

ZerOS – Networking guide

An introduction to the use of Zero 88
consoles on an Ethernet lighting network



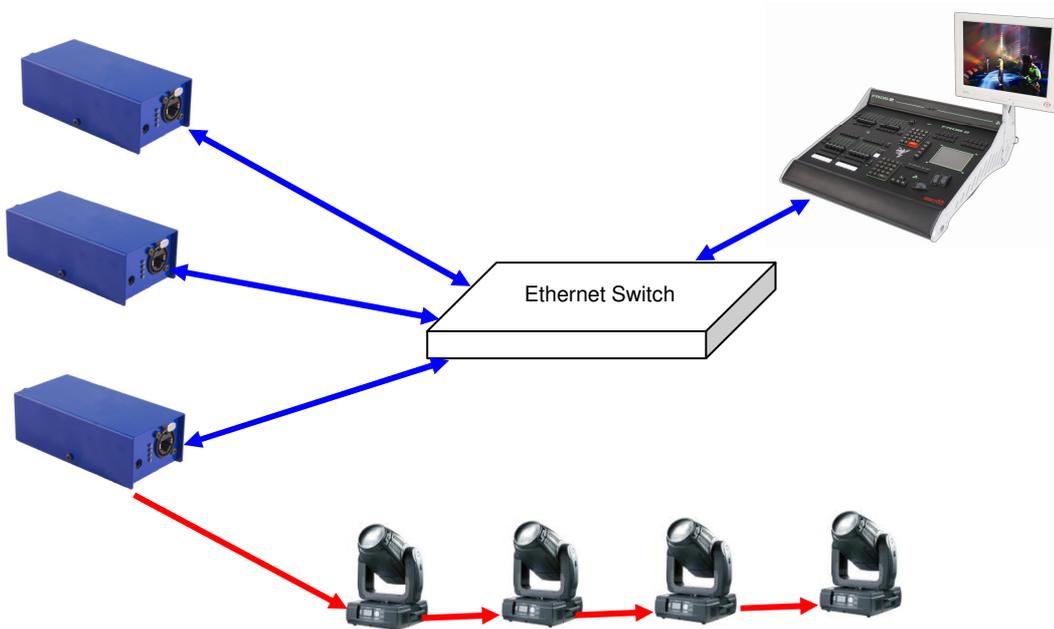
Usk House, Llantarnam Park
Cwmbran
NP44 3HD
United Kingdom

Tel: +44 (0) 1633 838088
Fax: +44 (0) 1633 867880
Web: <http://www.zero88.com>
Email: support@Zero88.com

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1. Ethernet Basics

Unlike DMX, Ethernet operates in a different topology. DMX is daisy chained from fixture to fixture, whereas Ethernet data is connected using a Star topology.



a. IP Addresses

IP Addresses are a devices identity on an Ethernet network. The address indicates where the device is located and in combination with the Subnet Mask, indicates what the desk can see, and vica versa. The number is made up from 4 blocks of data, between 0 and 255 – eg 192.168.0.1

b. Subnet Masks

The Subnet Mask indicates what a network device can see on the network – the standard subnet mask for an Ethernet network is 255.255.255.0, indicating that a device with an IP address of 192.168.0.1 can see any device whose IP starts with 192.168.0.x, but cannot see anything starting 192.168.1.x

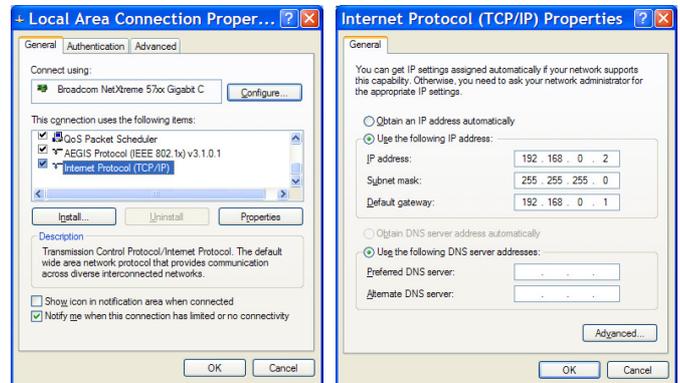
c. Changing an IP Address

On Windows XP, to configure the IP address of a PC, first select Start, Connect To, Show All Connections...

