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VR2 OEM IP Control
Basic Remote Operation of a Projector (EPSON)

Introduction

This document assumes the user is familiar with our control application, D-Net.

The VR2 PoE Touch Remote can be used to transmit IP based control strings to operate OEM equipment as well as all NST Audio products.

The IP control implementation is very flexible, and as such, will require prior knowledge of the device to be controlled and its capabilities to be controlled in this manner. All manufacturers of AV equipment who have IP based remote control of their products will of course have to implement a remote protocol to achieve this, but many also implement a layer of "simple remote protocol" for the purposes of OEM control.

A particularly well established area of this is with projectors.

PJLink is a standard for configuring video projectors via a network interface. This was developed by the Data Projector Group within the Japan Business Machine and Information System Industries Association (JBMIA). The aim of the standard is to define a cross-manufacturer and cross-model interface for the configuration and monitoring of video projectors.

Since 2009 the majority of well-known projector manufacturers have included this layer of protocol within their devices firmware allowing many functions to be remote controlled using simple commands.

The list of models that include this protocol is available at

https://pjlink.jbmia.or.jp/english/list.html

If you are intending to implement control of a projector, download the protocol here:

https://pjlink.jbmia.or.jp/english/data_cl2/PJLink_5-1.pdf

Important Note

The specifications of the protocol document are very extensive and not all projectors are capable of all the functions defined within it. Some experimentation may be required to discover what level of functionality any particular model supports. We recommend starting with the most basic functions to establish that you have connected successfully to your particular projector, and then try more advanced operations.

www.nstaudio.com

## IP Control Implementation on a VR2 – Start Simple

To establish the method of setting up an IP Control Pane, let's start with a simple command for an NST Audio product.

We will create a pane that will send a "Global Mute" command to a device. It doesn't matter what NST product this is, as they all respond to a "Global Mute" command, and it's possible to see this working on any product (all Mute LEDs on D48, all Clip LEDS on other products), so it's the ideal starting point.

If you are familiar with the process of configuring an IP pane, you may jump straight to page 9 for the projector control example.

