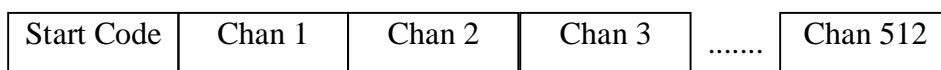


DMX, Ethernet and ArtNet

DMX

DMX data is transmitted in a serial form. This means that there is one cable carrying the data, which is sent bit by bit (a bit is a 1 or 0), one after another. The entire transmission of DMX data for a DMX universe is known as a DMX Packet.

The DMX Packet consists of a start code and 512 channel levels.



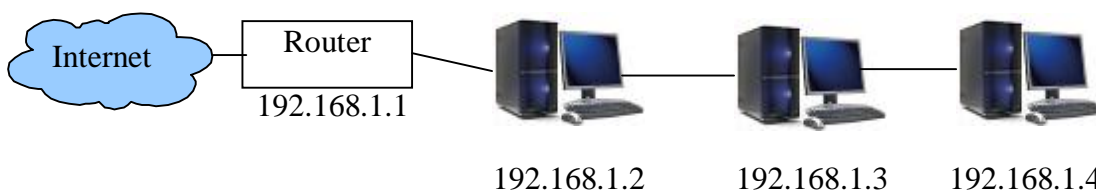
The start code for DMX is generally 0. The channel section contains the level for that channel.

Ethernet

Ethernet is the technology used to connect computers on a network. Most computers use a protocol called TCP/IP (Transmission Control Protocol Over Internet Protocol) to communicate over an Ethernet network.

Ethernet transmits the IP address (address of a computer on the network) of the sending computer, followed by the IP address of the receiving computer, followed by the data. The IP addresses allow the data to be routed to the correct computer.

On a typical office network, computers will have an IP address of 192.168.1.x, where x is between 0 and 254 (255 is a reserved address). These IP addresses are generally assigned dynamically by the Router on the network using a protocol called DHCP.



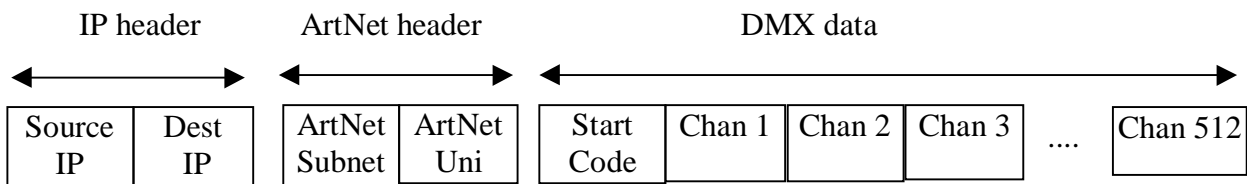
The computers use a subnet mask of 255.255.255.0. This specifies which range of IP addresses are on the local network. In the example above 255.255.255.0 specifies a range of from 192.168.1.0 to 192.168.1.255 which is a total of 256 addresses.

ArtNet

ArtNet is an open protocol developed by Artistic License to allow DMX data to be transmitted via Ethernet. ArtNet uses UDP/IP protocol to broadcast up to 256 universes of DMX data onto a network. Any ArtNet capable devices on the network can choose which of the 256 universes they decode.

ArtNet packets

ArtNet packets are made up of the Ethernet data (source and destination IP addresses), followed by the ArtNet subnet (0 to 15) and the ArtNet universe (0 to 15), and finally the DMX data for that universe).



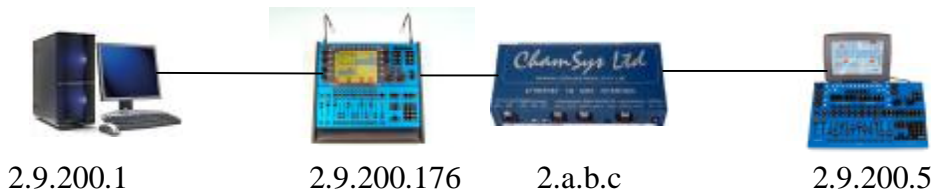
There are 16 possible ArtNet sub-net and 16 possible ArtNet universes for each ArtNet sub-net giving a potential of 16 multiplied by 16 or a total of 256 universes.

In practice the number of universes of ArtNet that can be used on a network depends on the available network bandwidth, the switching/routing equipment and the buffer capability of the attached ArtNet devices.

