Delta Media Server

Display Configuration

User Guide

Display Configuration : User Guide

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Printed: March 2023

This edition is for software version N/A
Document ref.: MC264-8

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Emulating, Grouping, Synchronising Displays

Emulating, Grouping, Synchronising Displays

Please note that this document demonstrates how to emulate EDIDs (spoof), group and synchronise (genlock) displays using AMD FirePro and Radeon Pro GPUs, and for NVIDIA GPUs. For each graphics driver, location of functionality may vary so please see manufacturers guidance if you cannot find emulation and grouping options.

Important for Reliable and Predictable Performance

All utilized desktop-based outputs must be configured as a single Mosaic Group [77] (NVIDIA), or as a single FirePro Eyefinity Group [19] (AMD), or Radeon Pro Display Group [44] (AMD) per graphics card.

All outputs from a single server must be configured to the same video format and refresh rate. See Delta User Guide Movie Formats and Timing Configuration.

Emulating, Grouping and Syncing AMD Displays

This guide covers AMD FirePro and Radeon Pro GPUs, for Windows 7 and Windows 10. It covers requirements for even numbers of graphics outputs in rectangular arrangements, within the maximum available pixel width of 16384 px.

Note that the sequence: Emulate > Group > Sync should be followed.

EDID (**E**xtended **D**isplay **I**dentification **D**ata):

- is a protocol to allow communication between a device (graphics card) and its connected displays (monitors)
- records display information to the GPU so that it doesn't have to repeatedly communicate with displays when drawing to them
- maintains the required arrangement on working displays if one (or more) display fails:
    - If the display EDIDs are not emulated ('spoofed'), and connection between server and a display is broken, then the display arrangement reverts to single display mode, causing media distortion across the working displays, or black output across multiple displays.
    - When EDID-emulated, working displays maintain the output as if the broken connection (missing display) was still working, minimising disruption to the main output.

Note: it is advisable to keep a note of the relevant IP address of the server so that you can still VNC into the server if you happen to lose visuals – which can happen if an incorrect EDID is applied, such as a resolution forced that was unsupported by the connected display.

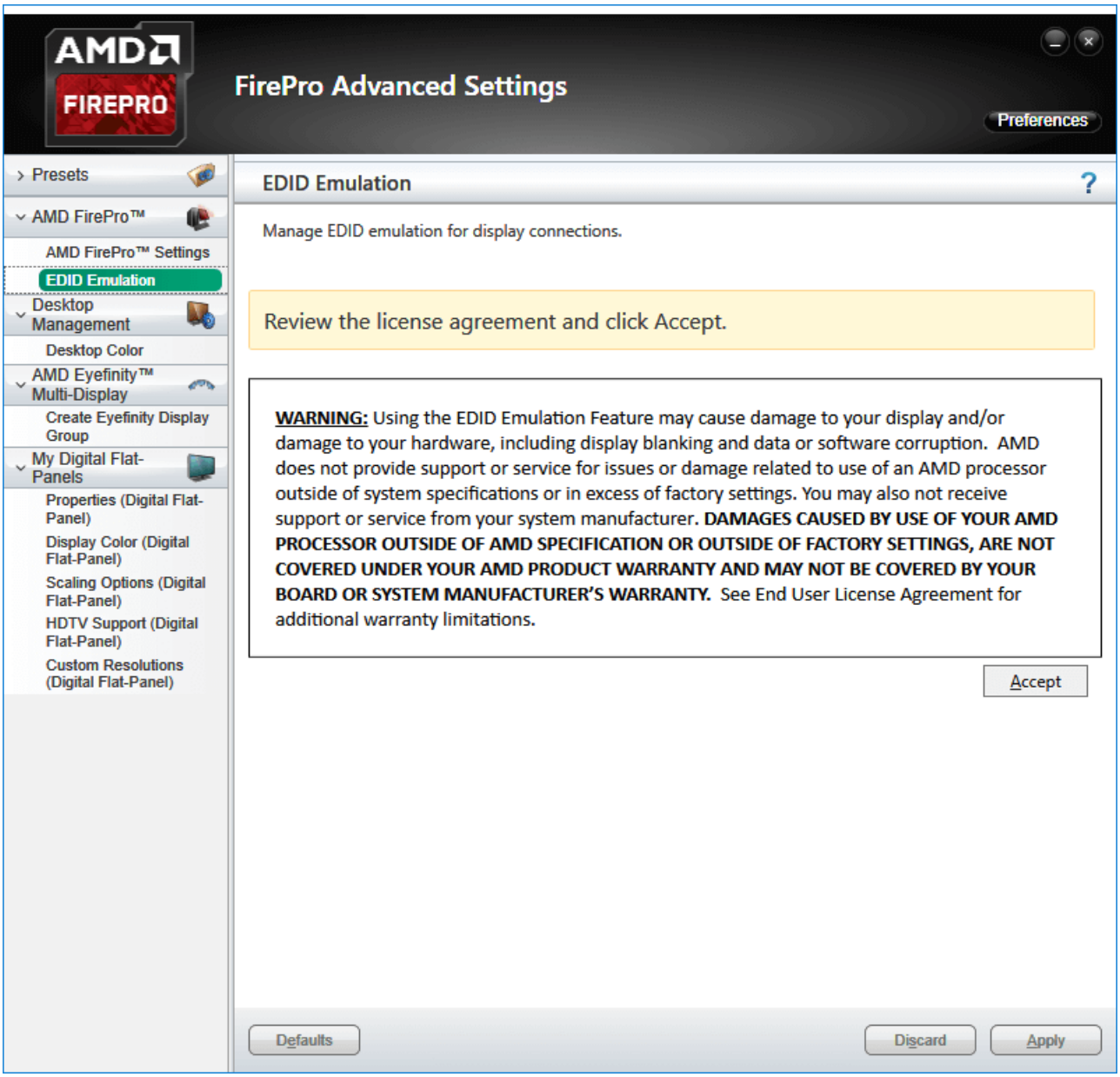
AMD FirePro (Win 7)

For FirePro W5100 / W7100 / W9100 under Windows 7, using AMD driver 15.[n]. The location of settings may vary between AMD graphics drivers, so please see manufacturers guidance if you cannot find emulation and grouping options.

Alternatively, you can emulate, group and Genlock your system through the web interface (see the Stack Control User Guide).

FirePro Advanced Settings

Right click the Desktop, and left-click AMD FirePro Advanced Settings:



FirePro EDID Emulation (Spoofing)

Right click on the desktop to gain access to the AMD FirePro Advanced Settings, and Click *AMD FirePro* > *EDID Emulation* > *Accept* to continue. In the example here, one GPU (AMD FirePro W9100) has been identified:

➢ See here [15] for dual GPU installations.

Begin EDID Emulation

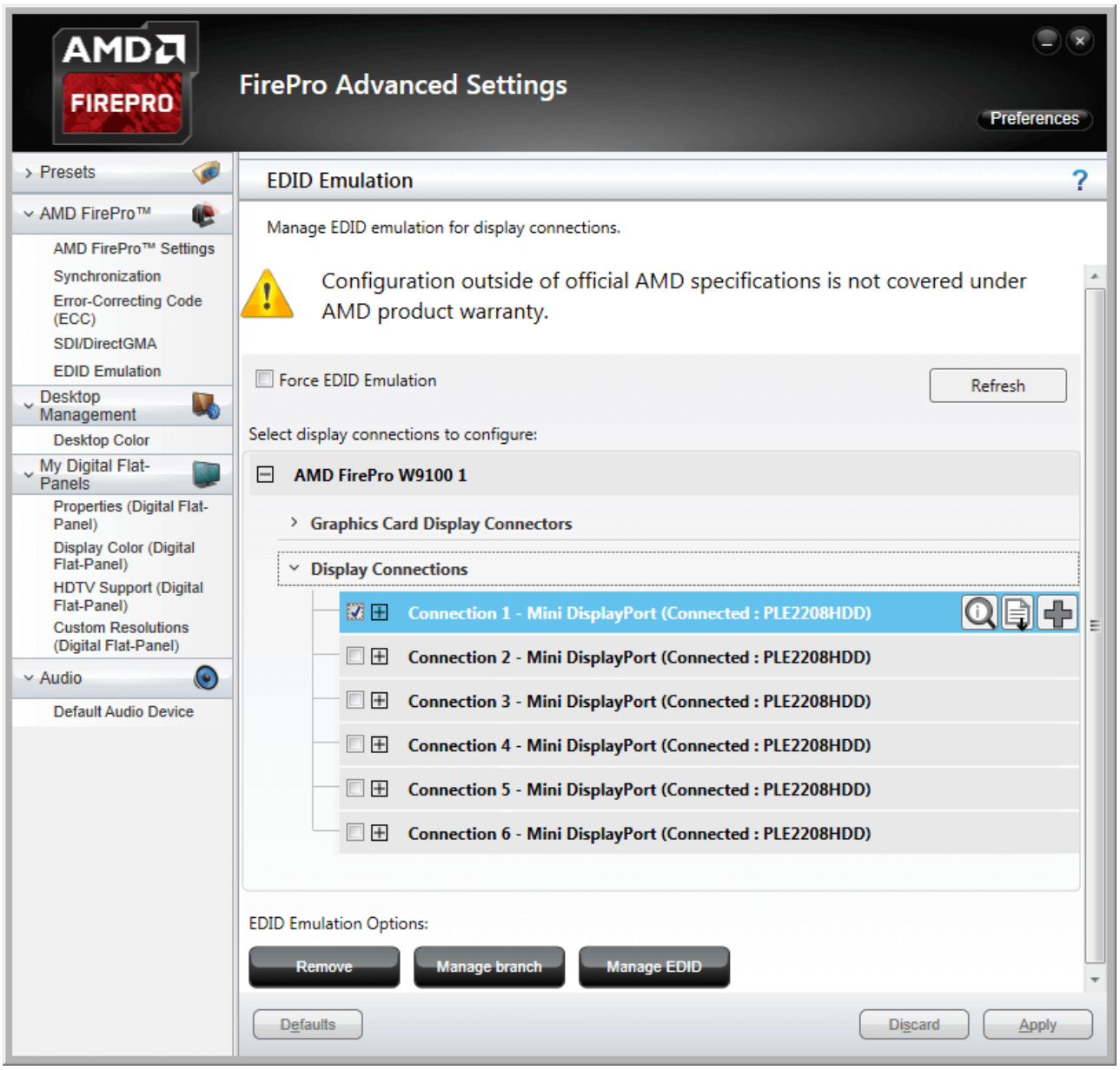
Click on the **+** icon on the left-hand side of the GPU. This will bring up a drop-down menu to show how many ports are available on the GPU. Click to expand 'Display Connections':

On this GPU, there are 6 available ports, showing what type of connections there are. In this instance, the GPU supports Mini DisplayPort