All NST Products also support a simple remote protocol layer, and we will use this to test out the system. Documentation about this is available upon request.
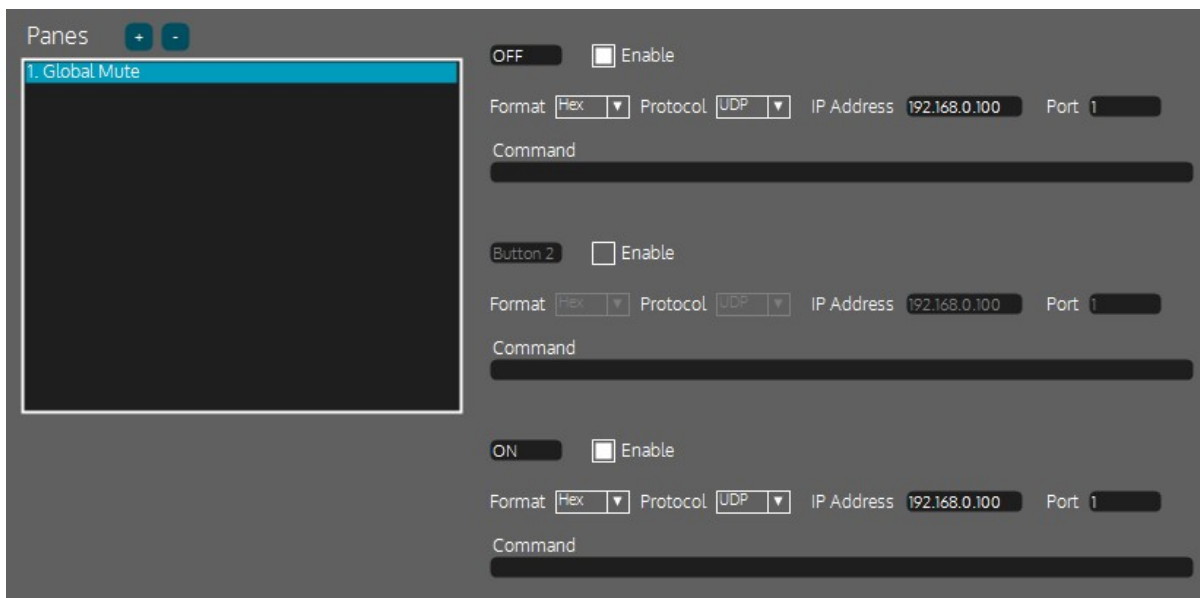
Setting up a control pane for IP control follows the same procedure as for other operations. Open