Things You Should Know

...about **DMX, Art-Net, Streaming ACN,** and **RDM**!

DID YOU *KNOW?!*

XLR stands for "Cannon **X** Connector, with **L**atch and **R**ubber Guard"

Art-Net and **Streaming ACN**...
is just DMX over Ethernet!
DMX logic **still** applies, Universes are **still** 512 bytes each.

Each "byte" of the **512 available control slots in a universe** can have a value from **0** to **255** or (256 potential values)

A Very Brief Background of DMX

USITT developed the DMX512 protocol back in 1986, made significant edits in 1990.

ESTA worked DMX512 into an ANSI standard in 2004.

Art-Net 1 was created by Artistic License Holdings, Ltd in 1998 (40 Univ), **Art-Net 2** in 2004 (256 Univ), and **Art-Net 3** in 2011 (32,768 Univ).

ACN (ANSI E1.17-2010) or *Architecture for Control Networks*, is a protocol for unidirectional lighting communication. This standard is managed by **ESTA**. The DMX version, **Streaming ACN** (ANSI 1.31), allows DMX to be sent over UDP/IP networks by wrapping a DMX frame in an ACN header. Streaming ACN supports **63999** potential universes!

When addressing Art-Net devices with an IP address, always use a **2.X.Y.Z** or a **10.X.Y.Z** IP address. This is how Art-Net is most happy! For example, **2.0.0.1** is a great place to start with your lighting console!

Art-Net uses **2.X.Y.Z** as its primary IP address scheme, and **10.X.Y.Z** addresses as a secondary.

In Art-Net, there are 32,768 possible places to send a DMX frame, called a Port-Address - a 15-digit number made up of the **Net** + **Sub-Net** + **Universe**.

There are 128 total **Nets**:
128 Nets * **256 Sub-Nets** = **32,768** potential places

Net: **256** consecutive Universes (or 16 Sub-Nets)
Sub-Net: **16** consecutive Universes (8,192 channels)
Universe: **512** consecutive channels

RDM, or *Remote Device Management*, sits on top of DMX data, and allows for 2-way communication of devices and controllers. RDM allows controllers to send **GET** and **SET** messages to devices it sees, like:

|		
Get|Set	**DEVICE_LABEL**	*(gets/sets the device's name)*
Get|Set	**DMX_START_ADDRESS**	*(gets/sets DMX address)*
Get|Set	**DMX_PERSONALITY**	*(gets/sets personality)*
Get	**LAMP_HOURS**	*(asks for lamp hours)*

NOTE: All devices have unique RDM IDs

Plug XLR-5   Receptacle XLR-5
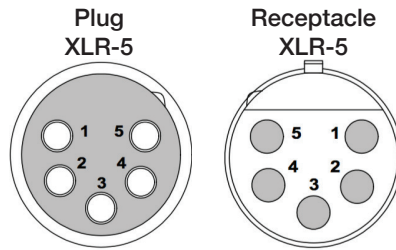
XLR5 Pinout for DMX512-A

PIN	WIRE	SIGNAL
1	Shield Drain	Ground, 0V
2	Inner Conductor (Black)	Data 1 -
3	Inner Conductor (White)	Data 1 +
4	Inner Conductor (Green)	Data 2 - (Spare)
5	Inner Conductor (Red)	Data 2 + (Spare)

Colors of internal conductors may vary by manufacturer

RJ-45 Connector
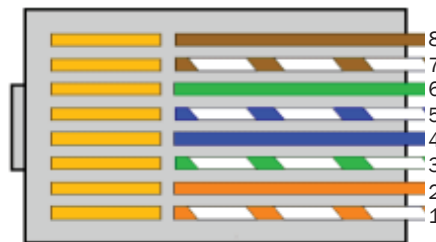
Viewed from gold contct side

RJ45 Pinout for DMX512-A

PIN	WIRE	SIGNAL
8	Brown	0V Data 2 Common*
7	Brown/White	0V Data 1 Common*
4	Blue	Not Used, PoE, *typ.*
5	Blue/White	Not Used, PoE, *typ.*
6	Green	DMX 2 Data -
3	Green/White	DMX 2 Data +
2	Orange	DMX 1 Data -
1	Orange/White	DMX 1 Data +

Pin numbering and color in accordance with ANSI/TIA/EIA-568 scheme T568B - Double check with your manufacturer.
*Pins 7 & 8 are often connected together; especially when adapting to the 5 pin XLR

Need a **DMX Terminator**?
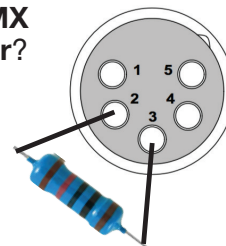
Solder a 0.5W or larger **120Ω resistor** across **pins 2 & 3** in a plug XLR5!
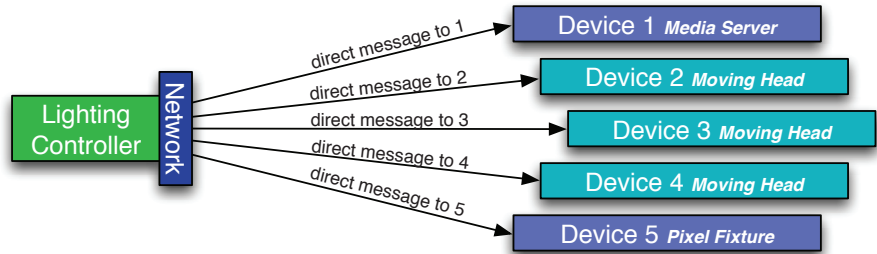
---