Find the connection for the Network Adaptor you want to use (usually “Local Area Connection”) and right click on it, selecting “Properties”.

Select the “Internet Protocol (TCP/IP)” and press Properties

Enter the required IP address settings in the popup window and select OK.



d. Switch vs Crossover

There are two ways of making an Ethernet connection with a ZerOS console

- i. Via a standard Ethernet Switch – the desk is connected to one connector on the switch, and other devices are connected to another port
- ii. Via a crossover cable – the desk and connected device are connected together directly via a crossed network cable. This system is ideal for visualisation PCs as it negates the need for an additional box in the middle, however this system has its drawbacks – it is not possible to use DHCP configuration, and it is not possible to connect more than one device in this manor.

e. DHCP

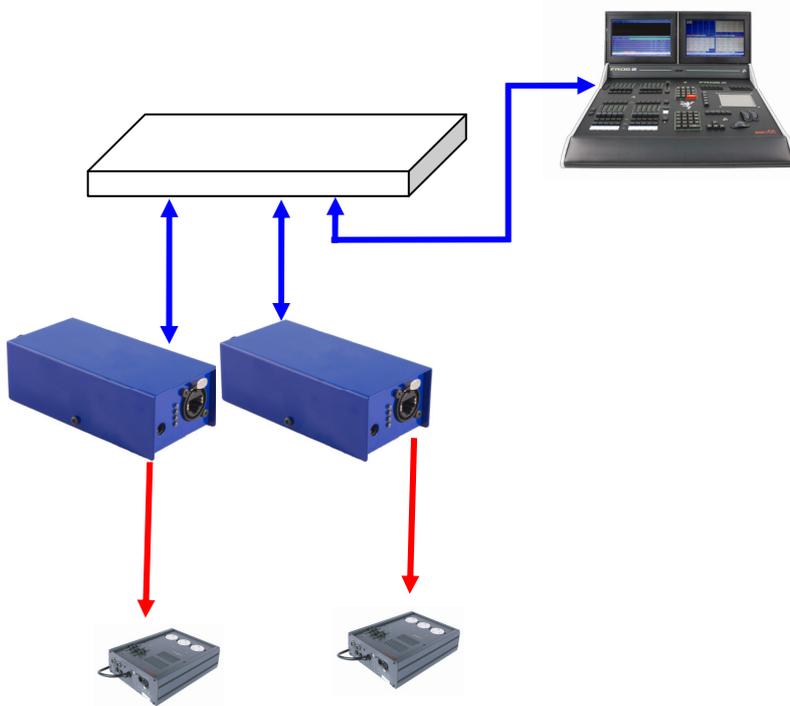
DHCP is a protocol used by Ethernet enabled devices to dynamically allocate an IP address to devices on the network. In order to use this system, a DHCP host must exist on the network. Some Ethernet Switches offer DHCP capabilities, as do Wireless Routers. It is important that you ensure that there is only ONE DHCP host on a network – multiple DHCP hosts can cause malfunctioning of the system.

2. Art-Net

Art-Net is a lighting protocol which sends DMX data over Ethernet. The standard allows for multiple DMX universes to be sent over a single Ethernet cable. The ZerOS consoles can output upto 4 universes of DMX data via Art-Net.

Each Art-Net device needs an IP address starting with a 2.x.x.x or a 10.x.x.x, and this setting must match on the desk itself. Each DMX universe must then be allocated to a Port – Art-Net Ports numerate from 0-15, so it is generally accepted that desk universe 1 will become Art-Net universe 0, however this is user definable.

Art-Net enabled devices include Media Servers, Moving Lights and also dedicated DMX output boxes such as the “1 Universe Ethernet Box” by Cooper Controls. The system will look something like this:

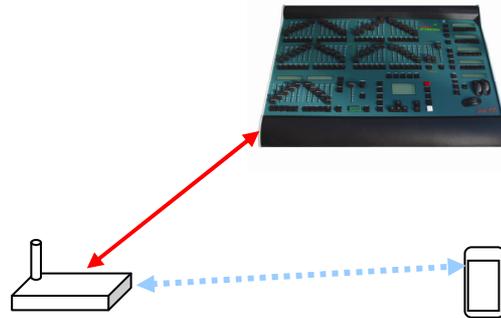


3. Remote

ZerOS Remote offers the ability to remotely control various areas of the desk. The remote uses a standard Windows Mobile or Windows PocketPC application to enable remote control of the console via a wireless network.