D-Net and go online, to discover the VR2 on the network.
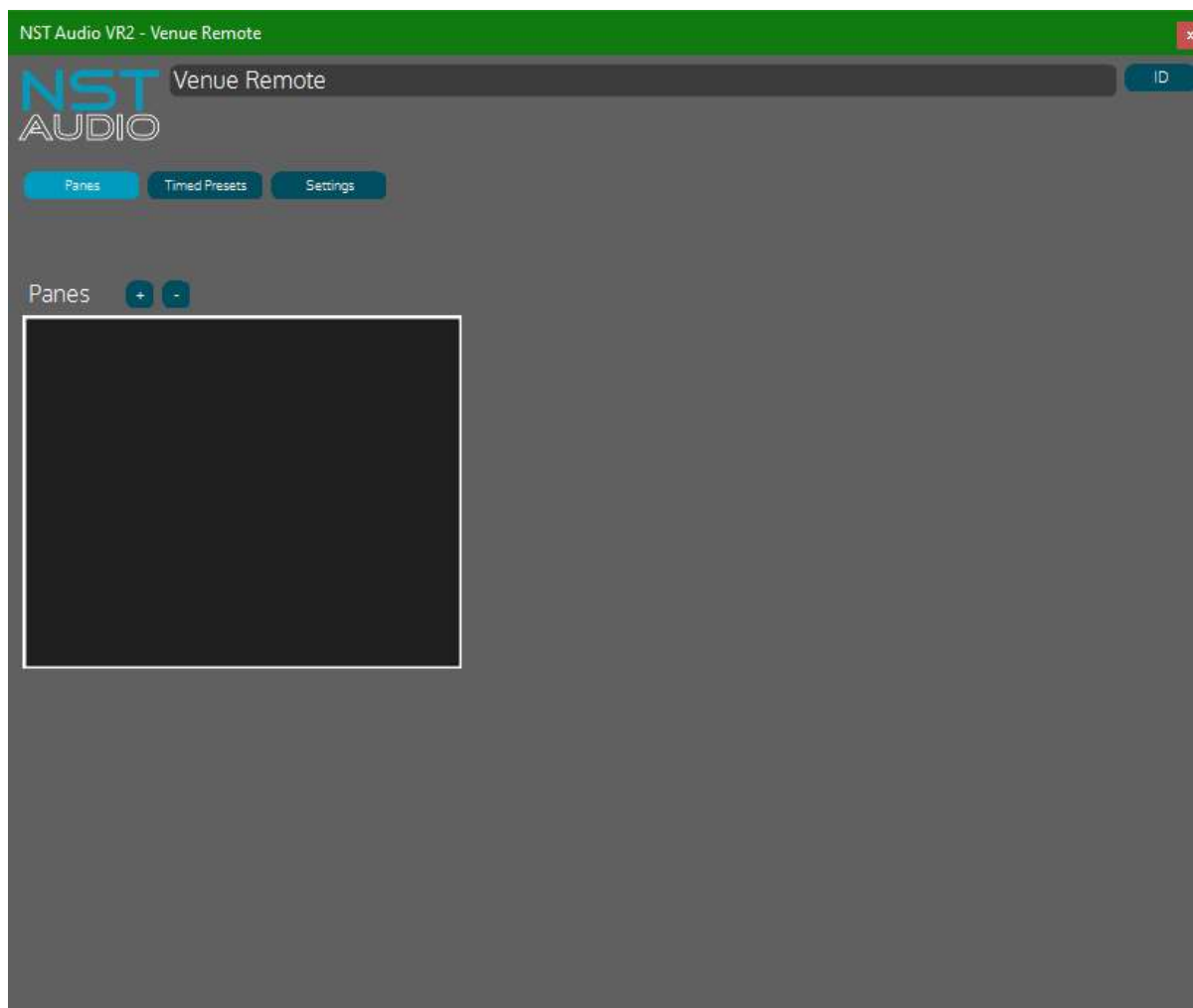
Click on the "+" button above and choose "Add IP Command Pane"
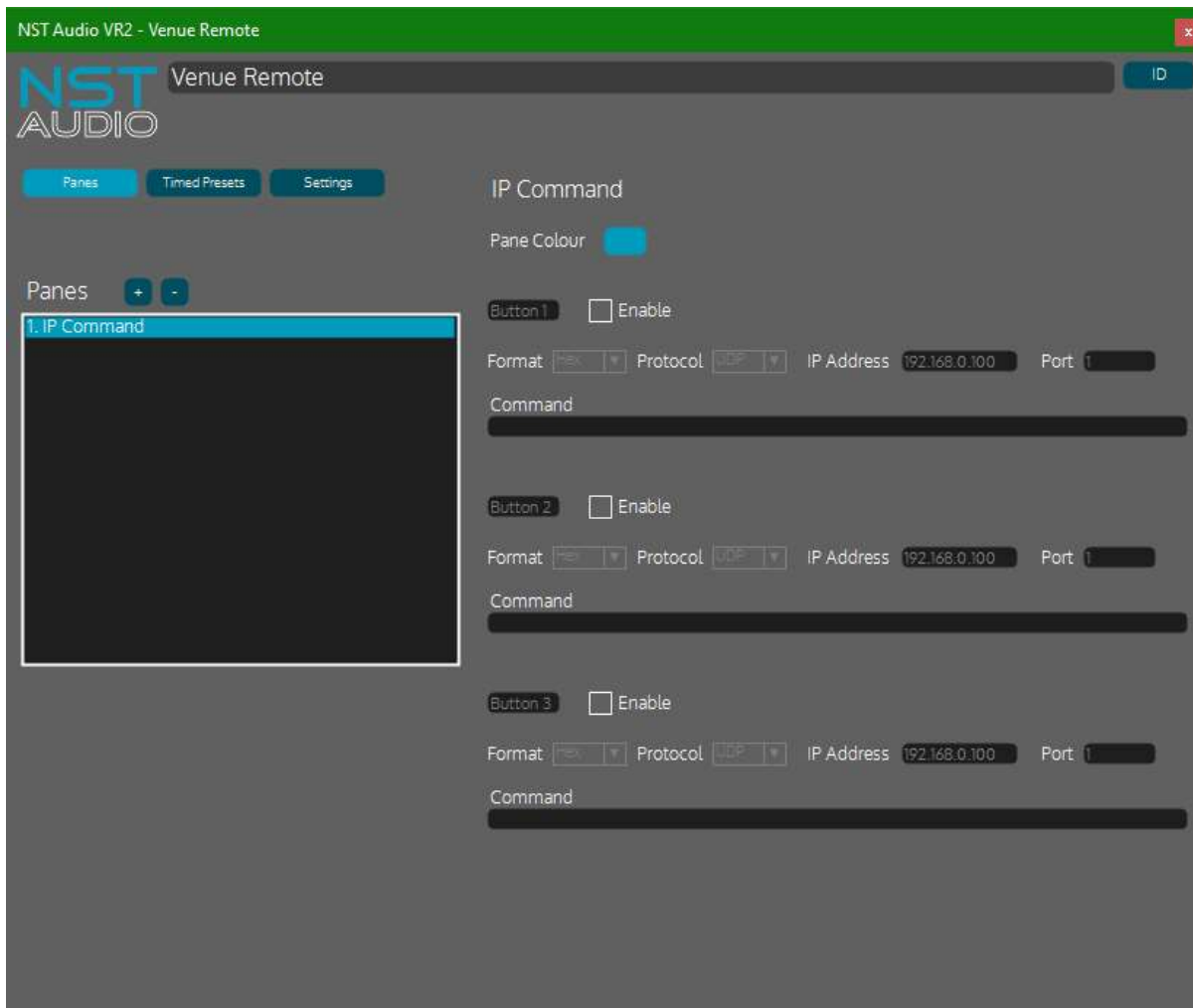
Enable two buttons on this pane, label them "OFF" and "ON", and name the pane "Global Mute".

