

Lighting Networks 101.101.101.101

CITT – Edmonton 2009

Lighting Control Standards

Official ANSI documents that manufacturers are supposed to comply with.

E1.3 – Lighting Control Standards – 0 to 10V Analog Control

E1.11 – USITT DMX512-A (2008) (aka DMX that we all love to use today)

Previous incarnations of the standard are E1.11 2004 - DMX512A , USITT DMX512(1990) and USITT DMX512 (1986)

E1.17 – Architecture for Control Networks (aka ACN)

E1.20 – Remote Device Management over USITT DMX512-A (aka RDM)

E1.27.1 – Standard for Portable Control Cables for Use with E1.11 – DMX512-A

E1.31 – Lightweight streaming protocol for transport of DMX512 using ACN (aka streaming ACN)

Standards that are still being worked on:

BSR E1.27.2 – Standard for Permanently Installed Control Cables for DMX512-A

BSR E1.30 – Application level equipment interoperability for control of commonly encountered entertainment technology devices using E1.17

(Basically, writing a bunch of Device Description Language files in the hope manufacturers will use them, in the hope that all gear will function together properly as a result.)

BSR E1.33 – Extensions to E1.31 (aka RDM over streaming ACN)

BSR E1.37 – Additional Message sets for E1.20 RDM

Hopefully this group will determine how RDM can upgrade firmware, among other things

Some Exploded Acronyms (with a few definitions too)

Ethernet: IEEE 802.3 standard for data transport.

TCP: Transmission Control Protocol. Reliable

UDP: User Datagram Protocol. Unreliable.

MAC Address: Media Access Control Address

Number is unique to each device (in theory) used to resolve device IP addresses

IP: Internet Protocol (IPv4)

A 32-bit address number, usually shown to humans as “dotted decimal” ranging from 0.0.0 to 255.255.255.255. Assigned dynamically or statically, some are routable to the Internet, some are not.

Subnet Mask (aka Netmask, Mask): Network Host ID – but really just call it a subnet mask.

A method of extending IP addressing. It's complicated. Just make sure all the gear is using the same mask.

TFTP: Trivial File Transfer Protocol

A method of firmware upgrade, often used in conjunction with a Bootp server (Bootp is a precursor to the DHCP method of IP address assignment)

DHCP: Dynamic Host Configuration Protocol

Method of dynamically assigning IP addresses as devices come onto or drop off of the network

ARP: Address Resolution Protocol

A method of using MAC addresses to map IP addresses

VPN: Virtual Private Network

A (typically) secure method of logging onto a private network from the public Internet. Will allow you to run a show from home, except your boss will probably find out.

VLAN: Virtual Local Area Network

A method of partitioning a network to allow independent sub-networks to share the same infrastructure without (hopefully) seeing the traffic on the other sub-networks

PoE: Power over Ethernet (IEEE 802.3af standard)

A method of injecting 48VDC power onto Ethernet wiring to drive Ethernet devices. Originally developed for VOIP phones. PoE wiring connected to DMX transceivers will lead to buying new gear.

UTP: Unshielded Twisted Pair

A type of Category wire that isn't shielded and so has lower noise immunity. For entertainment purposes, use this wire only for permanent installation and only inside conduit runs

STP: Shielded Twisted Pair

Category wire with a shield (or drain or sheathe) that attempts to 'drain' away any induced current, and therefore provide the twisted pairs with noise immunity. Put it in a conduit anyway.

10Base-T, 100Base-T, Gigabit: Networks with transmission rates of 10Mbits/sec, 100 Mbits/sec and 1000Mbits/sec respectively. DMX512 operates at approximately 250 bits/sec, so when Gigabit is specified, you may want to ask why.

A Few Useful Programs, mostly free

Wireshark. www.wireshark.org

An ethernet packet sniffer. Extremely useful for network trouble shooting. Includes streaming ACN and ArtNet packet decoder plug-ins.

TFTPD32. www.tftpd32.jounin.net

An excellent bootp and DHCP server. Very useful for handing out IP addresses and updating gear able to receive files via TFTP. Poor documentation, though.

NCE: Network Configuration Editor.

ETC's network configuration software

DMX Workshop

Artistic Licence's Art-Net configuration software

Pathport Manager

Pathway Connectivity's Pathport configuration software (version 5 now available).

Guardian

Entertainment Technologies/Genlyte/Strand configuration software.

Inssider. www.metageek.net

A Wi-Fi sniffer.

WinSCP. www.winscp.net

An open source, secure FTP client.

PuTTY

An open source, secure terminal program.