ArtNet networking

Unlike normal office networks, the IP address must be in the range 2.x.x.x, where x is between 0 and 255. The subnet mask must be set to 255.0.0.0. This means configuring the address of each piece of equipment on the network manually. MagicQ products are typically set to 2.9.200.x.

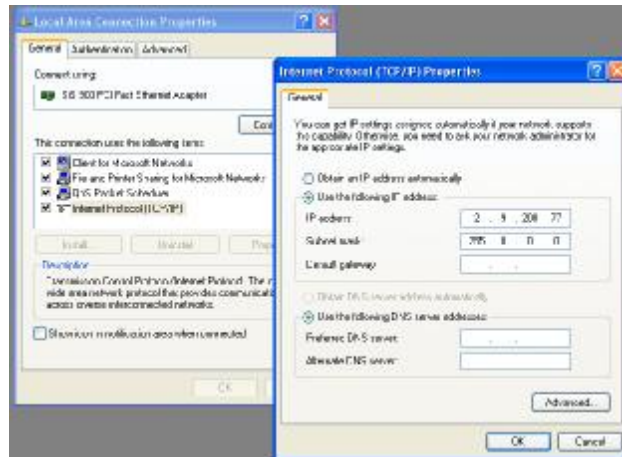
The IP addresses of most ArtNet to DMX interfaces are generated automatically using an algorithm based on the physical address of the Network Interface. This means they will have an IP address in the range 2.a.b.c where a, b and c are numbers between 0 and 255. It is not necessary to configure IP addresses for these devices.



Devices that convert from ArtNet to DMX (such as the ChamSys 3 Universe Ethernet Interface) generally choose an IP address automatically which avoids the user having to configure one. These interfaces use an algorithm in the ArtNet specification to automatically generate the IP address in the 2.x.x.x range based on their physical network (MAC address).

Setting the IP address on a PC

In Windows XP the IP address is configured in Control Panel, Networks and right clicking on Properties. Office networks typically have the “Obtain an IP address automatically” set.



Configuring the IP address on MagicQ

The IP address on MagicQ is set up in the Setup Window, View Settings. The sub net mask should be set to 255.0.0.0 for ArtNet systems. The picture below shows MagicQ set to IP address 2.0.0.77.

SETUP (show/SatJan191945452008.sbk) Not saved yet

Mode	Prog	Keypad Encoders	Windows	Cue Storage	Play Back	Network	Ports	MIDI Timecode	Multi Console	Hardware	All
Parameter		Setting									
IP address		2.0.0.77									
Sub net address		255.0.0.0									
Send to Applications on this PC		Yes									
Ethernet remote protocol		ChamSys Rem (rx)									
Web server enabled		No									
Web server port		8080									
Multi Windows		No External Windows									

Enabling ArtNet outputs on MagicQ

To enable output of channel data select the DMX IO VIEW in the Setup Window. This window enables modification of the inputs and outputs for the 18 universes.

SETUP (show/capture.sbk)

Uni	Status	Out Type	Out Uni	In Type	In Uni	Visualiser	Hot takeover	Test	Copy	Out Sub	In Sub
1	Enabled	ArtNet	Art 0	ArtNet	Art 0	None	No	No	No	0	0
2	Enabled	ArtNet	Art 1	ArtNet	Art 1	None	No	No	No	0	0
3	Enabled	ArtNet	Art 2	ArtNet	Art 2	None	No	No	No	0	0
4	Enabled	ArtNet	Art 3	ArtNet	Art 3	None	No	No	No	0	0
5	Enabled	ArtNet	Art 4	ArtNet	Art 4	None	No	No	No	0	0
6	Enabled	ArtNet	Art 5	ArtNet	Art 5	None	No	No	No	0	0
7	Enabled	ArtNet	Art 6	ArtNet	Art 6	None	No	No	No	0	0
8	Enabled	ArtNet	Art 7	ArtNet	Art 7	None	No	No	No	0	0
9	Enabled	ArtNet	Art 8	ArtNet	Art 8	None	No	No	No	0	0
10	Enabled	ArtNet	Art 9	ArtNet	Art 9	None	No	No	No	0	0
11	Enabled	ArtNet	Art 10	ArtNet	Art 10	None	No	No	No	0	0
12	Enabled	ArtNet	Art 11	ArtNet	Art 11	None	No	No	No	0	0
13	Enabled	ArtNet	Art 12	ArtNet	Art 12	None	No	No	No	0	0
14	Enabled	ArtNet	Art 13	ArtNet	Art 13	None	No	No	No	0	0
15	Enabled	ArtNet	Art 14	ArtNet	Art 14	None	No	No	No	0	0
16	Enabled	ArtNet	Art 15	ArtNet	Art 15	None	No	No	No	0	0
17	Enabled	ArtNet	Art 0	ArtNet	Art 0	None	No	No	No	1	1
18	Enabled	ArtNet	Art 1	ArtNet	Art 1	None	No	No	No	1	1