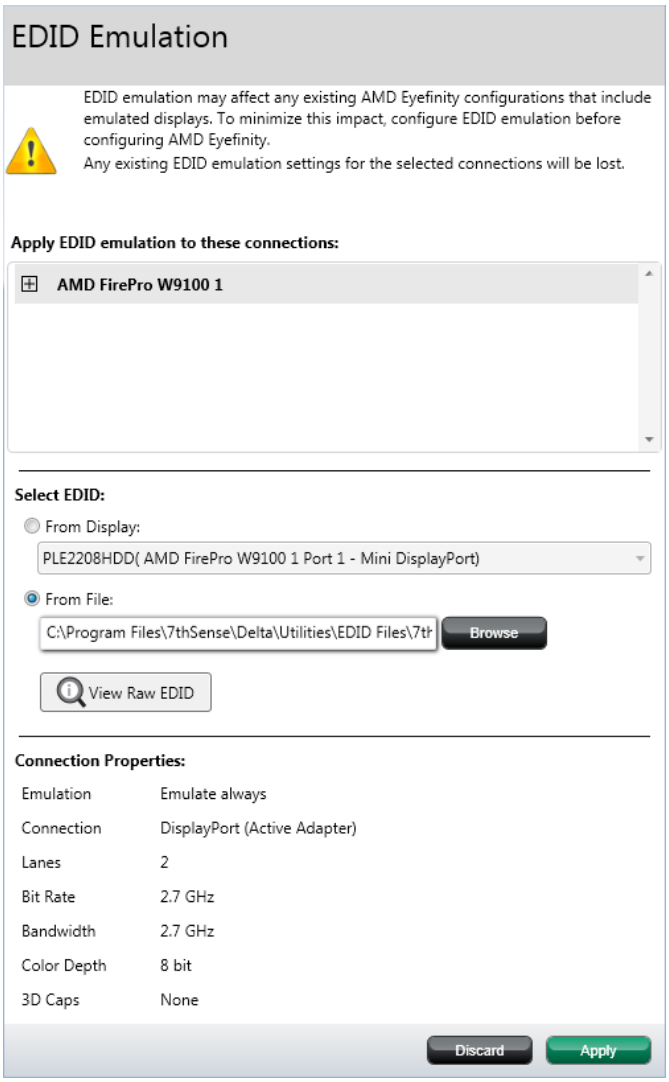
Note: Earlier versions of AMD may not have EDID Emulation as an option – you can emulate with DeltaMonitor through the Stack web interface if you can't find the option in the Control Center (see the Stack Control User Guide).

Manage EDID emulation for display connections

To apply EDID emulation to any connection, check its left-side box. Moving over a connection will reveal three icons on the right-hand side:



- The Magnifier shows raw information about the current EDID.
- The page icon downloads the current EDID, in this case, the PLE2208HDD EDID from the connected monitor.
- The large **+** will add an EDID to connections with a ticked check box. This will open a dialog:



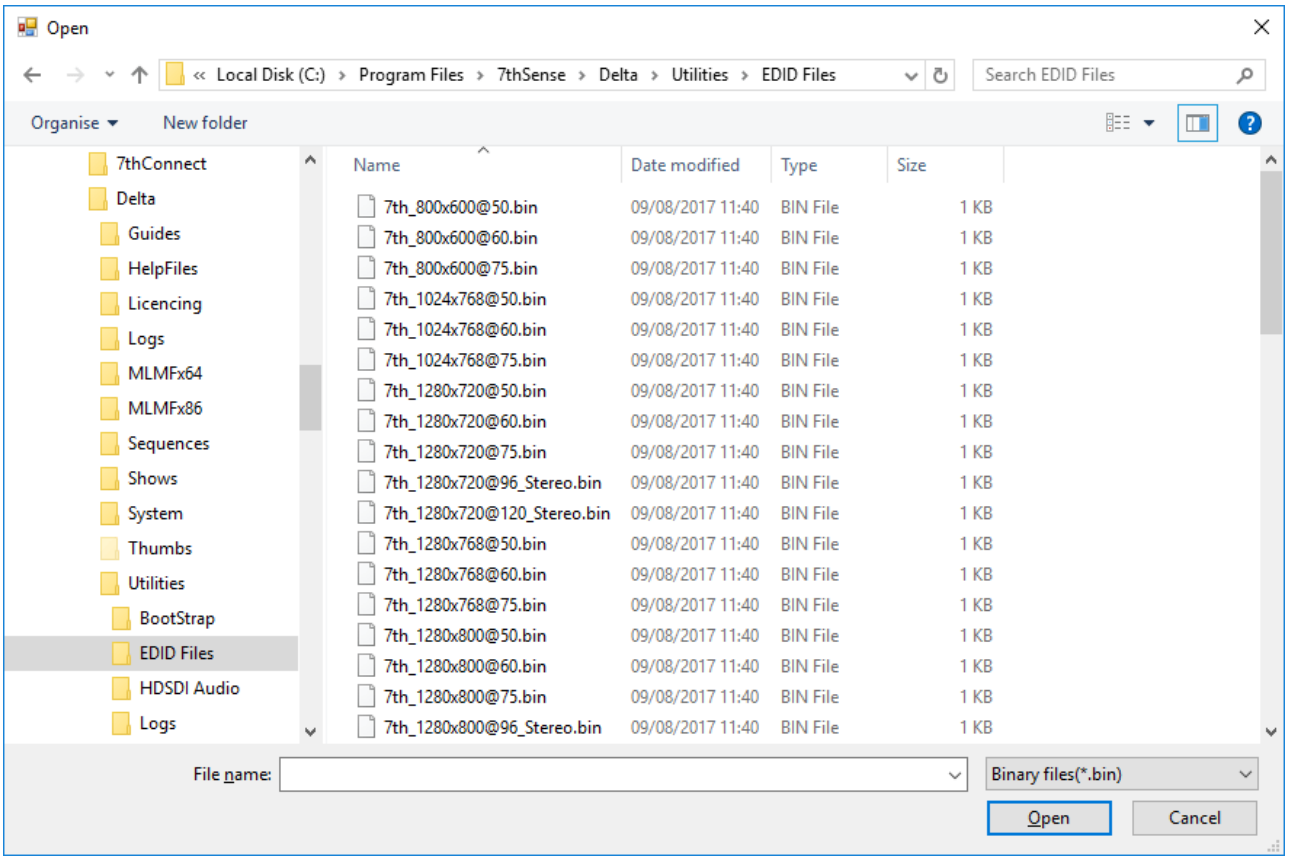
In the Connection Properties:

- **Lanes** should be set to 4.
- **Bit Rate**: dual link or above, 5.4 GHz, otherwise 2.7 GHz.
- **Bandwidth** should be changed to 5.4 GHz for higher output EDIDs, e.g. 4096 × 2160@60.
- **Color Depth** 8 bit or 10 bit depending on output required. This is important for Working in 10-bit Colour Depth.

Select the EDID that you want to use and change the properties underneath. You can either apply the EDID from the display (if connected) or load a *.bin file in the local directory (select 'From File' and Browse to the file).

Finding the right EDID

7thSense provides a collection of available EDIDs, located in: C:\Program Files\7thSense\Delta\Utilities\EDID Files. Change the file type (bottom right) to binary to see these files:

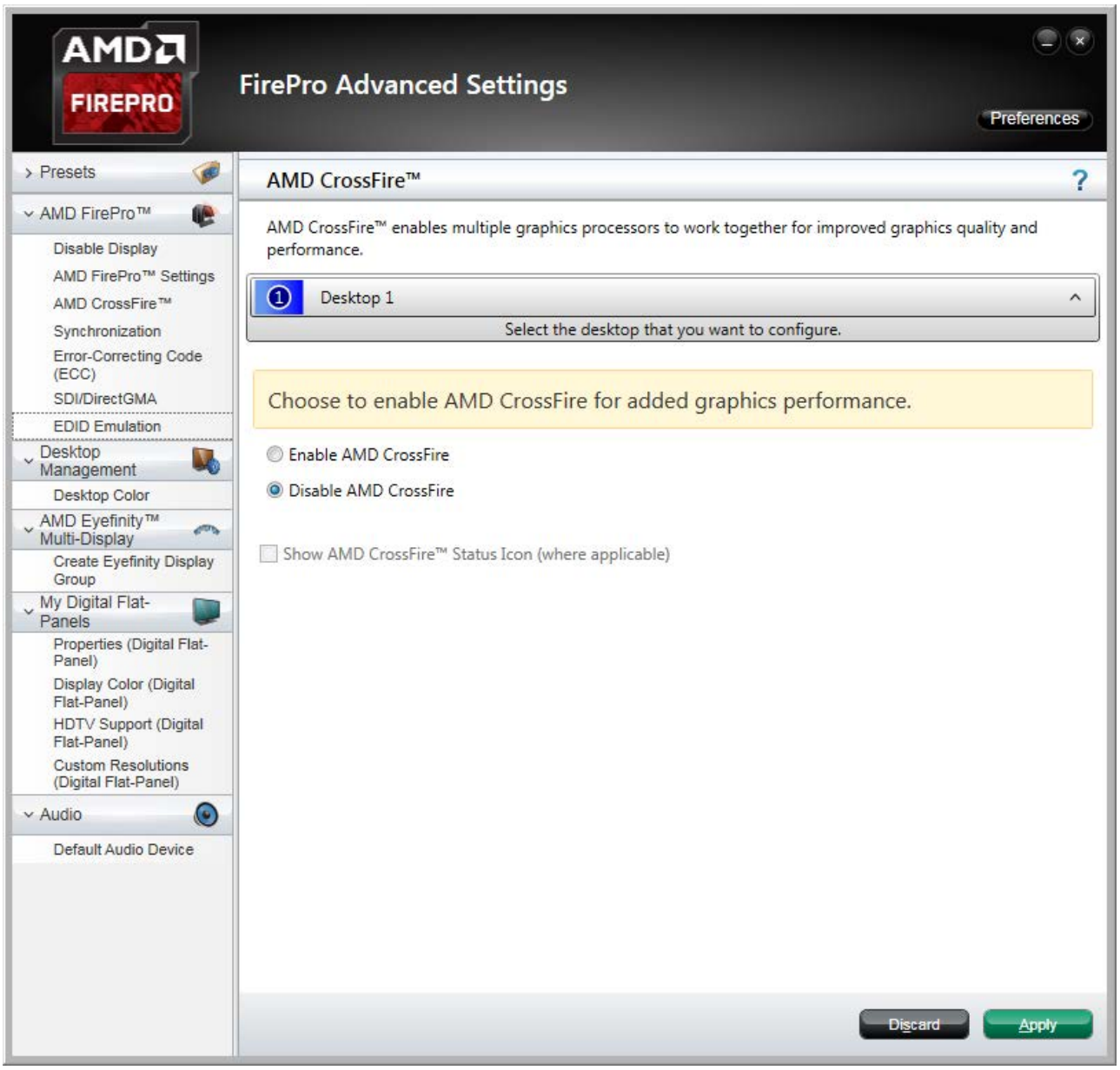


Select the EDID for the right resolution, bit depth as well as frame rate. Display devices (projectors, monitors) have their own set of embedded EDIDs that can also be used. Open the selected EDID then ‘Apply’, to apply it to all of the selected AMD display connections.

