switches can provide that unmanaged switches cannot is redundancy. Managed switches can be configured to work around a problem or even to activate a redundant leg of the network. In some applications, this feature may be sufficiently desirable to offset the added configuration time and expense.

For unmanaged and plug-and-play switches, the feature sheets must be carefully examined to ensure broadcast storm and IGMP filtering are not permanently turned on.

Switches should be connected to an uninterruptible power supply (UPS) with power conditioning. A UPS allows for orderly shutdown in case of power failure, and protects against spikes and brown-outs, which can cause memory corruption or physical damage to the nodes.

## OPERATING ENVIRONMENT

All Pathport nodes are designed for indoor use in a dry location. To maximize equipment life and minimize unreliability and sudden failure, the following environment should be maintained:

- ambient temperature extremes: -10 to +50 degrees C
- operating temperature: 0 to +40 degrees C
- relative humidity: 10 – 95%, non-condensing
- general conditions: clean, dust-free

## C-SERIES NODE INSTALLATION

Disconnect all power before proceeding with the installation.

C-series nodes are designed to be installed in recessed, standard two-gang masonry deep backboxes (ears in) for flush-mounting or, for surface mounting, in Pathport surface mount backboxes, part number 6901. Use of other surface mount backboxes is not recommended.

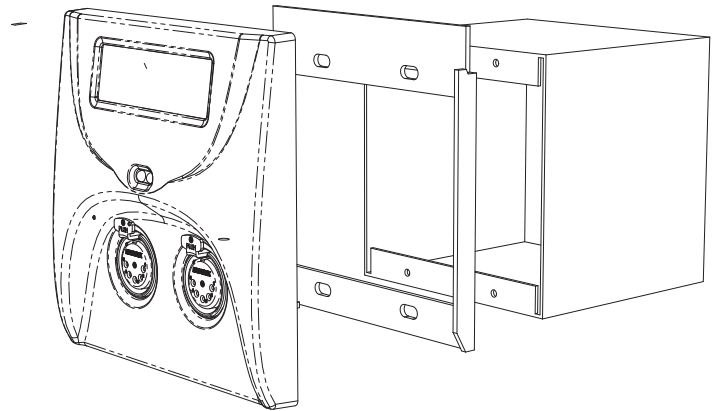
If the node has been pre-configured, check the temporary label to ensure the node is being installed in the correct location.

Check the installed backbox for obstructions or any foreign material. The backbox should be clean and empty. Make sure there is a RJ45 female punchdown connector in the box (preferred) or a male RJ45 pigtail. Install the in-line jack provided, if necessary.

Attach the Pathport trim ring to the backbox with the 4 screws provided. Do not over-tighten or do anything that will distort the shape of the trim ring.

Inspect the node and make sure all components are secure and that the printed circuit boards are secure. Note that it is normal to see exposed metal on the mating connectors.

If the backbox contains an RJ45 female punchdown



connector, use the male-to-male jumper (included) to connect it to the node. Otherwise, plug the male RJ45 pigtail directly into the connector on the back of the node. Attach the green ground wire to the ground screw in the backbox.

If local power is required for the node, see the note on local power at the end of this guide.

Gently insert the node straight into the backbox, lifting it slightly so that it is high in the backbox. Once all the way in, lower it slightly until the tabs at the top of the trim ring take hold of the face plate. Once the top of the node's faceplate is retained, swing the bottom in tight to the wall. Make sure no wiring or connectors are pinched or excessively bent or stressed. Using a #0 Phillips driver (not included), tighten the two setscrews provided, one on each side of the node's face, to complete installation. If the nodes have shipped with hex-head set screws, instead use a 1/16" Allen key (not provided)

The node is ready to be powered up.

## D-SERIES NODE INSTALLATION

Disconnect all power before proceeding with installation.

D-series nodes are surface-mount enclosures designed for conduit-enclosed cabling connection to permanently installed equipment such as dimmers and relay cabinets. D-series nodes are shipped attached to their backboxes.

First, remove the two screws holding the faceplate to the backbox. Keep the screws for later use. Gently remove the faceplate and attached printed circuit boards. Put the faceplate in a safe and clean location, such as back into its shipping container.

Determine the location of the backbox in relation to the incoming and outgoing conduit lines. Remove the appropriate knockouts then securely mount the backbox to the wall using appropriate fasteners. If the backbox must be installed prior to the completion of the conduit and wiring runs, then label the backbox and the container holding the removed faceplate and store the container in a safe location. Make sure the two faceplate screws are stored in



the same box.

Attach the conduit runs to the enclosure using standard connectors (not supplied). The backbox should be clean and free of obstructions or foreign materials. Inside, there should be one Cat5 wire with a female RJ45 punchdown connector (if necessary, install the mini-jack included) and one or two cables for the DMX connections, ending in bare wires. Identify which cable is for DMX Universe A and which is for DMX Universe B.