A Few Useful Commands (run from command window)

Ping. If it ain't pingable, then you can't talk to it

IPConfig: In Windows, reports useful info about your IP connection

Netstat: Reports information about the network configuration and what ports are in use. Useful for determining what program is camped out on the Bootp socket, explaining why you can't get an IP address through to a requesting device. Use 'netstat - an' and look for programs tying up ports 67, 68, and 69, which are the bootp and TFTP ports.

A few DMX-over-Ethernet Protocols

Strand Shownet. Proprietary. Widely used.

ETC Net2. Proprietary. Widely used.

ETC Net3 (based on E1.31). Standard-based, so it should be inter-operable with other adopters

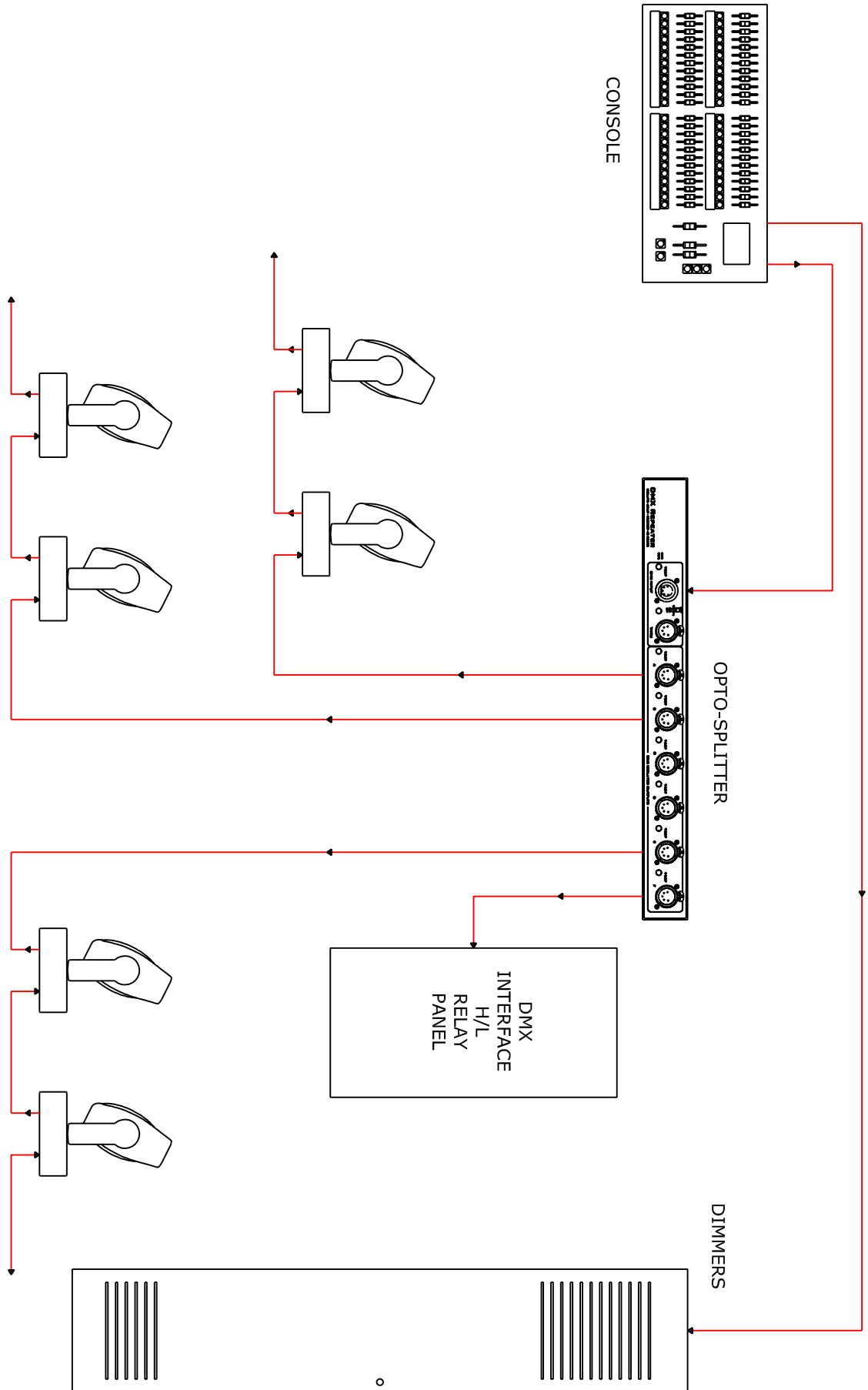
Art-Net. Artistic Licence's published protocol. Because it doesn't require licensing of any kind, widely adopted, particularly by media servers. However, some implementations don't fully work with others.