When using Ethernet to DMX512 conversion boxes then you will need to configure the boxes to respond to the correct ArtNet sub-net and ArtNet universe into the Out Uni and the Out Sub fields. Note that you may need to page right to get to the Out Sub field.

DMX, Ethernet and ArtNet

In most networks the ArtNet sub-net is set to 0. However if you plan to use more than 16 universes (more than 12 with ChamSys 3 Universe Ethernet boxes) then you will need to use more than one ArtNet sub-net.

You should only set one Universe to output on a particular ArtNet sub-net and ArtNet universe. If you enable more than one MagicQ universe to output Artnet on the same ArtNet sub-net and ArtNet universe then you will get flickering between the data from the two MagicQ universes.

Using a single Ethernet Interface connected to MagicQ

When connecting directly from a MagicQ console or a PC running MagicQ PC to an Ethernet Interface without a network or router you will need an “inverted” network cable. This is not necessary when using the network outputs on a MagicQ Pro console as they are auto switching.



With ChamSys 3 Universe Ethernet to DMX boxes you need to set up the two rotary switches to the correct values – the left one for ArtNet sub-net and the right one for ArtNet universe. The interface will then decode the three ArtNet universes starting from that ArtNet subnet and universe. Note that the rotary switches go from 0 to 9 so it is only possible to select ArtNet subnets 0 to 9 and ArtNet universes 0 to 9.

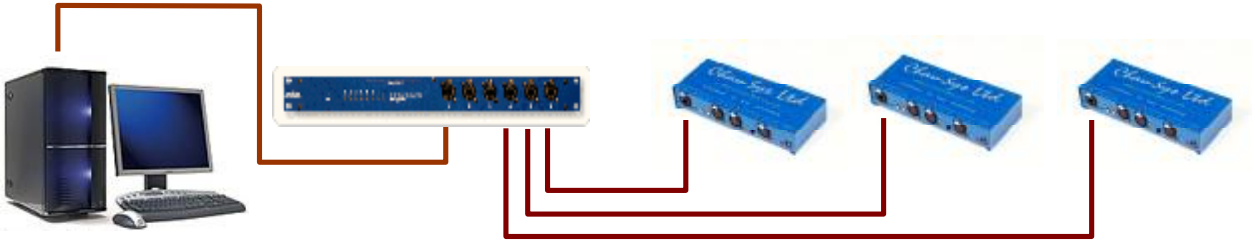


Using multiple Ethernet Interfaces

To connect multiple Ethernet to DMX converters to a MagicQ console or MagicQ PC use a network hub or network router using standard network cables.

When using multiple Ethernet Interfaces then you will need to set each Ethernet Interface to a different Art-Net Universe – for example when using two ChamSys 3 Universe Ethernet Interfaces set the first Interface to ArtNet Universe 0 and the second one to ArtNet Universe 3.

DMX, Ethernet and ArtNet



If you are using more than 6 universes of ArtNet with Art-Net to DMX interfaces then it is recommended that you enable DMX mixed mode in Setup, View Settings, Hardware, Reduced Rate DMX. Many designs of ArtNet to DMX interface including the ChamSys 3 Universe Ethernet Interface can get flooded when connected to a network with many ArtNet Universes. Mixed mode alternates the order that ArtNet data is sent on the network thus ensuring that the interfaces can receive the required data.

SETUP (show/capture.sbk)

Mode	Prog	Keypad Encoders	Windows	Cue Storage	Play Back	Network	Ports	MIDI Timecode	Multi Console	Hardware	All
Parameter	Setting										
Level above 0 to activate LTP	000										
Hysteresis on fader / encoder moves	000										
Encoder damping	Damped										
Touch screen	Enabled										
Encoders	Enabled										
Faulty faders mask	00000000										
Power fail detection	Enabled										
Screen save	Enabled										
Reduced rate output	Mixed universes										
Reserved (was mount path)											
Reserved (was index path)											
Standard logging	Yes										
Extended logging	No										