The Advanced Settings page will now display which EDID is connected to the relevant ports. In this instance, the **7th_WUXGA@60** has been applied to all six of the ports of the GPU:

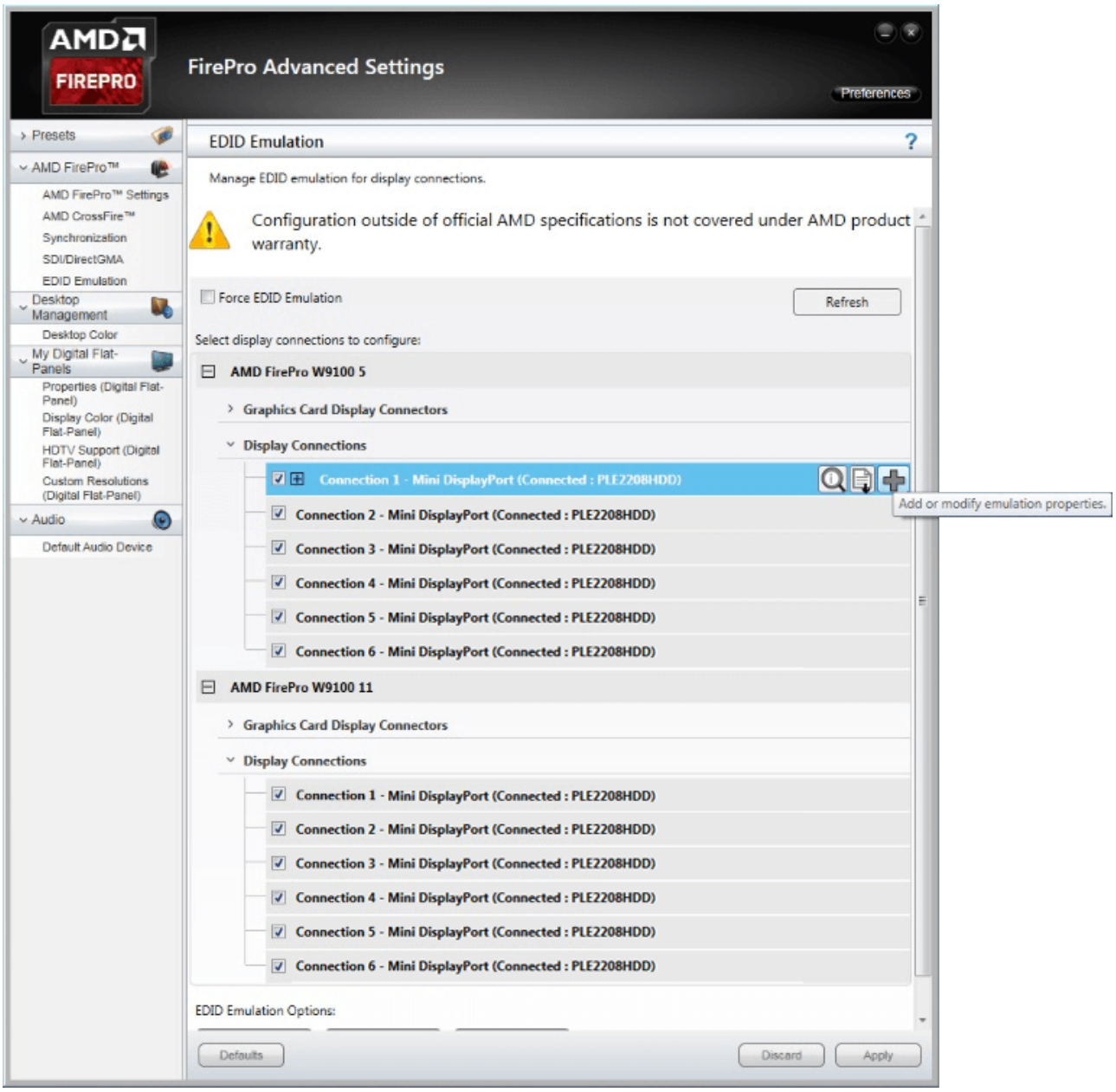
Dual GPU EDID Emulation

This is very similar to single GPU servers. Dual GPU operation for adding graphics power uses AMD CrossFire to link the cards. Delta servers instead simply need the extra display heads, so first of all ensure Crossfire is disabled. Open ‘AMD FirePro Advanced Settings’, and select ‘AMD CrossFire’ from the left-hand menu:

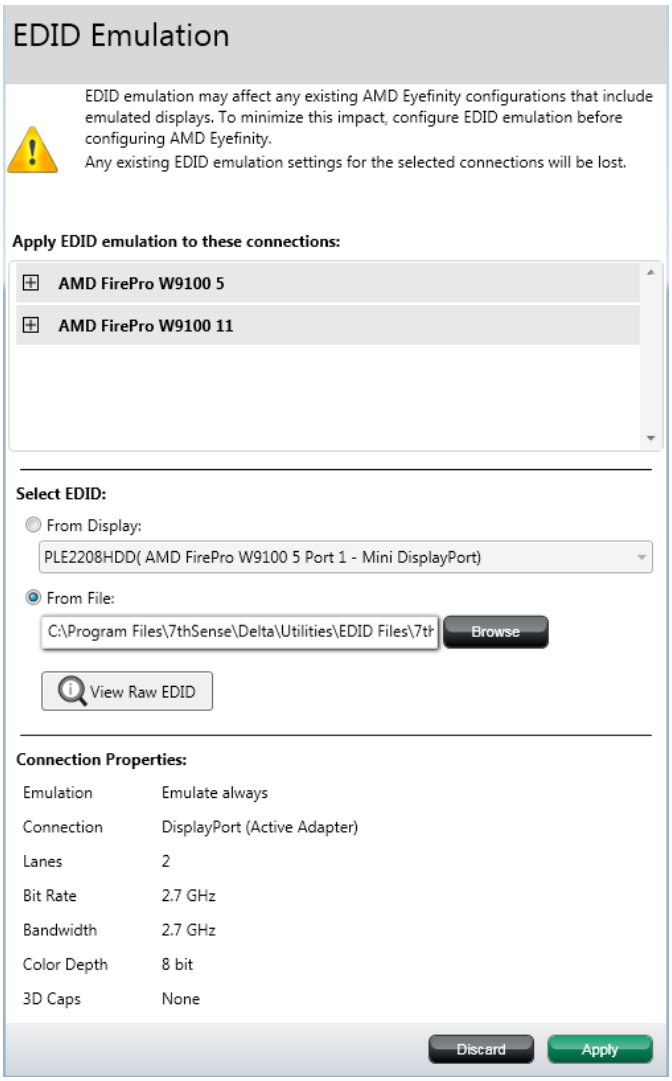


Now select ‘EDID Emulation’ from the left-hand menu. If asked whether to ‘Force EDID’, click ‘Apply’.

Now click the + markers to expand the list of connections per GPU detected. For each GPU in turn: tick all heads required, then move over the top connection and click the big **+** icon on the right:



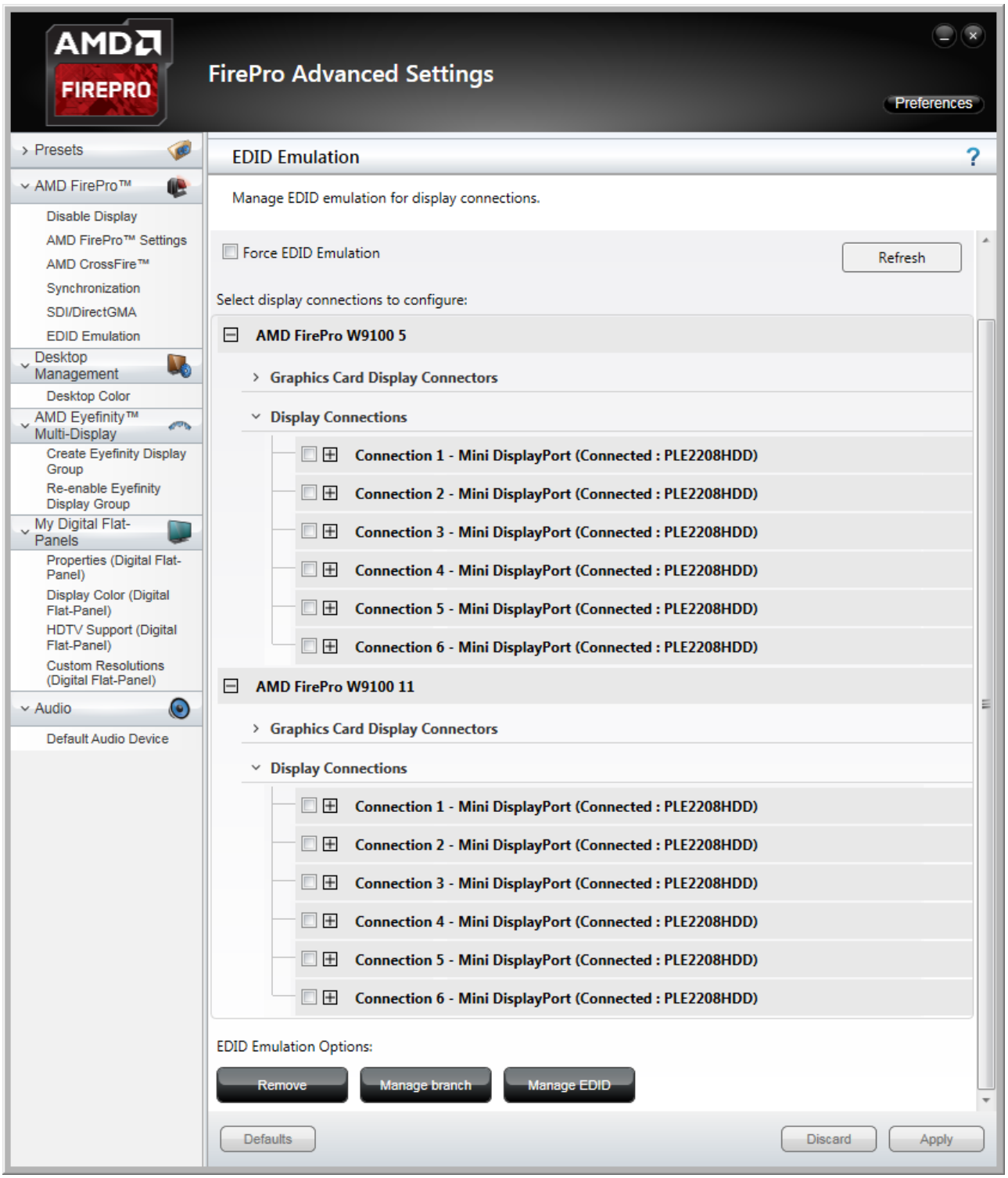
A new dialog will open. Select the EDID from the current display, or from a specific EDID file if available by clicking browse:



Finding the right EDID

7thSense provides a collection of available EDIDs, located in: C:\Program Files\7thSense\Delta\Utilities\EDID Files. Change the file type (bottom right) to binary to see these files.

All heads should show with the EDID information. Restart the server.



FirePro Eyefinity Grouping

For the most reliable results, first ensure that each display to be grouped has the correct resolution applied to it in Windows. (Windows search: 'display settings'.) These must all be the same, since mixed resolution displays are not supported in AMD Eyefinity groups. Failure to do this can often result in a Eyefinity group of the wrong resolution being created.

