Networking URE Book 2
The Control System

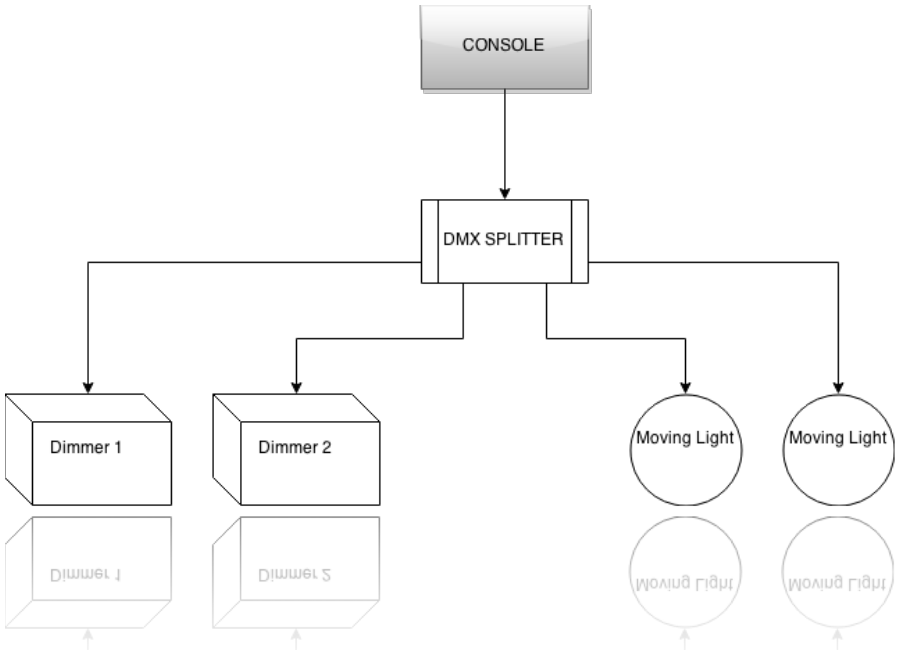
Introduction

A network allows us to have many devices which can talk together and communicate. Now we can look at this in the scope of a show, and see how it can allow us to be far more flexible in how we control lights, media servers and a whole load of other things.

The Concept of a "Control System"

When we think about networks, and their use on show it is better to think of our lighting console not as a single device, but more one part of a more complex system. In a system where we only have a single lighting desk and no network, the system is very simple. The Console is at the top of the chain, and using DMX we control all the devices below us. The communication is in one direction and all the control is provided from the console and every single device must through some connection of cables or splitters trace back to the console.

A system diagram of this kind of system would look something like this:



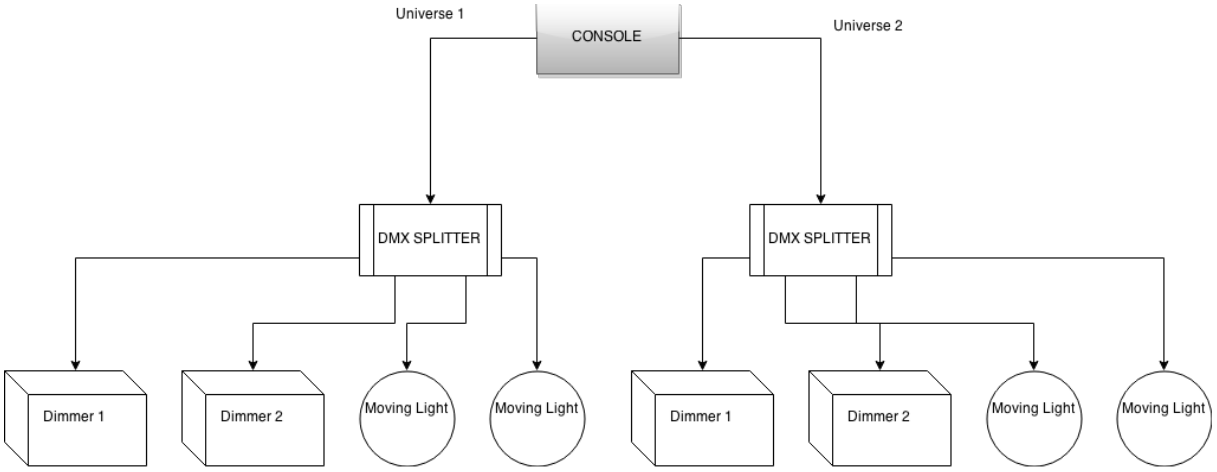
As we can see, we can represent our system in a graphical form, which makes it easy to understand where data is flowing and how everything is controlled.

Control Systems involving Networks

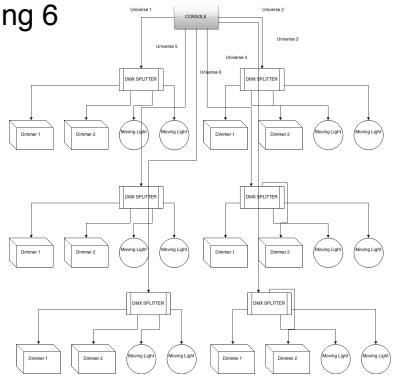
So now you have control system, we can start to look at ways we can use networking to make our system more efficient, more flexible and crucially more reliable.

