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Author: David Timmins
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Vista Networking

Introduction

Setting up Ethernet networks is becoming more and more a part of the stage lighting field as Ethernet based lighting equipment grows in popularity. This tech note attempts to provide some guidance for users encountering Ethernet as they expand and develop their Jands lighting systems.

Note these guidelines are applicable for the recommended case of an isolated network that's not connected to the Internet (there is no Gateway) where Vista is the only controlling device. Particular requirements of systems including Wygaliser or other network intensive devices are not within the scope of this document, nor are networks that are shared with other non-lighting devices such as desktop computers, servers, printers, or a digital audio system.

General

Modern Ethernet networks use a 'Star' topology based around Ethernet 'Routers' or 'Switches', like that shown in Figure 1. If more ports are necessary the 'Extended Star' topology in Figure 2 is employed. Good quality name-brand unmanaged Ethernet switches generally provide more than adequate performance for most lighting systems, while their simplified no-configuration setup means they can be incorporated easily with little or no training.

If no DHCP server is available then all Ethernet devices must be manually configured as detailed in the "IP Addresses" section.

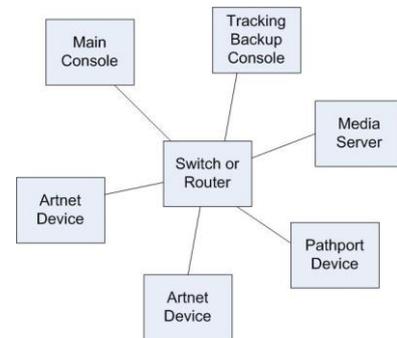
Ethernet routers can be used instead of switches if DHCP and/or WiFi is required, however over and above these features routers generally provide

no benefit over switches of the same quality. If routers are used, the Internet connection port on the router should **not** be used. Additionally some routers include an 'AP Isolation' facility to isolate the LAN outputs from each other – if available this feature must be disabled.

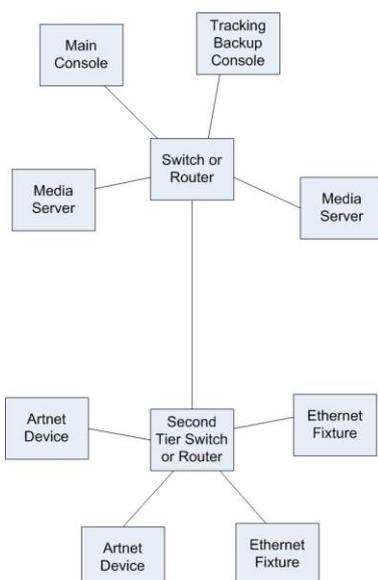
Only one DHCP server should ever be active in a system.

Connections

Ideally all switches will be 100Mbit or preferably Gigabit Ethernet, however if there are differences in performance between switches then the highest performance switch should be used for the main star point. Connect the main console and tracking backup directly to this switch. If an extended star network is planned, i.e. with 2 or more tiers, place the second level switches at a point physically close to the centre of the devices that will connect to it, and connect it directly to the switch at the main star point. Limit the network to 3 tiers.



Figures 1 and 2: Star (above) and Extended Two-Tier Star Topology (left)





There should be only ever single connections between Ethernet devices unless the literature for a device clearly states multiple connections are allowed. Equipment of this type is rare, however, and in general networks should never contain loops.

IP Addresses

All network devices must have an IP address, and that address must be unique within the network. The actual assigned IP Address has no bearing on performance, nor changes the stature of that device in any way, so long as it is valid and unique in the network. IP addresses can be assigned to each device manually or automatically from DHCP server – use of a DHCP server will ensure all addresses are unique and eliminate the need to keep records.

Where IPs are set manually, it's recommended that they be setup within one of the following ranges:

- 192.168.x.y
- 10.x.x.y or 2.x.x.y

Use a value for x between 0 and 255; it must be the *same* for all devices.

Use a value for y between 1 and 254; it must be *different* for all devices.

Note that if non-broadcast Artnet is used the IP addresses must be in the range 2.x.x.y or 10.x.x.y.

Set a Default Gateway field on a device to that devices' IP address.

As an example the IP addresses in a network could be set as follows:

Device	Main IP	Subnet Mask	Default Gateway
Main console	192.168.10.1	255.255.255.0	192.168.10.1
Tracking Backup	192.168.10.2	255.255.255.0	192.168.10.2
Artnet box	192.168.10.10	255.255.255.0	192.168.10.10
Vista D1	192.168.10.11	255.255.255.0	192.168.10.11
Pathport Device	192.168.10.15	255.255.255.0	192.168.10.15
Media Server	192.168.10.20	255.255.255.0	192.168.10.20

In the above network the Artnet devices must be used in Broadcast mode. If non-broadcast Artnet is needed use the following settings:

Device	Main IP	Subnet Mask	Default Gateway
Main console	10.0.0.1	255.0.0.0	10.0.0.1
Tracking Backup	10.0.0.2	255.0.0.0	10.0.0.2
Artnet box	10.0.0.10	255.0.0.0	10.0.0.10
Vista D1	10.0.0.11	255.0.0.0	10.0.0.11
Pathport Device	10.0.0.15	255.0.0.0	10.0.0.15
Media Server	10.0.0.20	255.0.0.0	10.0.0.20

Note the Subnet masks are intentionally different in the above tables. Use the correct Subnet Mask for the IP range used.



WiFi

WiFi can provide a handy ability to control the lighting from the stage during the focus, however it can also provide easy access for a hacker to take control. It's recommended that as an absolute minimum:

- Turn on WPA/WEP encryption.
- The SSID be set to something non-specific, for example 'abc123', so that the purpose of the wireless access point isn't obvious.
- Disable SSID broadcast. The name of the network will have to be typed into the WiFi receiver in order to see the wireless access point.
- Change the default password.

Additionally, where higher security is required:

- Enable MAC address filtering so that only a very limited number of devices can access the network.
- Disable DHCP and assign a static IP to the WiFi device.
- Place the WiFi access point near the place it will be needed so that its inherent range limits will prevent access from other areas.
- Turn off the WiFi access point when it's not needed.