The pane and the labels will update in real time on the VR2.

At this point we are ready to set up the control aspects of the pane. We need to know the protocol (UDP or TCP), the transmit port and of course the IP address of the device to be controlled.

Consulting the "Simple Remote Protocol" specification for NST Products we can answer the first two of these:

The IP address of the unit is found in D-Net on the unit's "System" page. We will address an ID48X in our example.
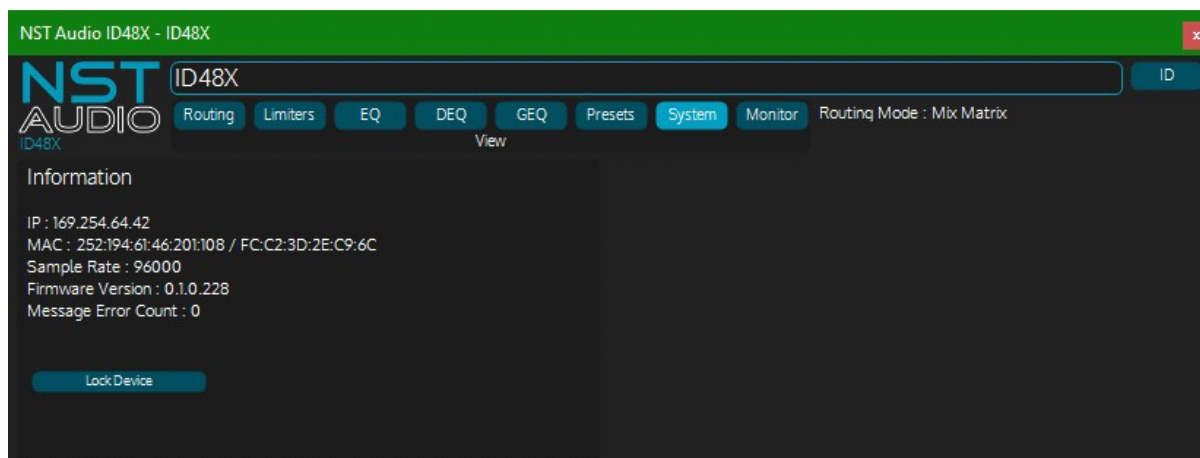
So, our destination IP address is 169.254.64.42. Note that this is a self-generated IP address in the absence of a DHCP server. For reliable operation we recommend using reserved IP addresses configured through a router's management console for control of NST equipment, or a static IP address accessed through the device itself. This second method will be used later in this document when we set up the projector control.
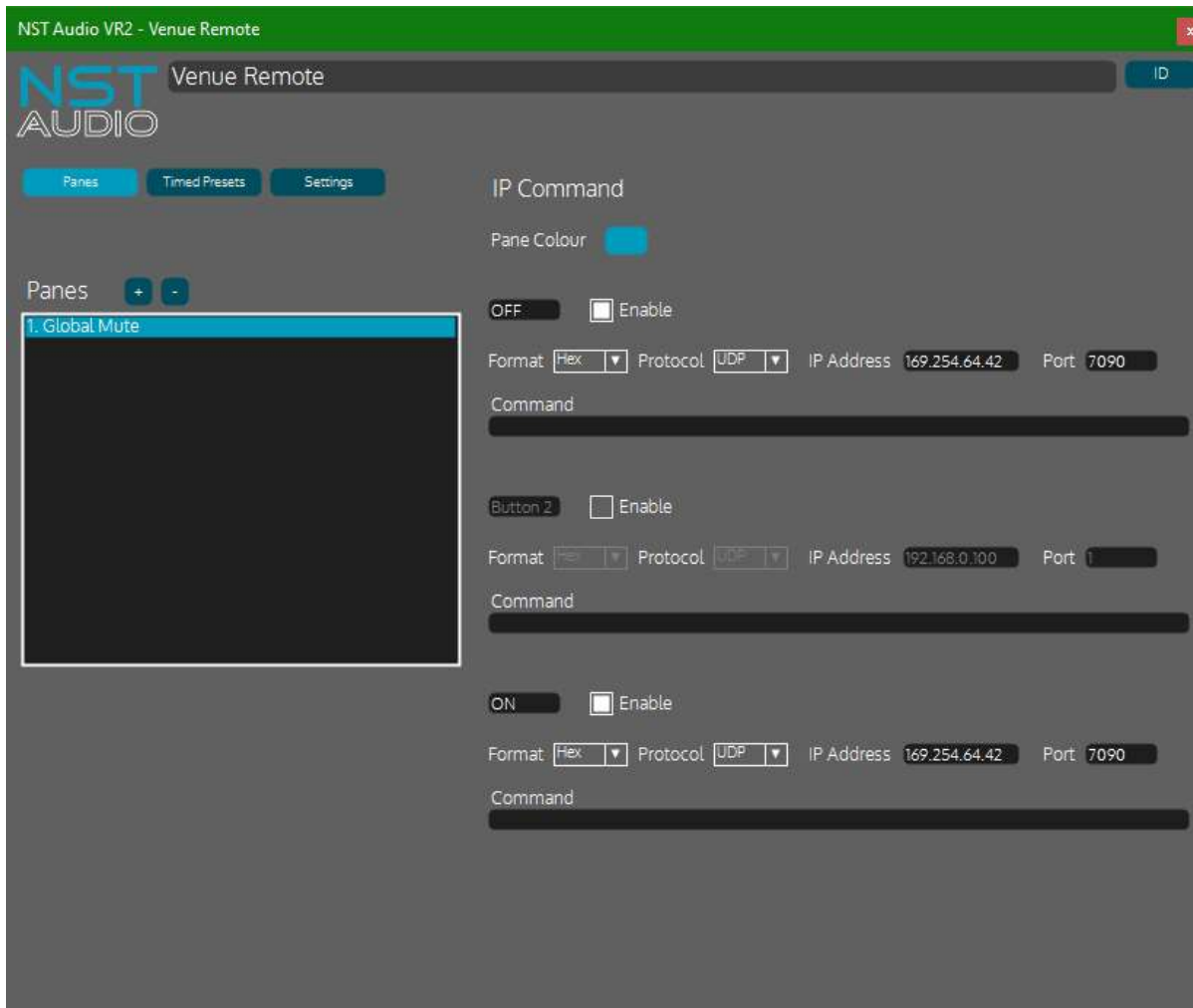
Finally, we add the command strings to be sent on pressing each of the buttons.
Referring to the protocol document again and looking up the commands for Global Mute we find:

NST Simple Control Protocol v0.9.doc - 26/05/22

1006 – Global Mute

Command Format :
char - Mute status (0x00 = OFF, 0x01 = ON)

Reply Format :
Header only, no data. MessageDirection value indicates success or failure.