64 DMX Universe Quick Reference

UNIVERSE	START #	END #
1	1	512
2	513	1024
3	1025	1536
4	1537	2048
5	2049	2560
6	2561	3072
7	3073	3584
8	3585	4096
9	4097	4608
10	4609	5120
11	5121	5632
12	5633	6144
13	6145	6656
14	6657	7168
15	7169	7680
16	7681	8192
17	8193	8704
18	8705	9216
19	9217	9278
20	9279	10240
21	10241	10752
22	10753	11264
23	11265	11776
24	11777	12288
25	12289	12800
26	12801	13312
27	13313	13824
28	13825	14336
29	14337	14848
30	14849	15360
31	15361	15872
32	15873	16384
33	16385	16896
34	16897	17408
35	17409	17920
36	17921	18432
37	18433	18944
38	18945	19456
39	19457	19968
40	19969	20480
41	20481	20992
42	20993	21504
43	21505	22016
44	22017	22528
45	22529	23040
46	23041	23552
47	23553	24064
48	24065	24576
49	24577	25088
50	25089	25600
51	25601	26112
52	26113	26624
53	26625	27136
54	27137	27648
55	27649	28160
56	28161	28672
57	28673	29184
58	29185	29696
59	29697	30208
60	30209	30720
61	30721	31232
62	31233	31744
63	31745	32256
64	32257	32769

Unicast, Broadcast, and Multicast

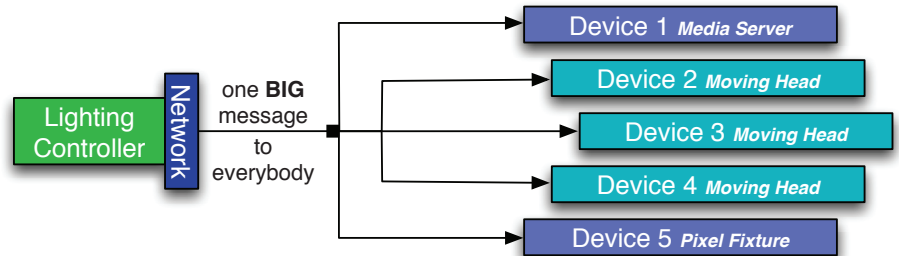*The **3 Ways** of Sending **DMX Over Ethernet***

UNICAST

Unicast messages are sent over the network from the controller to exactly one device, individually. Multiple devices require multiple messages.
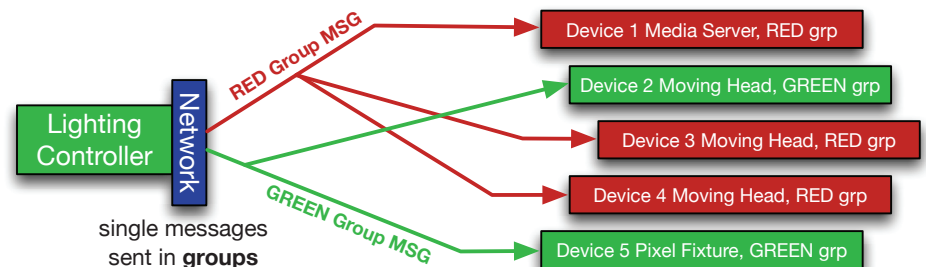
Lighting Controller — Network

direct message to 1 → Device 1 *Media Server*
direct message to 2 → Device 2 *Moving Head*
direct message to 3 → Device 3 *Moving Head*
direct message to 4 → Device 4 *Moving Head*
direct message to 5 → Device 5 *Pixel Fixture*

BROADCAST

Broadcast messages are sent over the network from the controller to all devices on the network. Every device processes the message, even if it's not for that device.

Lighting Controller — Network

one **BIG** message to everybody →

Device 1 *Media Server*
Device 2 *Moving Head*
Device 3 *Moving Head*
Device 4 *Moving Head*
Device 5 *Pixel Fixture*

MULTICAST

Multicast messages are like Broadcast messages in a way, except a single message is sent over the network from the controller to logical groups of devices on the network. Devices can be addressed to listen to these group messages.

Lighting Controller — Network

RED Group MSG
GREEN Group MSG

single messages sent in **groups**

Device 1 Media Server, RED grp
Device 2 Moving Head, GREEN grp
Device 3 Moving Head, RED grp
Device 4 Moving Head, RED grp
Device 5 Pixel Fixture, GREEN grp

DMX DO's & DON'Ts

to save *your* load-in day!

DO:

Always have **DMX terminators on hand**, and use them.
Any time you have multiple DMX lines, **use a repeater.**
Always optically isolate outdoor fixtures from console.
Always use approved **digital signal cable** for DMX!
Always use 5 Pin XLRs for DMX portable cable

DON'T:

Don't use a **DMX "two-fer" or Y-cable.** It can distort the signal.
Don't use **mic cable** for DMX. Wrong impedance & conductor.
Don't **solder DMX cables** together.
Don't go **over 1500'** when using DMX and proper cabling (suggested)
Don't talk DMX to **dangerous devices** like pyro, cryo, rigging.
Devices using 3 pin XLRs may work but are NOT COMPLIANT
Don't add more than 32 fixtures on a single DMX run out repeater!

BARBIZON
LIGHTING COMPANY

Systems, Products, and Services
for Entertainment and Architecture