The ideal setup for this system is as follows:

The console is connected to a Wireless Router via an Ethernet connection. The Wireless Router is then configured to enable wireless communication via a standard 802.11b connection, and the Palmtop Computer (PDA) connects to this wirelessly. As long as the console IP address and the PDA IP address are able to see each other, the system should automatically setup and configure.



With a PC connected to the network with the desk and the PDA, load up an internet browser and type in <http://192.168.0.1/> (or the configuration IP address of the router, if different) into the address bar and hit GO.

At this point you will be prompted for a user name and password, which will be detailed in the user manual for the router.

Once connected to the router, look for settings which relate to the wireless connection and to DHCP. Ensure that DHCP is enabled and that the wireless is active. Setup a name for the wireless network which you'll recognise (we use "Zero 88") and choose a wireless channel. If required, security can be added. Once settings have been changed, click the Save Option and then the Reboot Router option to ensure that the settings are stored.

Ensure that the PDA has activated the wireless connection (this is normally done through some sort of connection manager). The first time you enable wireless in an area, the PDA will search for all available wireless networks and will ask you if you want to connect to any it finds. At this stage, you should see the Zero 88 network listed. Select it and choose connect (if you added security, you'll need to enter these details here).

Once the PDA is connected and the desk is connected, on the desk go to Setup / Network / Remote. Choose Enabled Remote - Yes, and Use DHCP Address - Yes. Again, enable security if you like (this security is simply a password the remote will prompt you for before connecting).

At the bottom of the remote setup screen, a message should appear - "Remote Active". If "Remote Not Active - No DHCP Address" is displayed, ensure that DHCP is enabled on the router and reboot the desk.

Assuming "Remote Active" is displayed and the PDA connected to the wireless network, you should be able to start the ZerOS Remote program on the PDA and the desk should be detected. Press on the Desk name and click the connect button.

4. Visualisers

- a. Light Converse (<http://www.lightconverse.net>)



The Light Converse visualiser uses Art-Net to communicate with the desk software, hence the presence of the visualisation configuration settings in the Art-Net tab of Network Setup. The rules of Art-Net (above) apply when configuring a Light Converse setup.

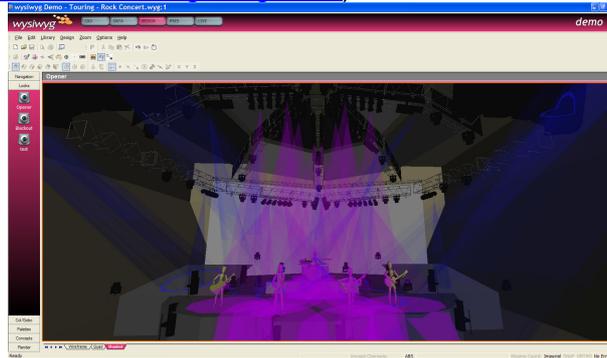
Light Converse integration requires a Zero 88 Light Converse USB dongle, available from Zero 88. Once active, the system allows bidirectional control of fixtures, selection and patching via the Ethernet connection.

- b. Capture (CITP) (<http://www.capturesweden.com>)



Capture 2005 visualising software communicates with the desk via a protocol known as CITP. This protocol allows for any standard PC network between the desk and the visualising PC. The console allows you to configure either a fixed IP address or one allocated via DHCP. As long as the two devices can see each other, the system should function correctly.

c. WYSIWYG (<http://www.castlighting.com>)

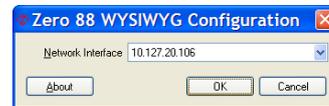


i. **WYSIWYG Requirements**

- A current (Release 21 or greater) installation of WYSIWYG Perform
- The Zero 88 consoles file (provided on the Cast website)
- The Zero 88 WYSIWYG Driver (provided on the Zero 88 website, or on the CD with the desk)
- An Ethernet connection to your Zero 88 console