Troubleshooting: a Note on Scaling

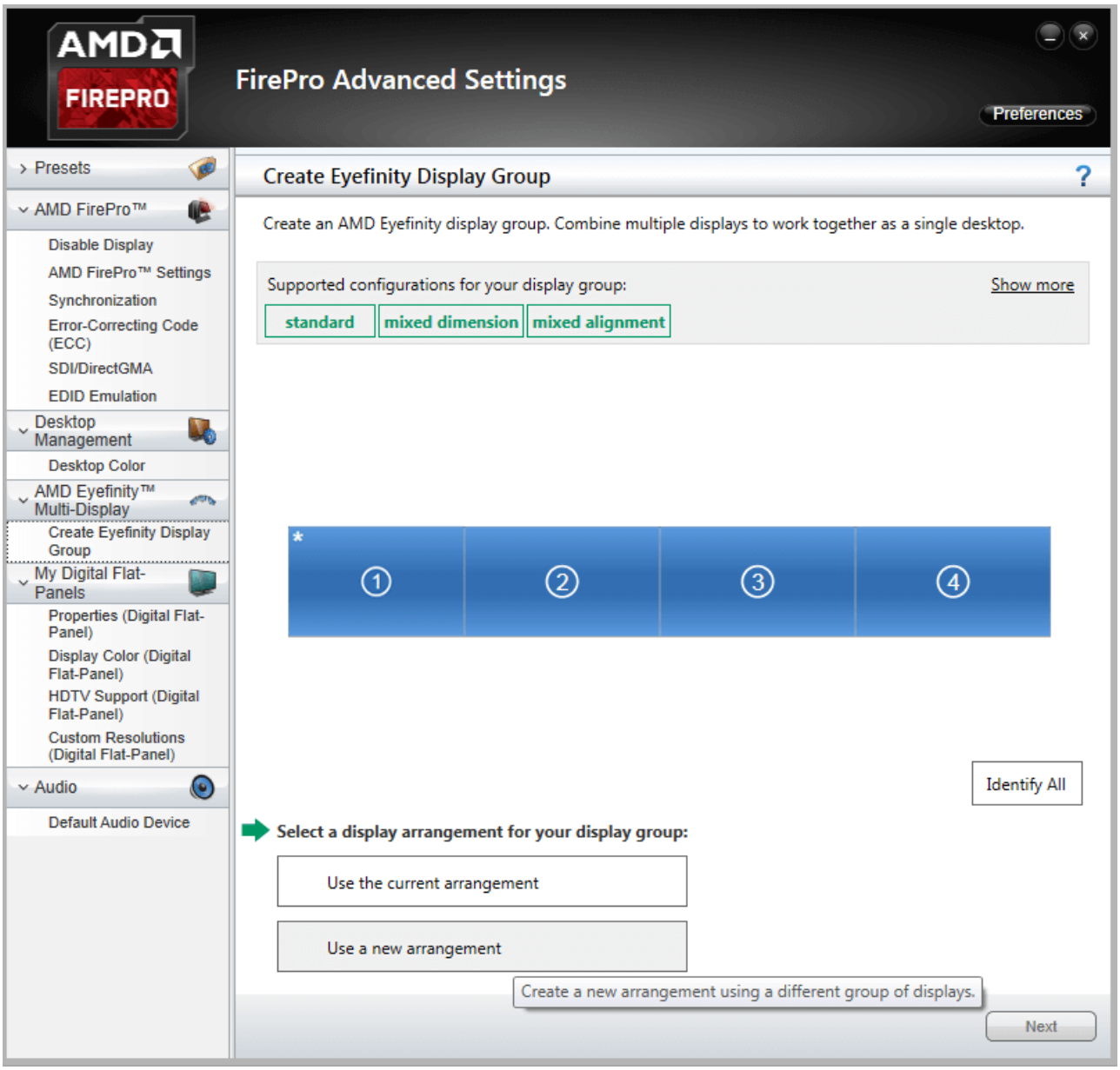
Scaling is a feature in AMD for handling media of non-native resolution. When switched on, it will either maintain aspect ratio, force-fill the screen, or centre a lower-resolution in a higher-resolution display. Occasionally an EDID has the scaling flag enabled in the CEA extension block, and AMD seems to want to default to a scaled output.

If on the actual display (not VNC) you are seeing black borders, or the aspect ratio appears incorrect, check for scaling before Eyefinity Grouping.

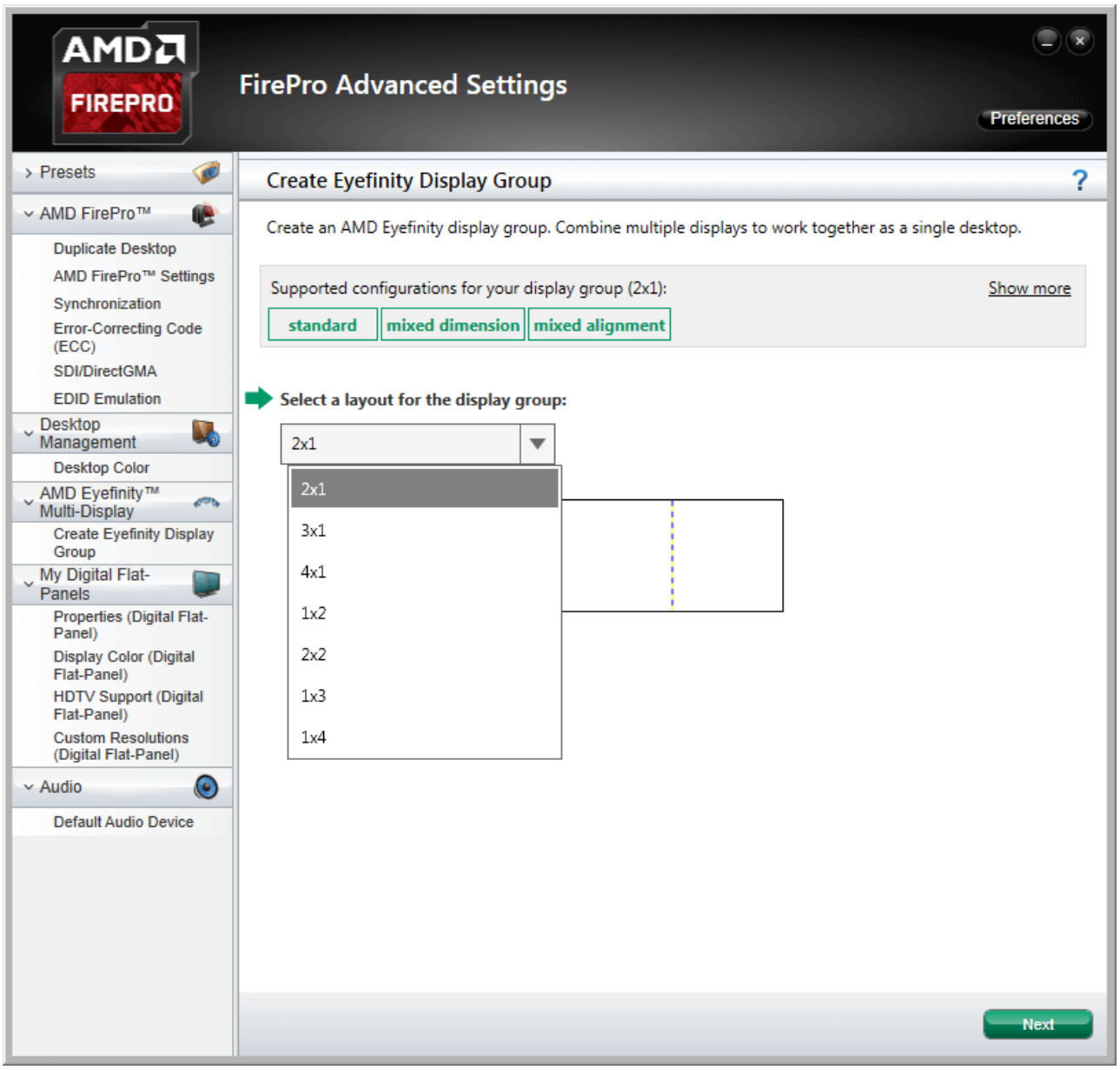
Scaling options can be found under older AMD Catalyst™ Control Center > *My Digital Flat Panels*, either as an option or within Properties.

Grouping

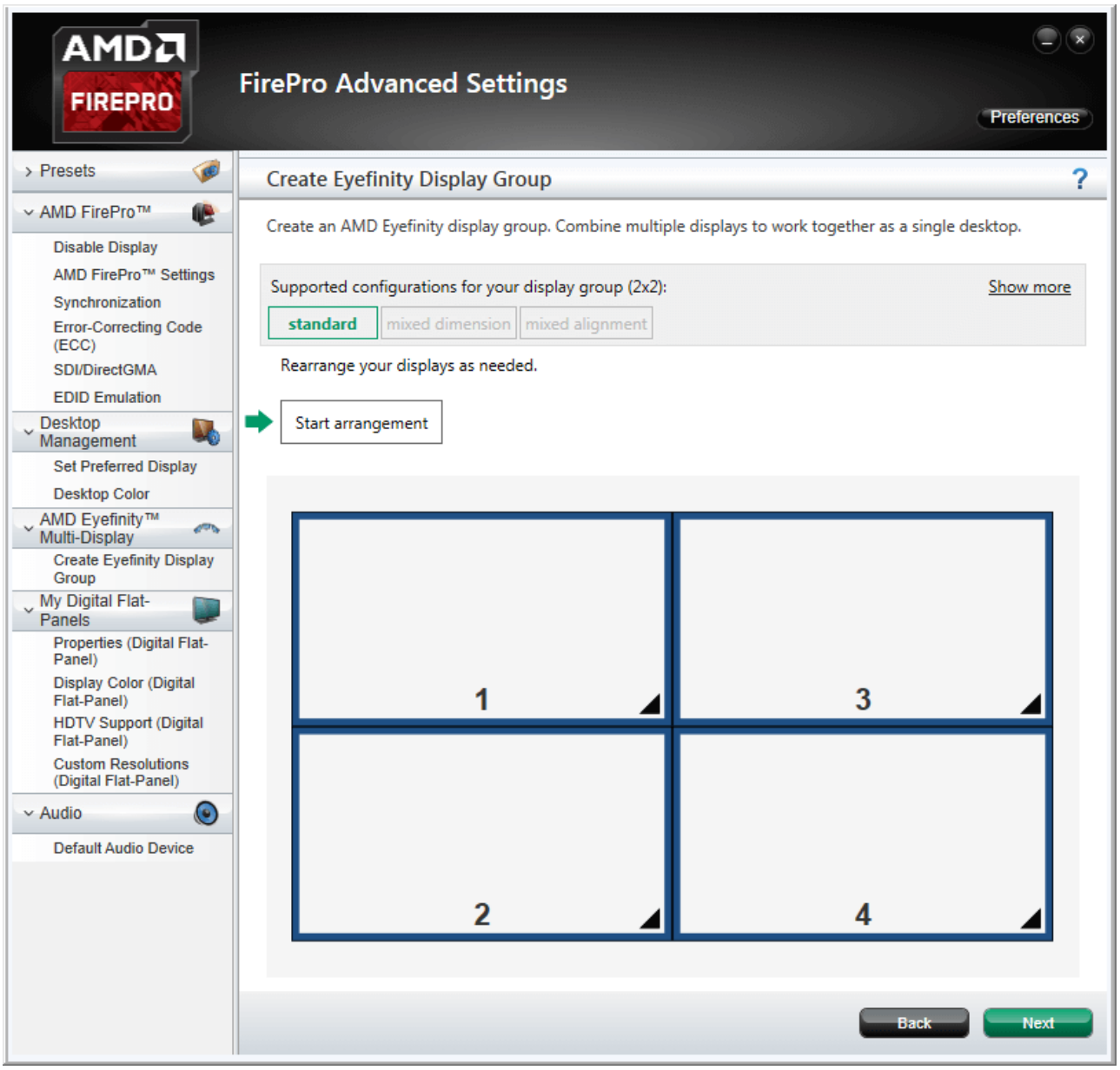
When media is to be displayed over more than one display, the display outputs need to be Grouped. Select ‘Create Eyefinity Display Group’ on the left. This will show how many monitors are connected:



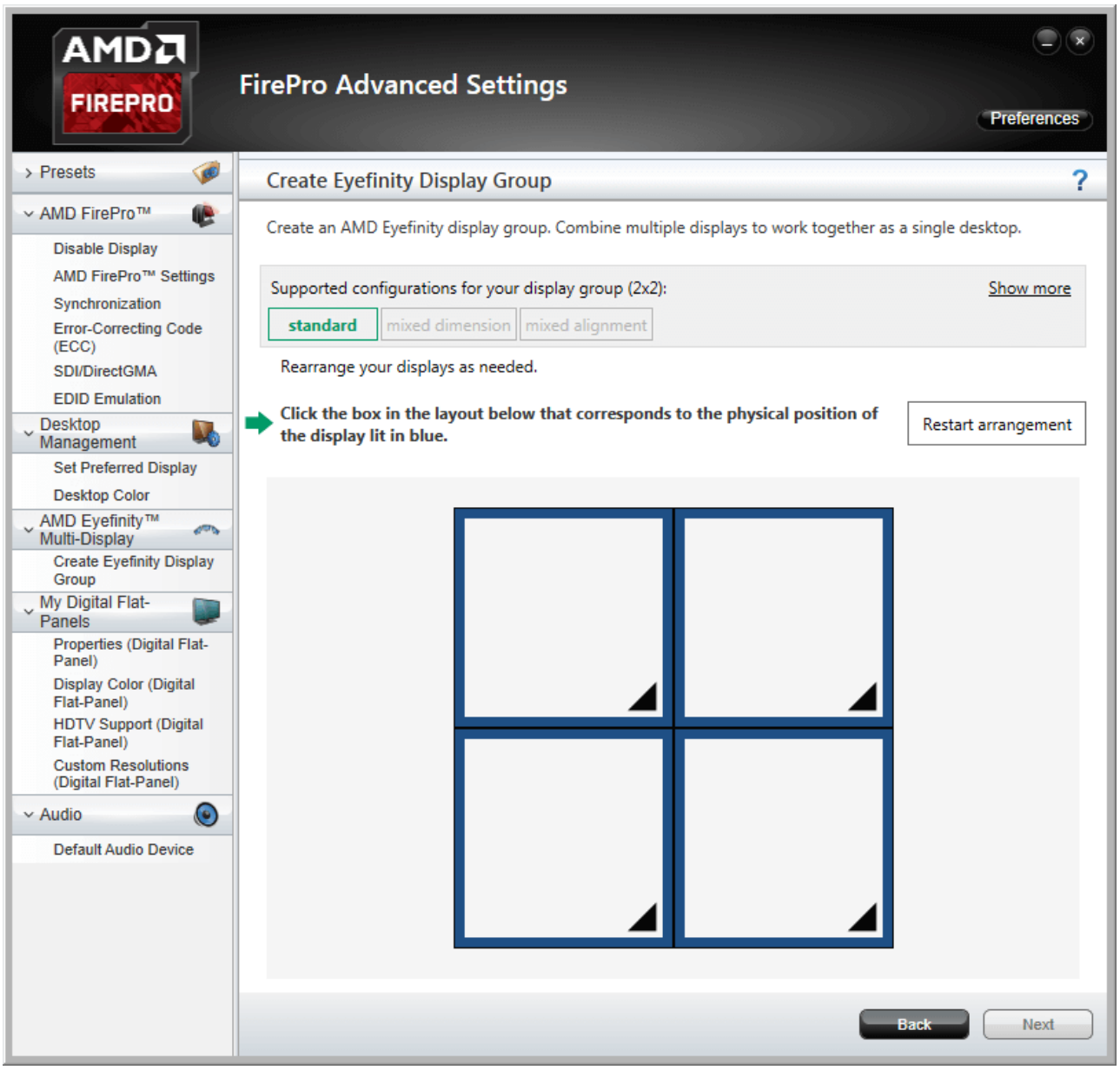
Click on ‘Use a new arrangement’ and then ‘Next’ and choose the matrix you want (AMD format: columns × rows):



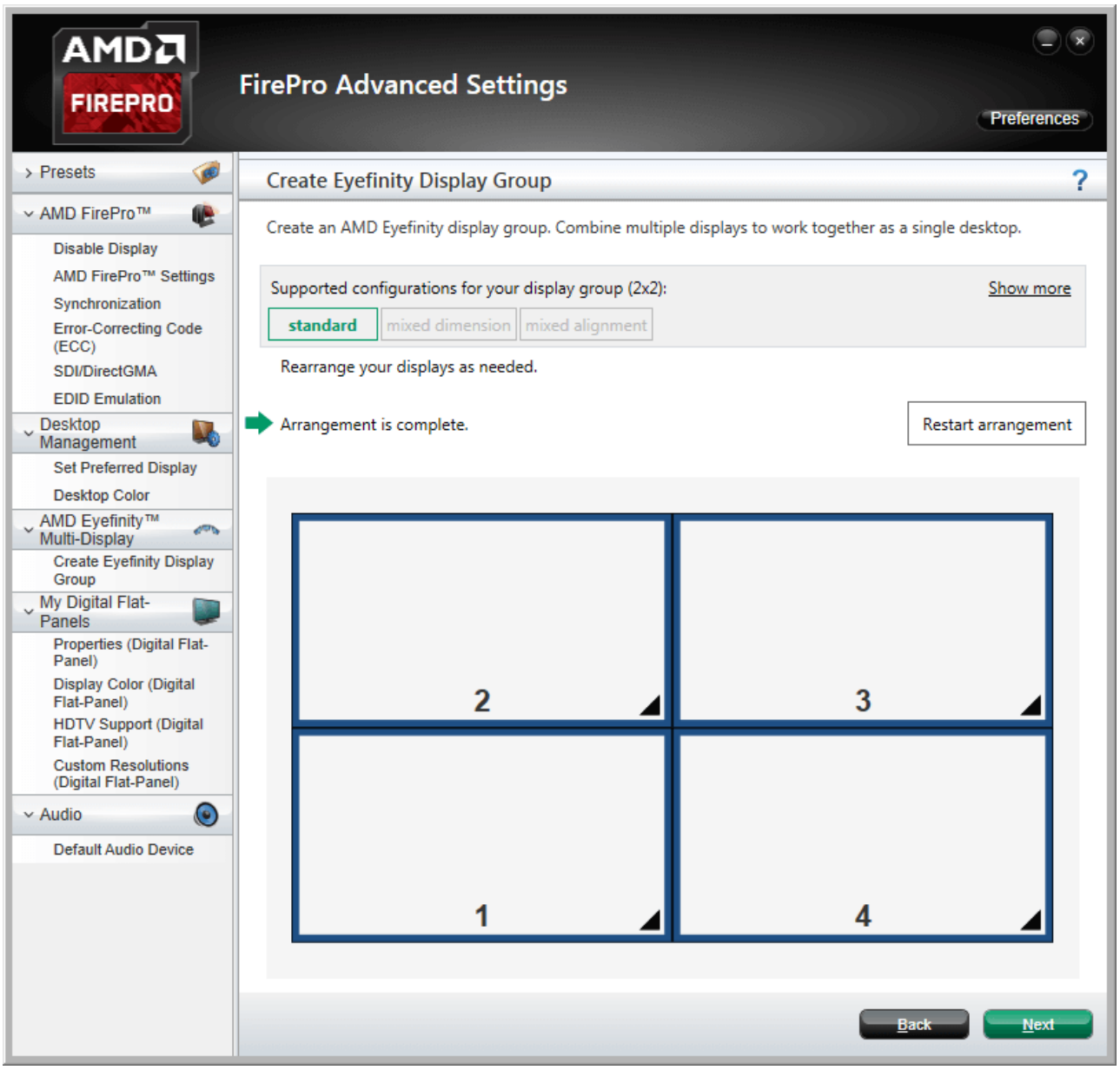
Here a standard 2 × 2 arrangement has been selected: if the appearance is correct, click ‘Next’ and then ‘Start arrangement’ for correct placement of the displays in actual physical order:



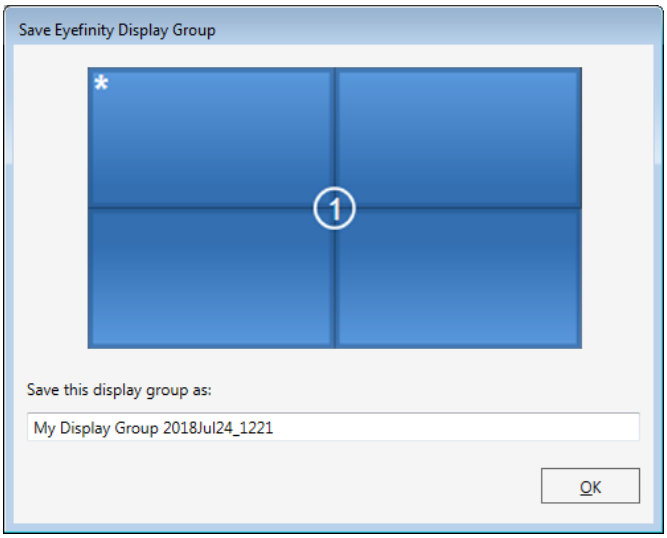
Each monitor will illuminate blue in turn. Click the square in the dialog corresponding to its physical position:



When finished, the actual correspondence will be displayed:



When you click Next you can save the .xml file of the arrangement:



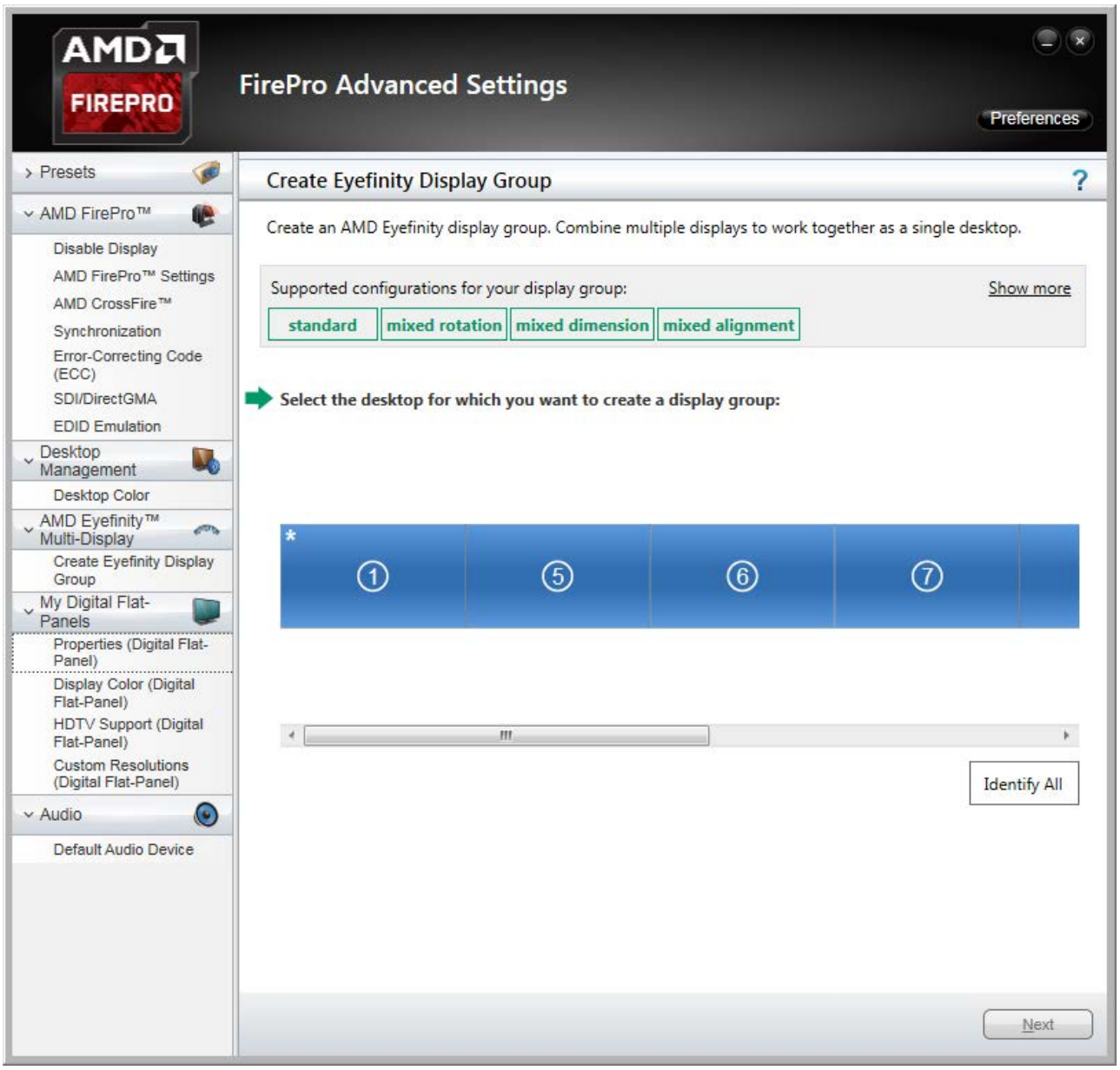
Now that you have a grouped display, return to the Windows display resolution configuration to verify that the resolution of the overall grouping matches the sum of the individual display resolutions.

You are now ready to synchronise displays to an external sync source if required.

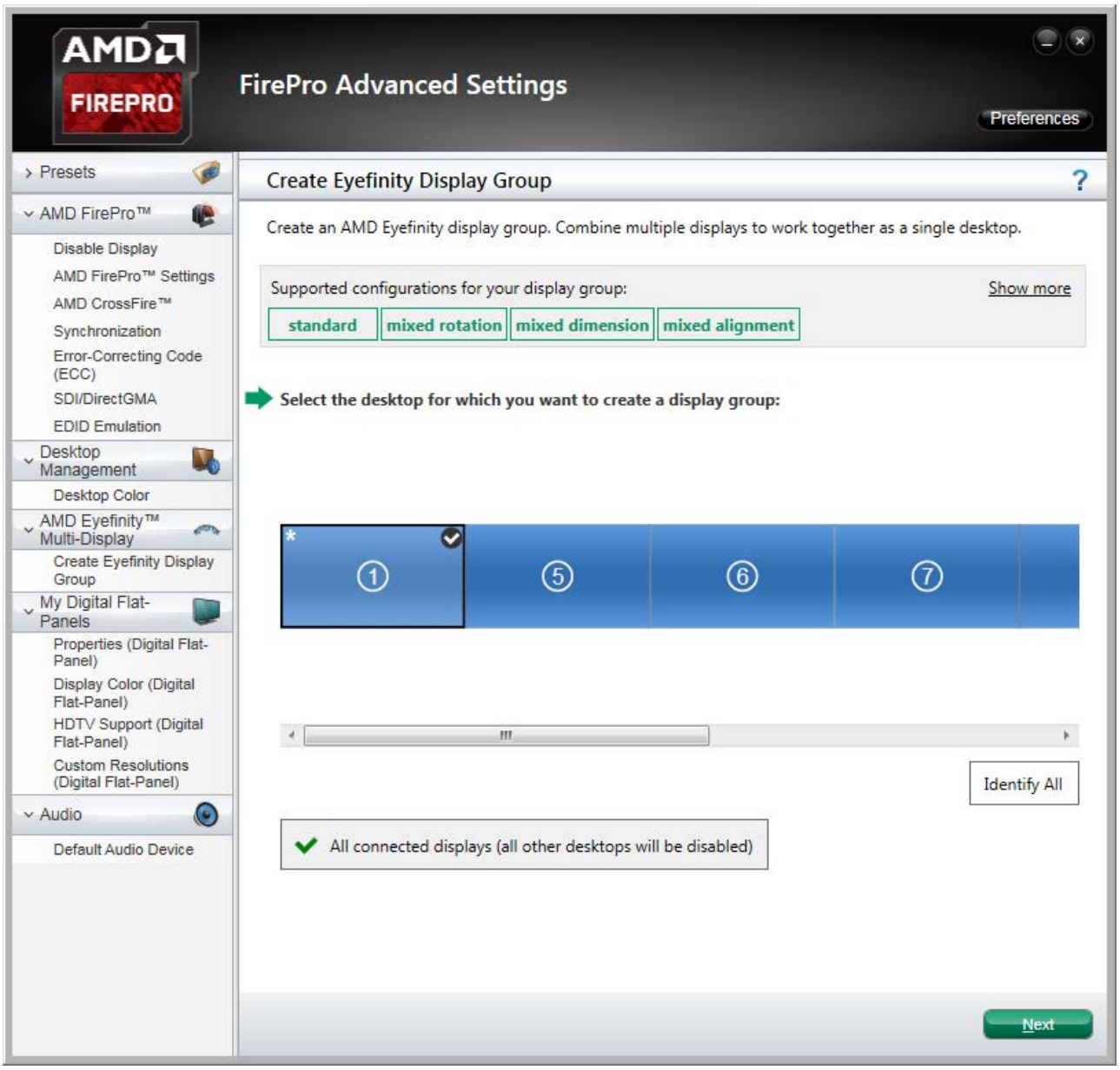
Dual GPU Grouping

For dual GPU grouping, open 'AMD FirePro Advanced Settings'. Select 'Create Eyefinity Display Group'. This will show the available displays, but not which GPU they are connected to. With AMD, displays are grouped as desktops, not as one entire group of displays. You therefore need to address each GPU in turn and group its outputs, following the same process as for a single GPU.

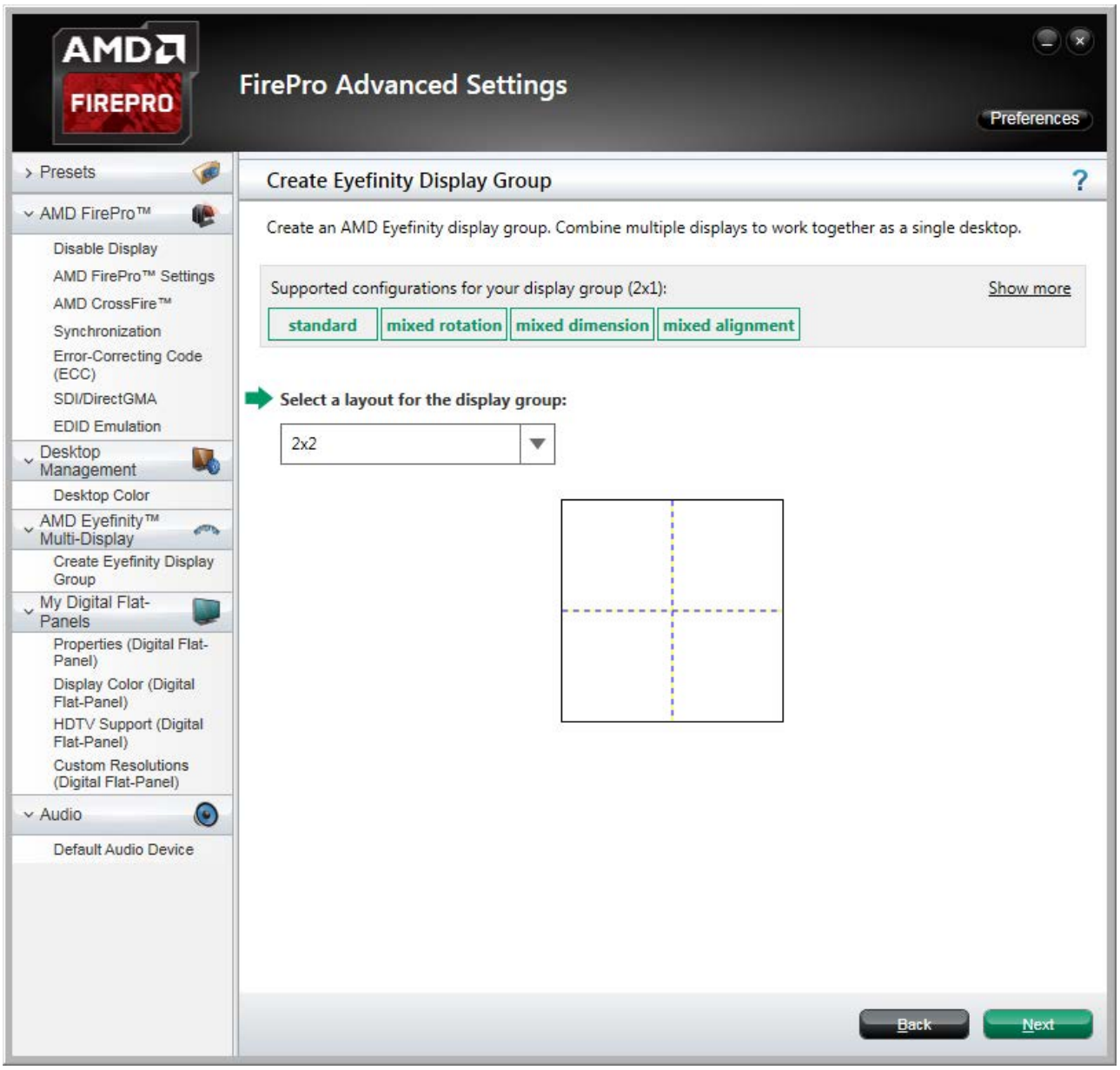
To select the first desktop to group, just click on the blue square of first display. You will see that the number sequence may appear a bit random:



With the first display selected, click Next:

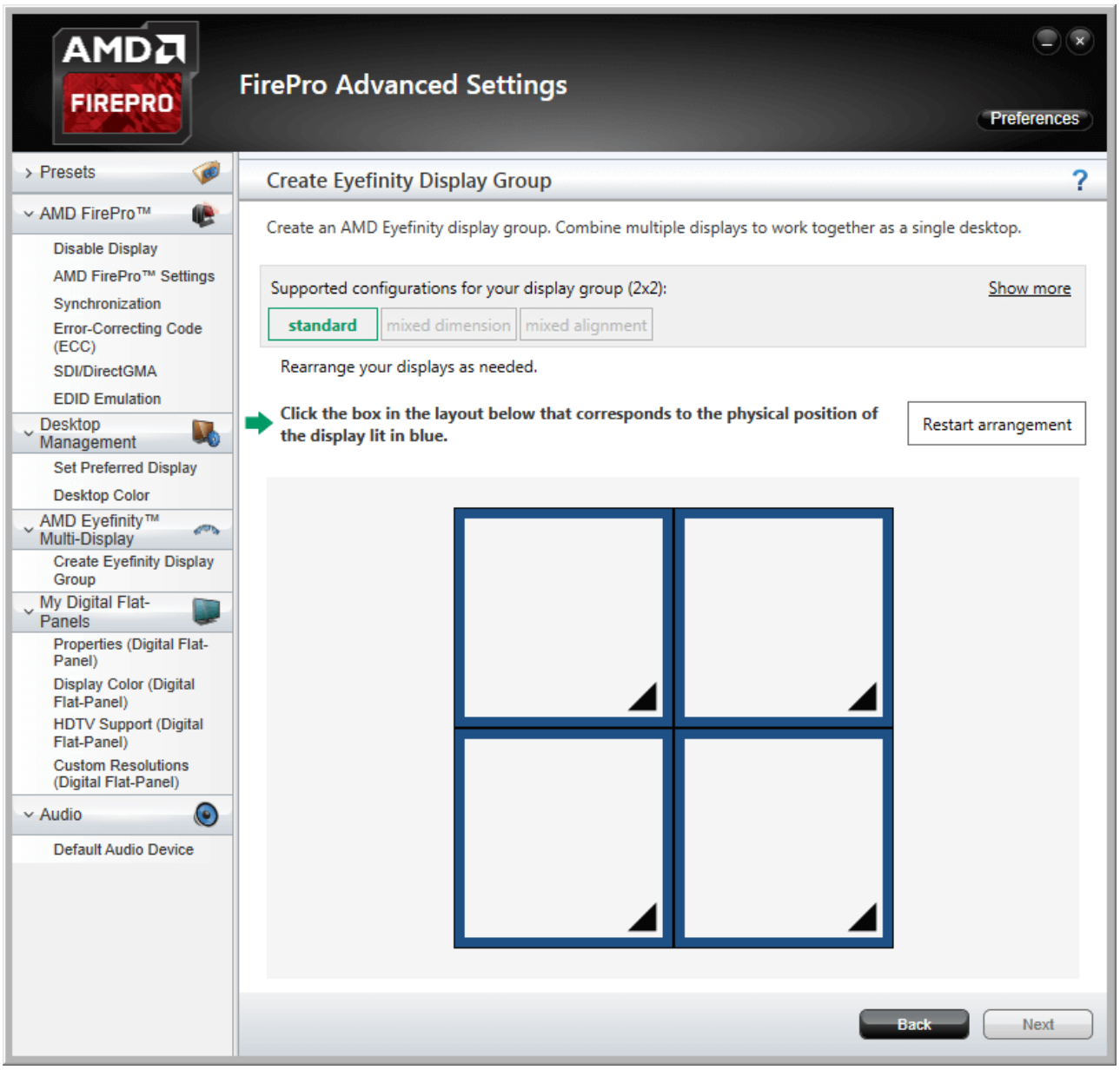


Select a layout for this display group (i.e. the outputs for one of the graphics cards). AMD format is: columns × rows:

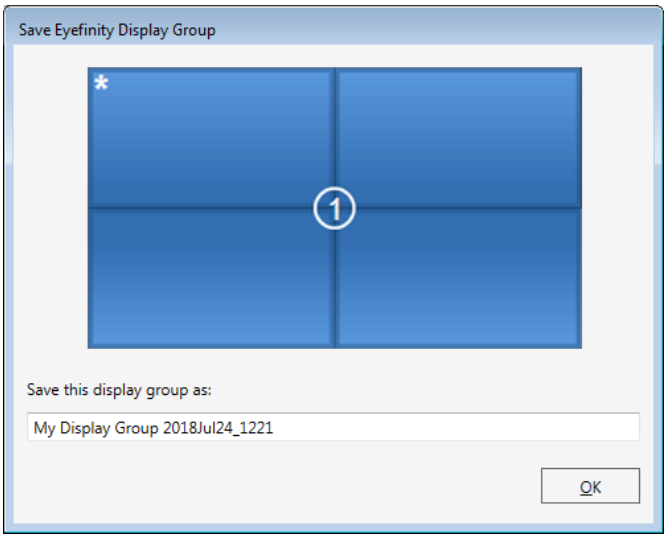


Click ‘Next’ and then ‘Start arrangement’. Displays can now be rearranged into the actual physical order *for this part of the overall display*.

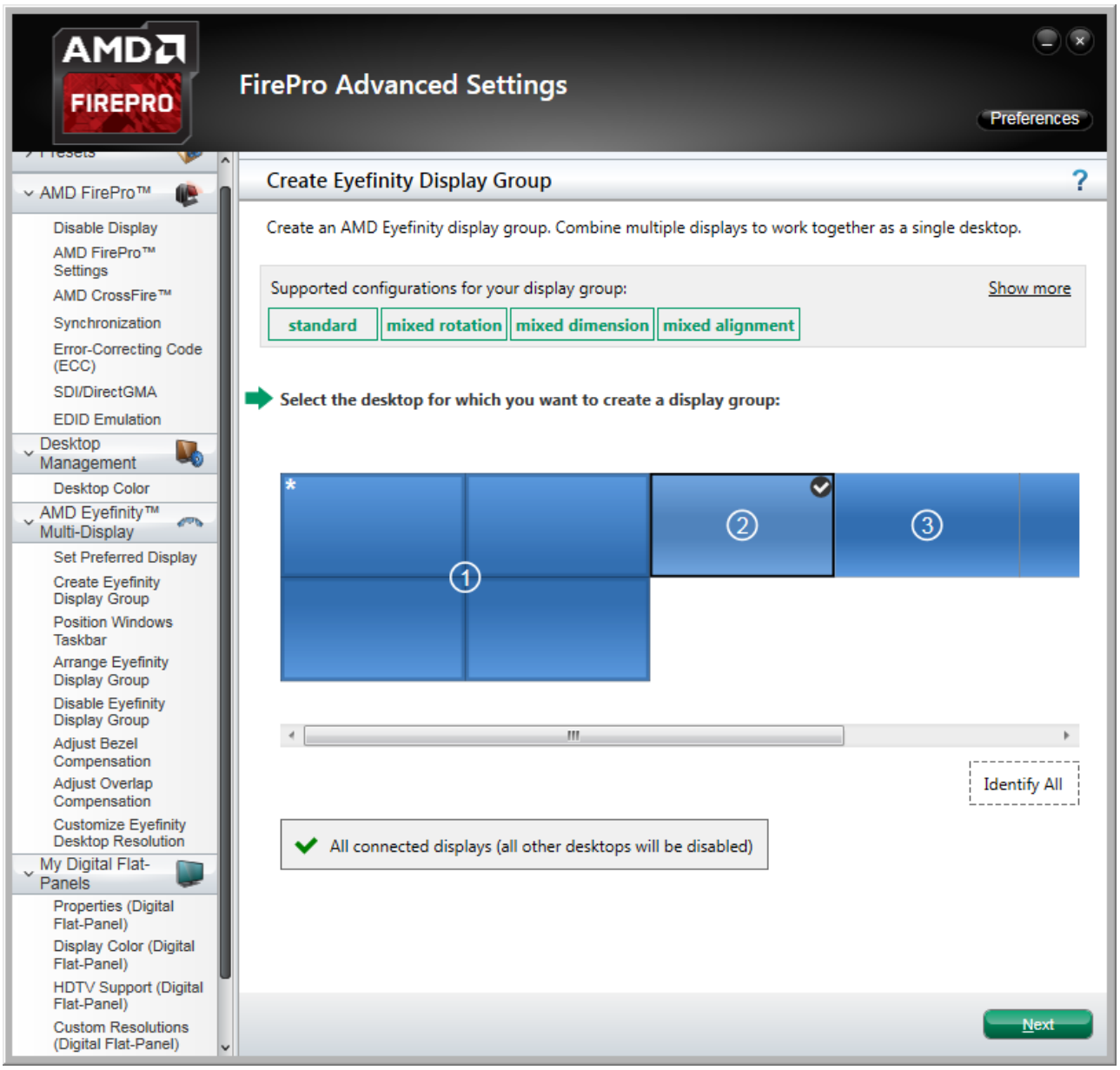
Each monitor will illuminate blue in turn. Click the square in the dialog corresponding to its physical position:



When finished, the actual correspondence will be displayed. Click Next and save the .xml file for this display group:

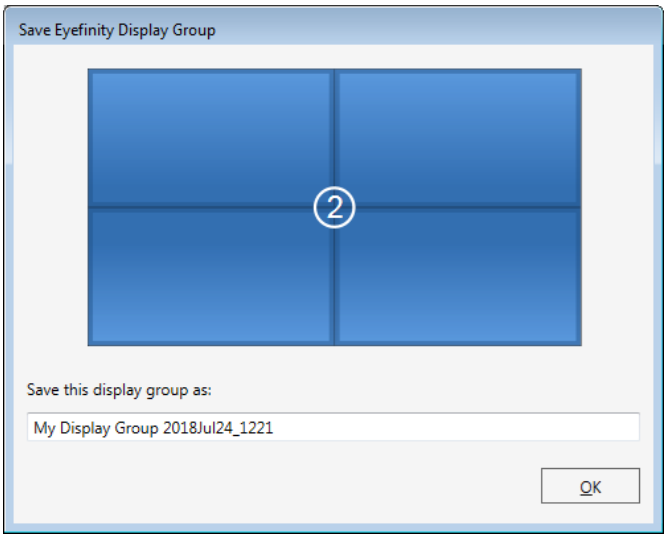


With the first group made, return to ‘Create Eyefinity Display Group’, where you will see the group you have just made, and the ungrouped displays. Click on one of the ungrouped displays (i.e. the next desktop):