Example Hex Bytes:

EE	03	00	00	01	00	00	00	12	34	56	11	01	00	00	00	00	00	00	00	01	--	--	--
MessageType				MessageSize				MessageCounter				Dir	Reserved							Global Mute State			
Message Header																				Message Data			

Adding the string (in hex) to each button, we only change the final byte in the command to set Global Mute On (01) and Global Mute Off (00):
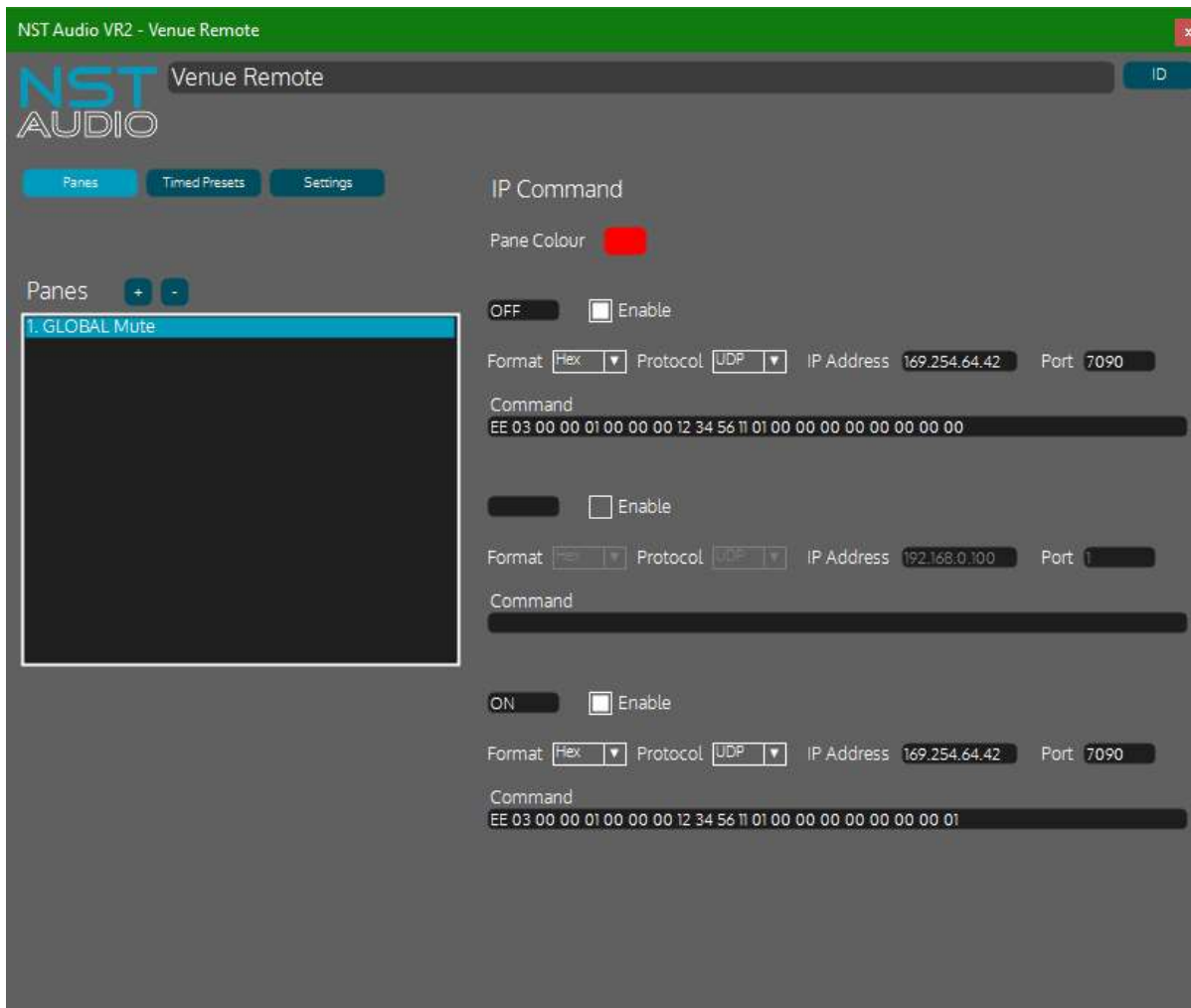
And that's it – pressing the buttons on the VR2 will now mute/unmute all the inputs and outputs on the ID48X.

Projector Set-up Checks

As mentioned in the introduction, different devices will obviously support different functions and offer different options for that can be remotely controlled. Additionally, there are several aspects of a typical projector's set-up that need to be confirmed to mitigate against problems, both establishing a connection and maintaining one.

Network settings

First, we need to ensure that the network connection to the projector is using a static IP address, and so that DHCP is disabled. This is required so that each time the projector is power cycled, or the switch/router that it is plugged into is power cycled, that its IP address will not change as this will prevent any control from the VR2 from accessing it if the address would be free to change.

We are only showing examples for a typical EPSON projector menu system – but the principle will be the same for most manufacturers.