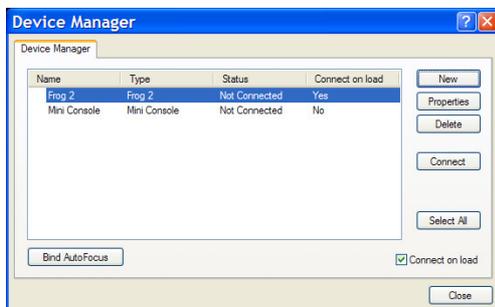
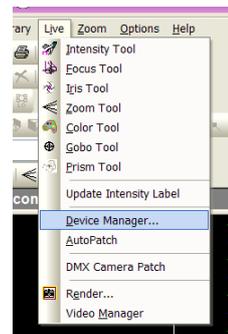
ii. **WYSIWYG Installation**

- First install WYSIWYG Release 22, following the standard procedure (if you're using Release 21, you'll need the Zero 88 Consoles CFB file)
- Run the Zero 88 WYSIWYG Driver installation tool
- Once the driver is installed, run the tool
- Select the network interface you wish to connect WYSIWYG with (the IP address is shown)
- Choose OK



iii. **WYSIWYG Usage**

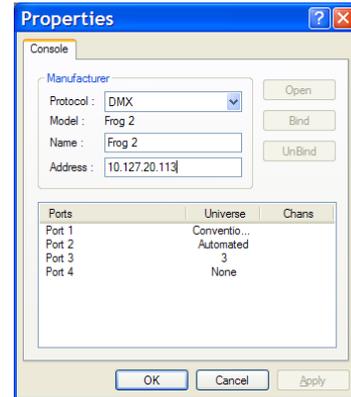
- Start WYSIWYG & load your show file
- Patch your fixtures to Universes in WYSIWYG
- In the LIVE tab, select LIVE, Device Manager
- In Device Manager, select New and locate the Zero 88 console you are connecting to



- Select the console and click Properties, then enter the IP address of the desk in the Address. Select each Port on the desk and Bind these to a Universe on WYSIWYG.

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- In the Device Manager, click CONNECT and the console should connect. You can now use WYSIWYG to visualise your show.
- When you have finished using it, click DISCONNECT in the Device Manager.



5. Glossary

802.11b: The wireless standard which most Wireless Enabled devices can communicate with. 802.11b uses the 2.4GHz radio spectrum.

Art-Net™: Artistic License network protocol. This is the Artistic License DMX over Ethernet protocol.

Dimmer: One discretely controlled device or parameter of a device out of 512 possible in the DMX512 protocol. Sometimes also referred to as “Address”, “DMX Channel” or “Output Channel”

DMX: Digital MultiPlex. The protocol most lighting equipment responds to.

DHCP: Dynamic Host Configuration Protocol. Generally DMX over Ethernet systems should not use DHCP, but should be manually configured.

Ethercon: An RJ45 ethernet connector fitted into an XLR housing

Ethernet: Many modern lighting consoles use Ethernet as a medium for transmitting DMX lighting control data using protocols such as Art-Net. This allows lighting data to be carried over existing wiring infrastructure.

IP: Internet Protocol.

IP Address: The unique identifier for a device communicating on an IP Network

LAN: Local Area Network – a network between devices which are contained within an area

PDA: Personal Desktop Assistant – a palm sized pocket computer, capable of connecting to a ZerOS console via a wireless system.

RJ45: Registered Jack 45 – the connector used for Ethernet

Stream: A DMX512 over Ethernet Universe coming into or leaving the 1 Universe Ethernet Box

Subnet: A group of 16 consecutive DMX universes is referred to as a sub-net. Not to be confused with the subnet mask.

Switch: A device which takes the Ethernet data from multiple devices and sends it to other such devices.

Universe: 512 addresses or slots of control information as conveyed by DMX512 protocol. As a lighting system may have more than 512 discrete things to control, multiple universes may be required. When this is the case, the Universe number is expressed as a subnet (0-15) and universe number (0-15), giving 256 possible Universes on a network.

ZerOS: The operating system running on Zero 88s top range consoles.

6. *Further Reading*

Rock Solid Ethernet, by Wayne Howell offers a more in depth look at Ethernet systems for the entertainment industry.