Retrieve the faceplate from the storage container. Inspect it for damage and to ensure the printed circuit boards are securely fastened.

Using the XLR pin-out chart at the end of this guide, attach the cable for DMX Universe A to the terminal block marked DMX Port A. Repeat, if necessary, for DMX Port B. If Cat5 cable is being used to complete the DMX run, use the Cat5 pin-out guide instead.

Using the male-to-male jumper, connect the female RJ45 connector to the connector on the back of the circuit board of the node. If the Ethernet wiring has been terminated with a male RJ45 connector (not recommended), plug it directly into the circuit board connector.

If local power is required, see the note at end of this guide.

Gently position the faceplate on the backbox until the screw holes line up, while taking care that no wiring is pinched or excessively bent or stressed inside the box. Using the original two screws, reattach the faceplate. Do not over tighten.

The node is ready to be powered up.

## R-SERIES INSTALLATION



Disconnect all power before proceeding with installation.

R-series nodes are designed for installation in standard EIA 19" racks, at least 18" deep. Up to two R-series nodes may be installed in one RU of space, using the included rack-mount ears. Nodes may be mounted with the display or the connectors toward the front of the rack. The side walls of the node have an identical screw pattern at the front and rear. Rack ears can be mounted on either side of the node.

Determine which direction the node is to face and remove the appropriate four 4-40 Phillips screws from each side of the enclosure. Attach the 3 inch rack ear to one side of the node with the pan-head screws included, reusing the 4-40 screw holes. If only one node is being mounted in the rack space, attach the 10 inch rack ear to the opposite side of the node, again using the pan-head screws included. Attach the assembled unit to the rack using standard rack screws (not included).

If two nodes are to be mounted side-by-side in the rack space, attach the 3 inch ear to the opposite side of the second node, again using the pan-head screws provided into the empty 4-40 screw holes. Then attach the 1-inch link-ears to the sides of the nodes facing each other using

the pan-head screws provided. Attach the two 1-inch link-ears together using four of the Phillips 4-40 screws removed earlier. Do not tighten down completely. Attach the assembled unit into the rack using standard rack screws. Now tighten the 4-40 screws to finish the link-ear assembly.

Plug in the appropriate XLR connectors to the node to complete the DMX lines. If the node has terminal blocks, use the XLR pin-out chart at the end of this guide. Attach the cable for DMX Universe A to the terminal block marked DMX Port A. Repeat for DMX Port B. If Cat5 cable is being used to complete the DMX run, use the Cat5 pin-out chart instead.

For most installations, the Ethernet switch is located in the same rack as the nodes. Using a male-to-male RJ45 patch cable (not included), connect the female RJ45 jack on the node to the switch. If the switch is located elsewhere, consult the appropriate drawings for the Ethernet jack location.

The node is ready to be powered up. If auxiliary power is required, see the note on local power at the end of this guide.

## PATHPORT UNO INSTALLATION

Disconnect all power before proceeding with installation. Pathport Unos can only be powered using Power-over-Ethernet.

Pathport Uno single-port nodes are designed to be installed in recessed, standard masonry deep backboxes (ears in) for flush mounting, or deep (minimum 58mm or 2.25") surface mount backboxes. Unos may also be installed in multi-gang backboxes with other low voltage devices or Pathway modular receptacles. In this instance, the single gang faceplate provided will need to be replaced with a multi-gang faceplate. Cover plates ranging from double-gang up to 6-way, in brushed stainless steel or black, are available from Pathway.



If the node has been pre-configured, check the temporary label to ensure the node is being installed in the correct location.

Two important things must be done prior to installing the Uno. Uno nodes can be permanently set to a specific DMX universe, 1 through 4, by use of a jumper on the back edge of the circuit board. If the system designer has not given specific instructions about the setting, then leave the jumper in the NET position. This position will allow the universe the node operates on to be set remotely at a later time.

Second, each Uno node ships with additional serial number stickers. Do not lose these stickers. Because Unos do not have a faceplate screen, serial numbers and their locations are necessary to configure the system. Losing track of this information will add considerable time to commissioning.

As each node is installed, remove one of the additional serial number stickers and place it on the Installation Record Sheet included with each Uno. Write down the location, jumper settings and any other comments. A second sticker can be placed on the face of the Uno for identification during commissioning. This sticker can be easily removed and discarded when no longer needed.

Once this information is recorded, check the backbox for obstructions or foreign material. The backbox should be clean and empty. Make sure there is a RJ45 female punchdown connector (preferred) in the box or a male RJ45 pigtail.

Inspect the Uno and make sure all components are securely fastened and that the printed circuit boards are intact.