Improving Efficiency

Most lighting rigs nowadays easily use up more than 1 DMX universe requiring multiple universes of control to deal with the amount of fixtures in the Rig. If we use a traditional control system architecture like above for a rig with 2 universes, it's not so bad:



However, if we were to draw a diagram like this for a system using 6 universes……:



Quickly, we start to have a lot of DMX cable coming out of our console and having to be ran to the stage. In a small studio theatre, this might not be too much of an issue, but if we are in a large touring house where we have to do 100m FOH looms, most people would rather not have to run 6, 10, 15, 20 bits of DMX.

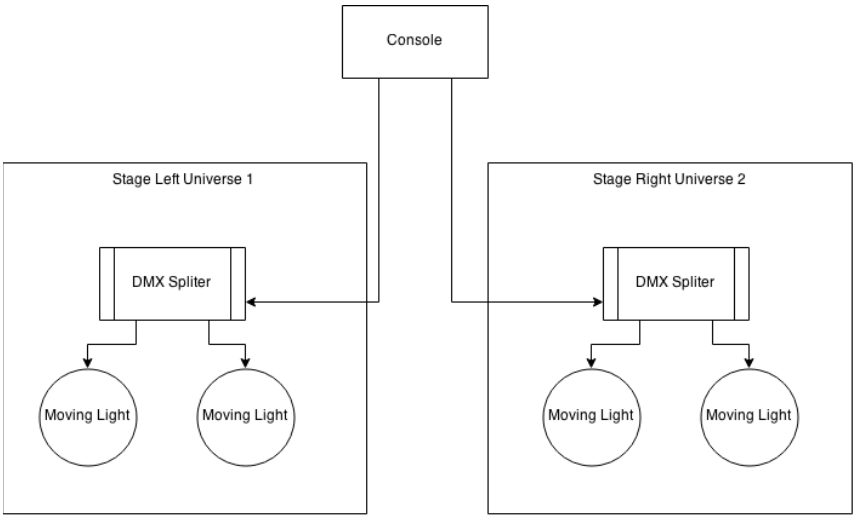
But what we could do to save cable, is output our DMX over a network protocol (covered more later) which for now will be ArtNet, run one cable from our desk to the stage and use an ArtNet to DMX Box, which could look like this:

This is advantageous as ArtNet can carry 64 universes of DMX over one network cable. So now we only need one cable out of our console. Suddenly our FOH Cable Runs become a lot nicer and we don't need as many DMX cable hires! Both easier and money saving.

Improving Flexibility

So having talked about how some of our network protocols can output multiple universes of DMX down a single cable, we can start to see how this gives us flexibility in our system.

Let's look at a more traditional system again.



This system is fine and will work perfectly well as long as nothing dramatic changes on our stage. However, what if we wish to add another moving light next to the ones on the right of our diagram. However, our Universe 2 is full up of fixtures. At this point we would have to look at running in another line of cable.

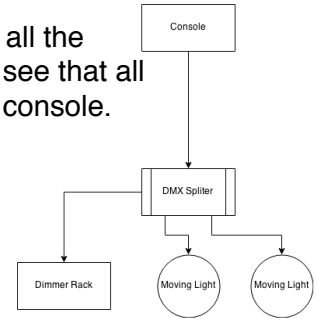
However, if our system was networked we would have many options open to us. Let's look at an ArtNet to DMX Unit again:

This unit has 9 ports, 8 outputs and 1 input. However these ports are entirely configurable to output whatever universe you like. So we could have ports 1 > 4 output universe 1 and 5 > 8 output universe 2, or any combination we like.

So in our situation above, if we used ArtNet to DMX Units instead of DMX Splitters, we could just switch on of our ports to universe 3. Easy.

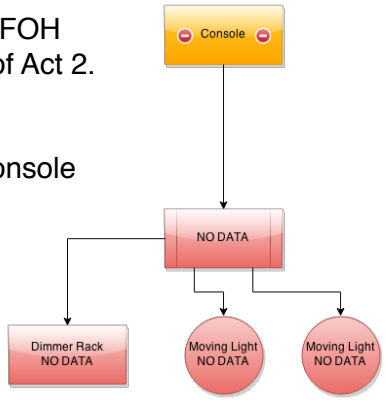
Improving Reliability

In a very basic system, the single console in the system is responsible for all the control data. Looking again at a simple system with one universe, we can see that all our control comes down one cable, and all our processing is done by one console.



This system is great and will work perfectly controlling our lights and our dimmers until the end of our run.

But one day, some very helpful audience member comes up to our FOH position and pours their interval pint into our console in the middle of Act 2. Our console is now sadly dead, and our system is in chaos.



Because all the processing in the system was done by the single console we have now lost every single light in our rig.

A solution to this would be to have a backup desk at FOH, but swapping over the DMX cables would take time and cause issues on stage.

With a networked backup system, we can have our backup console take over immediately Because it is using a network protocol, both consoles can be connected at the same time, meaning our backup can take over instantly should our primary crash.

Conclusion

Control systems can be very diverse and contain lots of different items. However once you've put together a few devices, making large complicated systems becomes just a matter of scale.

The advantages of having a networked system massively outweigh the negatives and thats why they are found on most shows today.