Find the wired network menu and the network settings.
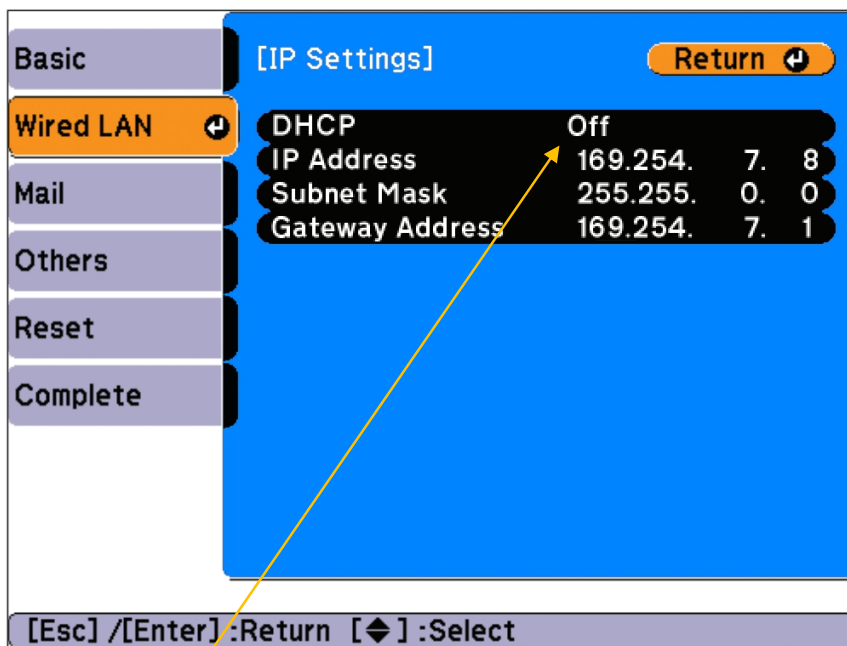

Make sure DHCP is set to OFF (the IP address and other settings may not be adjustable until it is turned off). Set the IP address in the correct range, and make a note of it. Some projectors will require a Gateway Address as well for return messages, even if you do not intend to request information from the projector (which is not required for operation with the VR2).

Check ECO settings!

Probably the most basic feature to remote control that would be supported by every projector, is the ability to turn it on and off. EPSON projectors by default power down the wired network connection when the projector is in standby, meaning it is possible to turn it off remotely, but not back on again!

Find the ECO menu and make sure that the network connection is kept alive in standby:
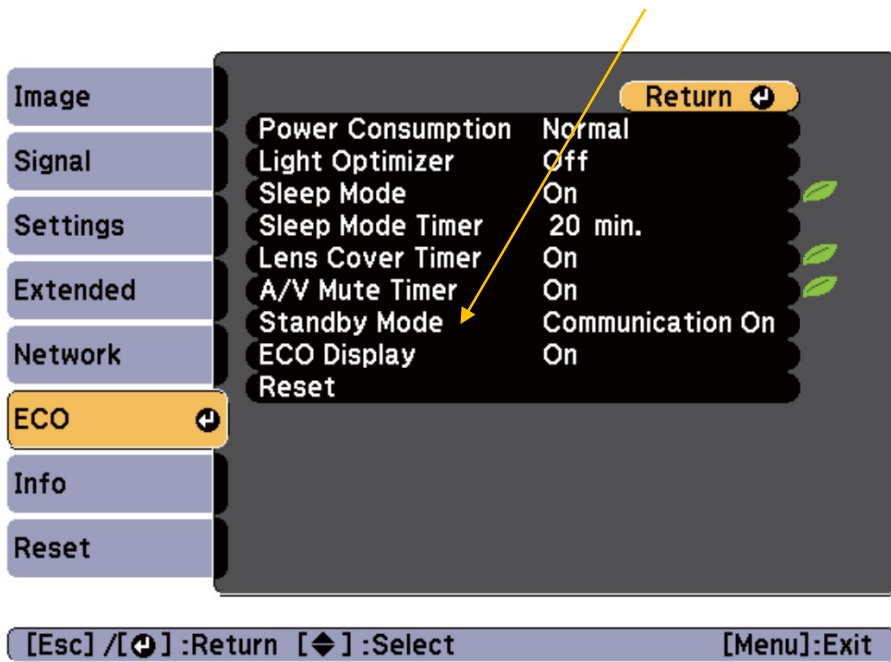
Projector Control

As stated at the start of this document, the majority of projector manufacturers implement the PJLink protocol in their equipment, to enable simple remote control and monitoring.

However, be aware that the level of control offered is device dependant and some level of experimentation may be required to make a projector respond accordingly.

For example, unless a request has been made from the projector to return the inputs makeup supported (and input number codes), it will be "trial and error" to see what numbers have been assigned to represent which inputs.

Create the VR2 Pane

As with the test pane at the start of this document, we will set up a pane on the VR2 for our projector. Let's start with power on/off.