Pathport Protocol. Pathway Connectivity's protocol. Licensable. Less widely used

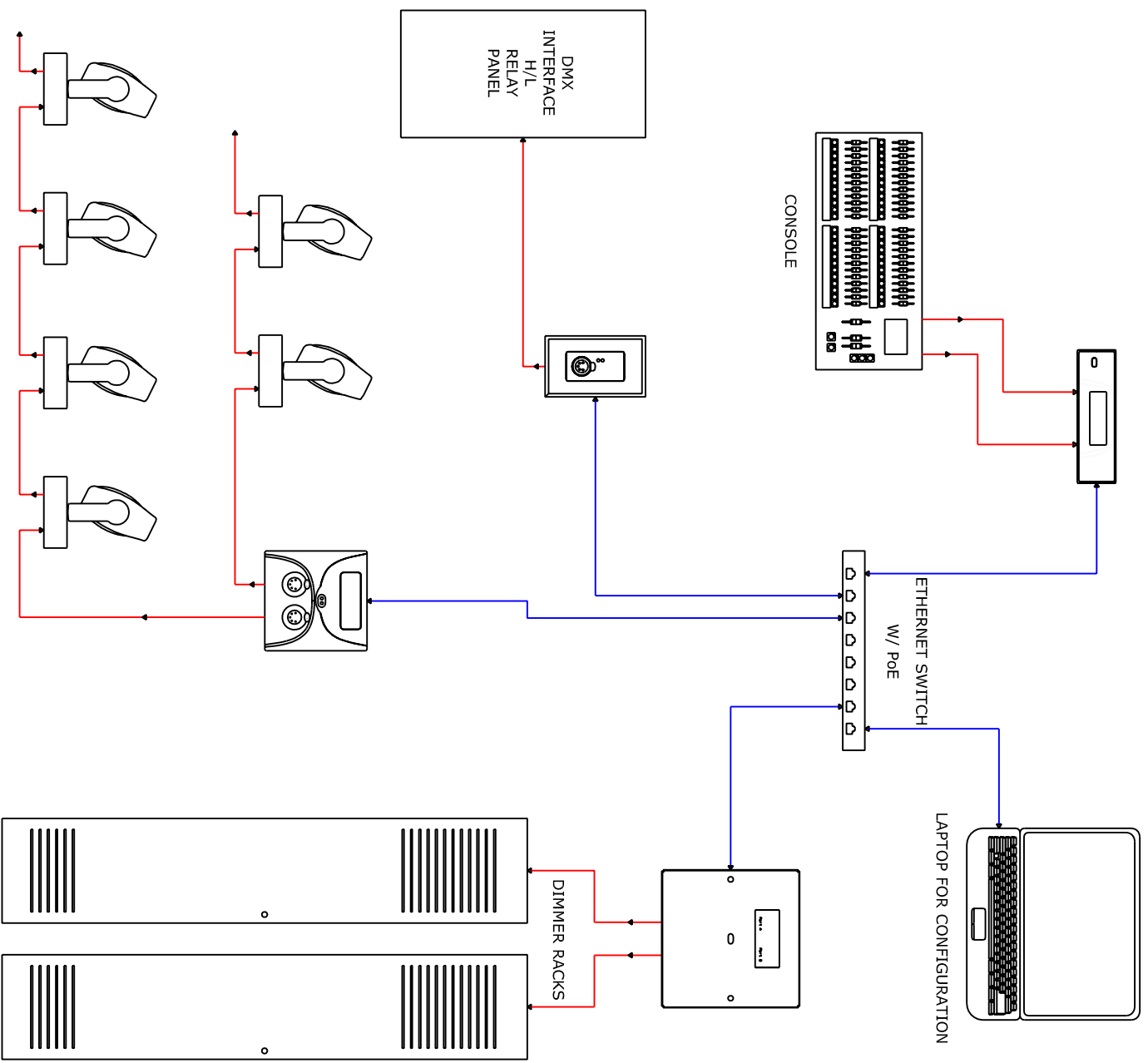
ColorNet: Leviton/Colortran proprietary protocol. Not widely used.

KiNet: Color Kinetics proprietary protocol. Not widely used.

E1.31. Streaming ACN. Open standard, this is where we will end up.



Typical DMX Network Riser



Simplified DMX-over-Ethernet Network Riser