If the back backbox contains an RJ45 female punch-down connector, use a male-to-male jumper to connect it to the node. Otherwise, plug the male RJ45 pigtail directly into the connector on the back of the node. Attach the green ground wire to the ground screw in the backbox.

Gently insert the Uno straight into the backbox and screw it into place with the long mounting screws provided. Place the cover plate over the installed Uno and use the two short screws to fasten the cover plate. Do not over-tighten these screws.

When the network switch or in-line injector is turned on, the Uno will power up. Remember, the Uno will only operate on Power-over-Ethernet.

## TESTING THE INSTALLATION

Once all connections are made and inspected for errors, power up the Ethernet switches on the network. The Pathports should boot up and, except for the Uno, display their IP address or node name, if configured. The NET LED will illuminate on the Uno, showing that it has power. The appropriate lights on the Ethernet switches should also light up.

At this point, refer to the Pathport Manager Software User Manual for system configuration and protocol selection.

## LOCAL POWER

All C-series, D-series and R-series nodes can be connected to an external power supply, for situations where Power-over-Ethernet is not available. Each node will require a supply between 18 and 50VDC and consume 4 watts of power.

With the power supply turned off, connect the bare wire ends to the 2-wire terminal block (included). Slip the block over the pins marked V+ and V-, observing polarity. On C- and D-series nodes, these pins are mounted on the circuit board. On R-series nodes, the connector is on the back face of the unit. Check all wiring, then connect the power supply to the mains power. The node should boot up.

## DMX XLR CONNECTOR WIRE TERMINATION

Wire color is manufacturer-specific. Use the connector to determine pin number for each wire.

XLR Pin	Standard RS422/485 Wire Conductor
Pin 1	Shield
Pin 2	Data – (pair 1 complement)
Pin 3	Data + (pair 1 true)
Pin 4	Optional Data – (pair 2 complement)
Pin 5	Optional Data + (pair 2 true)

The following is the termination for Cat5 cable, *when used for DMX*.

Wire Colour and #	Function	XLR Pin Number
White/orange (1)	Data + (pair 1 true)	3
Orange (2)	Data – (pair 1 complement)	2
White/green (3)	Optional Data + (pair 2 true)	5
Green (6)	Optional Data – (pair 2 complement)	4
Blue (4)	Unassigned	
White/blue (5)	Unassigned	
White/brown (7)	Data signal common for Pair 1	1
Brown (8)	Data signal common for Pair 2	1

This chart is based on the current ESTA draft standard BSR E1.27-2 and is intended for DMX cabling - NOT DMX-over-Ethernet cabling. This pinout chart should NOT be used for wires carrying Ethernet signals or DMX-over-Ethernet protocols.

Great care must be taken to prevent the accidental connection to non-DMX equipment.

The connection of DMX equipment to non-DMX equipment such as Ethernet switches may result in serious equipment damage.

To help prevent this possibility, unless the wires have another known usage in the existing installation, wires 4 and 5 should be capped and turned back rather than connected.

The use of RJ45 connectors for DMX equipment should be restricted to patch bays in access controlled rooms and should not be used for the direct connection of portable equipment.

## PATHPORT SYSTEM COMPONENTS

Model Number	Model Description
6001	Single node inline power supply
6010	Pathport Manager Configuration Software on CD
6101	Pathport Uno, Single DMX input node with cover
6102	Pathport Uno, Single DMX output node with cover
6151	Pathport Uno, Single DMX input with Portable Enclosure and bracket
6152	Pathport Uno, Single DMX output with Portable Enclosure and bracket
6201	Pathport C-series node with 2 DMX inputs (XLR5M)
6202	Pathport C-series node with 2 DMX outputs (XLR5F)
6203	Pathport C-series node with 1 DMX input and 1 DMX output (XLR5M/F)
6225	Pathport D-series node with 2 DMX ports (terminals) and backbox
6235	Pathport R-series node with 2 DMX ports (terminal strips)
6241	Pathport R-series node with 2 DMX inputs (XLR5M)
6242	Pathport R-series node with 2 DMX outputs (XLR5F)
6243	Pathport R-series node with 1 DMX input and 1 DMX output (XLR5M/F)
6301	Pathway DMX Manager Plus 4-port node (XLR5)
6302	Pathway DMX Manager Plus 4-port node (terminal strips)
6901	C-series Surface Mount Enclosure
6911	C-series Portable Enclosure with hanging bracket
6913	R-series Truss mount kit
6931	R-series front connectors adaptor kit – inputs (XLR5M)
6932	R-series front connectors adaptor kit – outputs (XLR5F)
6933	R-series front connectors adaptor kit – input/output (XLR5M/F)
6950	RJ45 female in-line mini-jack and M-M RJ45 jumper kit