Create a pane with two buttons enabled and change the names as appropriate.
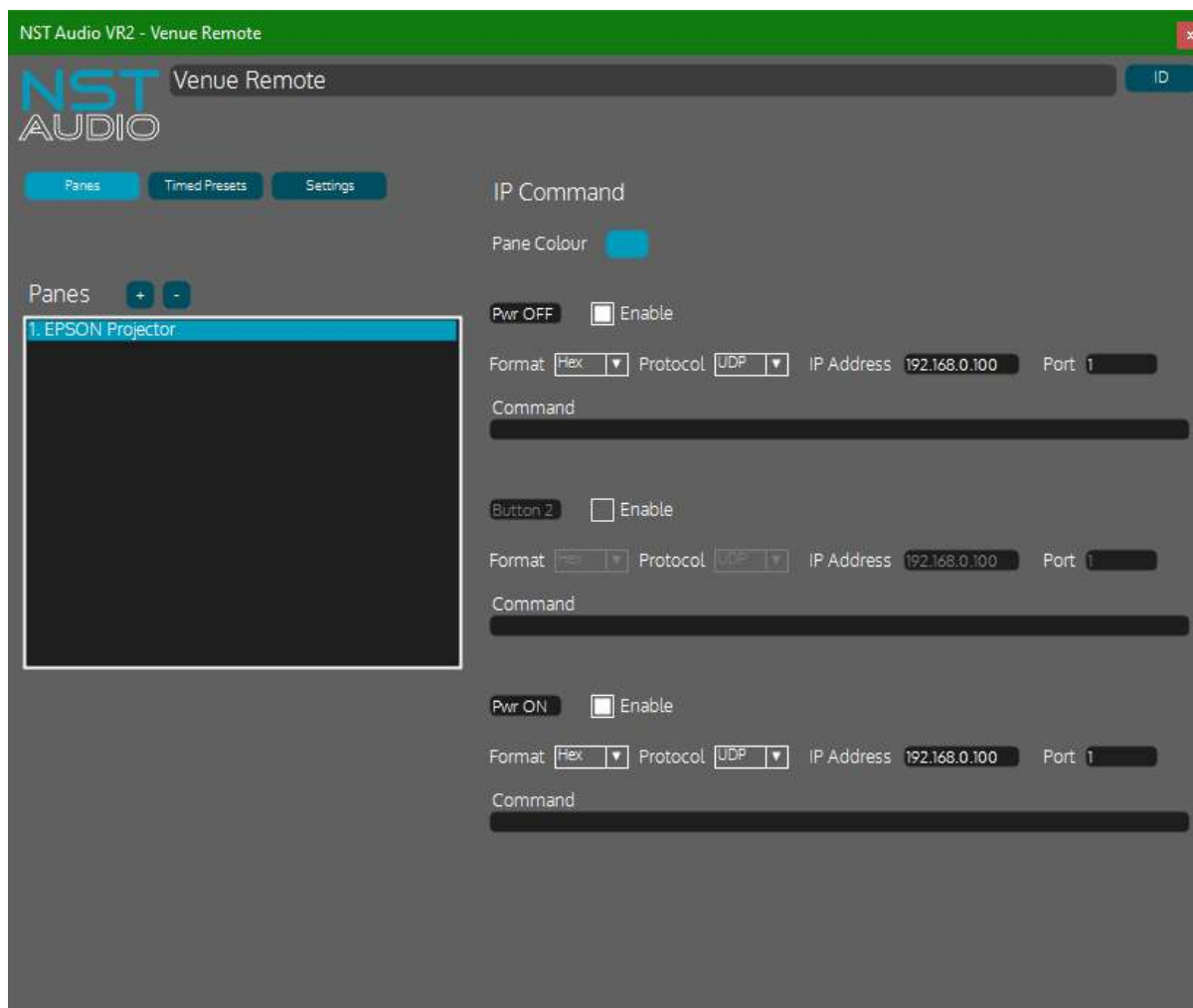
Referring to the PJLink protocol document, we see that the protocol is TCP and the port number is

PJLink Specifications Version2.00 2017.1.31

3. Protocol

3.1. Control protocol

The TCP/IP protocol is used for communication between the adaptable projector/display and the controlling PC.

The projector/display is set as the server and the CONTROLLER as the client. In other words, establishment and termination of communication are determined by the client CONTROLLER (hereinafter, "CONTROLLER").
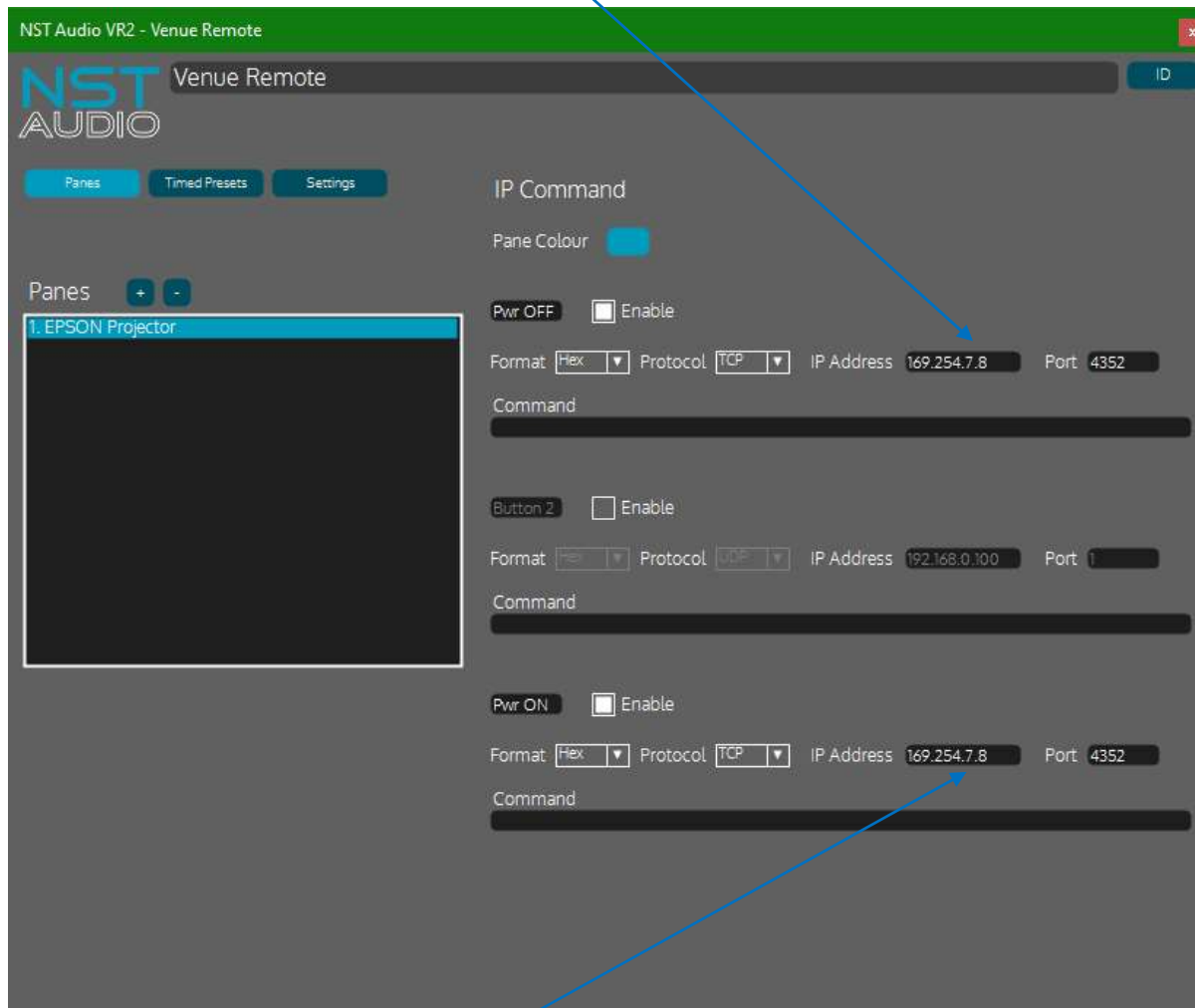
Port name pjlink	TCP 4352 port

Add these details to **both** buttons' comms:

Lastly for the comms set-up, change the IP address to that of the projector, as set to static on the device itself on page 7.

Remember to do this for **both** buttons!

Finally, look up the strings to be sent for power control and copy these to both buttons command text box.

PJLink Specifications Version2.00 2017.1.31

4. Command Descriptions

4.1. Power control instruction   POWR

Power-on (lamp-on) instruction

Character code in hexadecimal	25	31	50	4f	57	52	20	31	0d
Character	%	1	P	O	W	R	(SP)	1	(CR)

Power-off (standby) instruction

Character code in hexadecimal	25	31	50	4f	57	52	20	30	0d
Character	%	1	P	O	W	R	(SP)	0	(CR)

Pwr OFF   ☐ Enable

Format [Hex ▼] Protocol [TCP ▼] IP Address 169.254.7.8   Port 4352

Command
25 31 50 4F 57 52 20 30 0D

Button 2   ☐ Enable

Format [Hex ▼] Protocol [UDP ▼] IP Address 192.168.0.100   Port 1

Command

Pwr ON   ☐ Enable

Format [Hex ▼] Protocol [TCP ▼] IP Address 169.254.7.8   Port 4352

Command
25 31 50 4F 57 52 20 31 0D

And that's it!

The buttons should now turn the projector on and off. Be aware that there will be a pause between a power up/down operation where the projector will not respond, due to it going through a warm-up/cool-down cycle, much the same as controlling it with an IR remote.

For reference, and again, only for our particular projector, we set up the following additional functions as shown on the two screenshots overleaf…

Additional functions

AV Mute – it's better for projector bulb life to "mute" the projector for short periods. This dims the bulb and blanks the screen, instead of a full power cycle. It's also instantaneous in operation.

Input Switching

Inputs supported are device dependant – these three buttons swap between VGA, USB (flash device plugged into device) and HDMI.