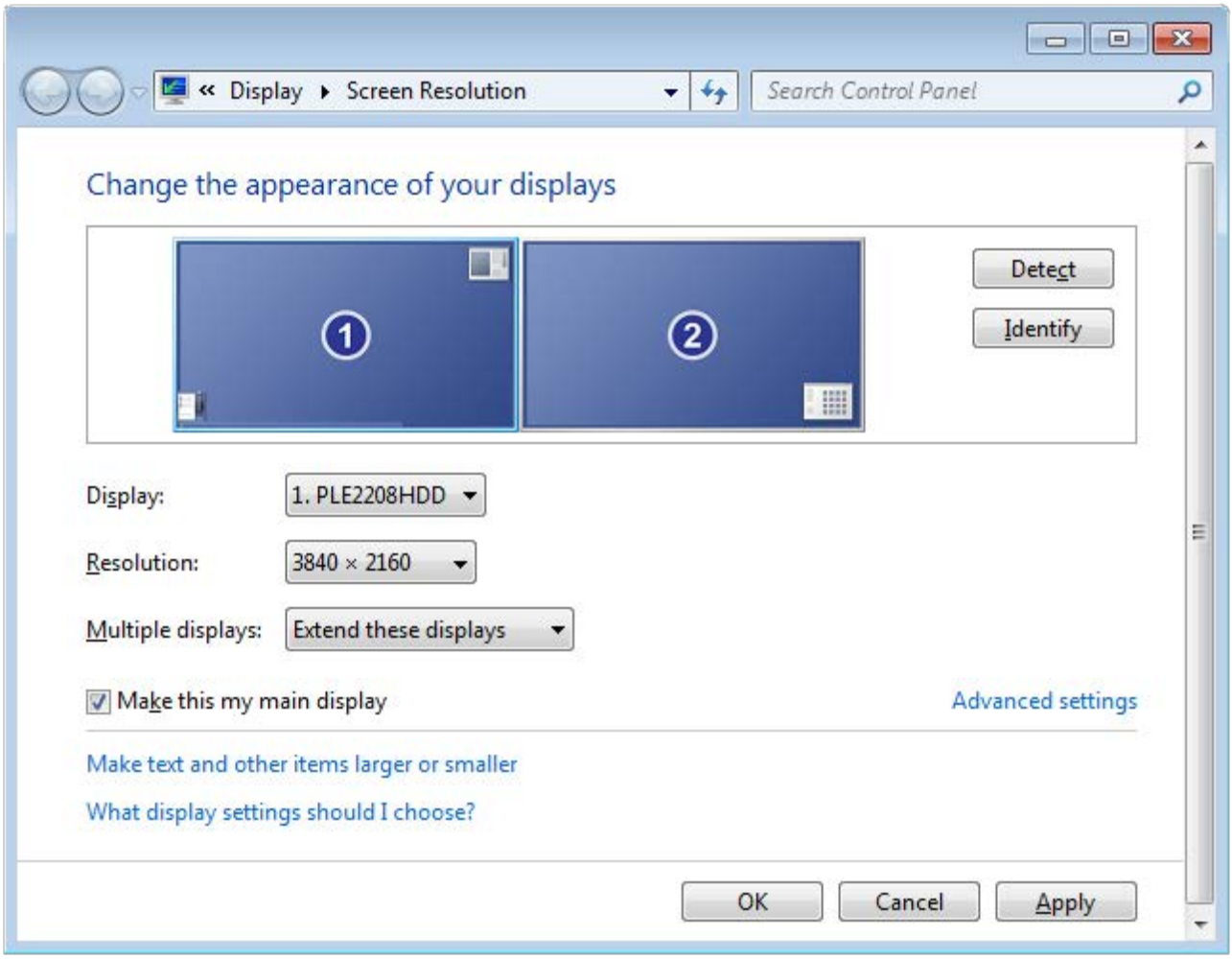


Click ‘Next’ and, as before, select the matrix layout and proceed to arrange the displays so that they correspond to their physical layout.

When all displays have been grouped, save the .xml file for this display group:



It may be that your desktops, as far as Windows is concerned, are not in the right order. Right-click the Windows desktop and select ‘Screen Resolution’:



Drag the desktop groups into the right order, ‘Apply’ and click ‘OK’.

Restart the server.

You are now ready to synchronise displays to an external sync source if required. The procedure is the same as for a single GPU, so this time, open ‘AMD FirePro Advanced Settings’.

FirePro Synchronization (Genlocking)

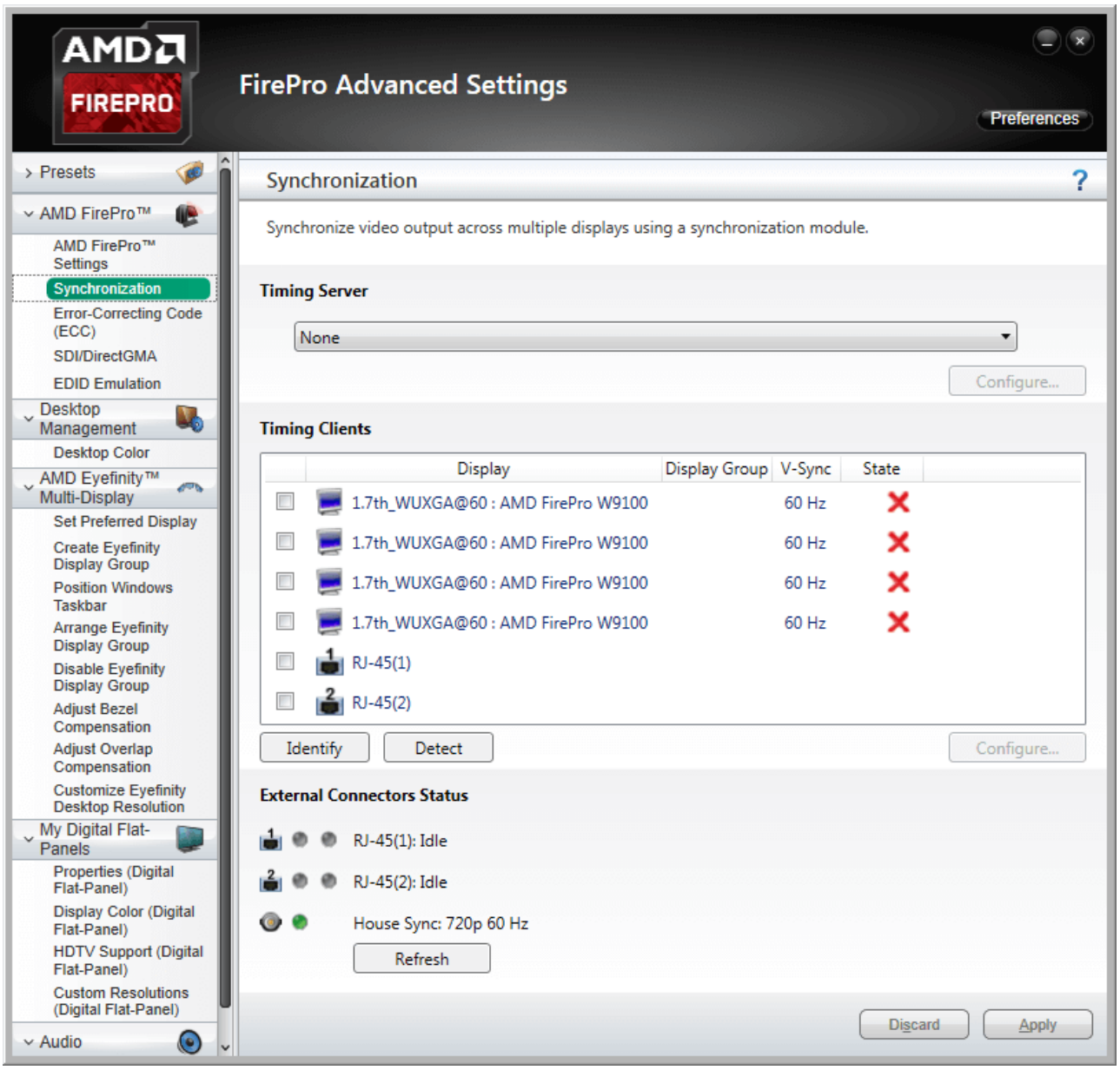
Synchronization between GPUs, and/or with an external signal source (genlocking) requires installation of an AMD FirePro S400 Synchronization Module in each Delta Media Server. This can be linked to a central house sync/reference generator.

Genlocking your system ensures that all output/displays play at precisely the same rate to prevent media tearing. 7thSense Design recommend using House Sync genlocking via the BNC reference port, rather than the framelocking method using the RJ45 ports. This procedure will synchronise your server(s) to a house sync source when using AMD GPUs.

Ensure that a House Sync Generator is plugged in to the S400 Genlock card.

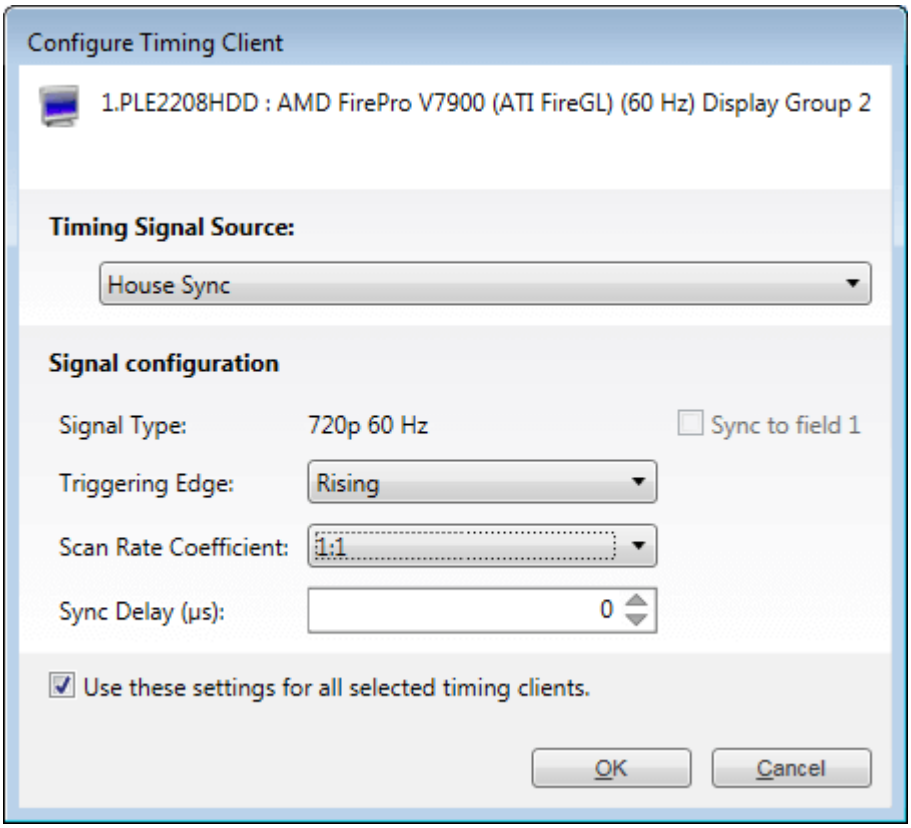
Timing Clients

From the FirePro Advanced Settings, select Synchronization. Each port that has been connected will be displayed. With the Sync Generator connected, the ‘House Sync’ will show the refresh rate of the Sync Generator instead of ‘Idle’. The displays will always appear as a red cross at first, this is just to show that they have been registered in the Advanced settings.



Check all the displays you want to sync.

Click the ‘Configure’ button to select the sync source:



Timing Source Signal

can either be the first display and sync from that or just the normal House Sync. The signal type is displayed here as resolution and refresh rate, e.g. 720p 60 Hz.

Triggering Edge

by default, Rising. Only critical in mixed-GPU scenarios where another default differs.

Scan Rate Coefficient

The EDID rate and Sync rate must match to some extent, either equal, or one a multiple of the other.

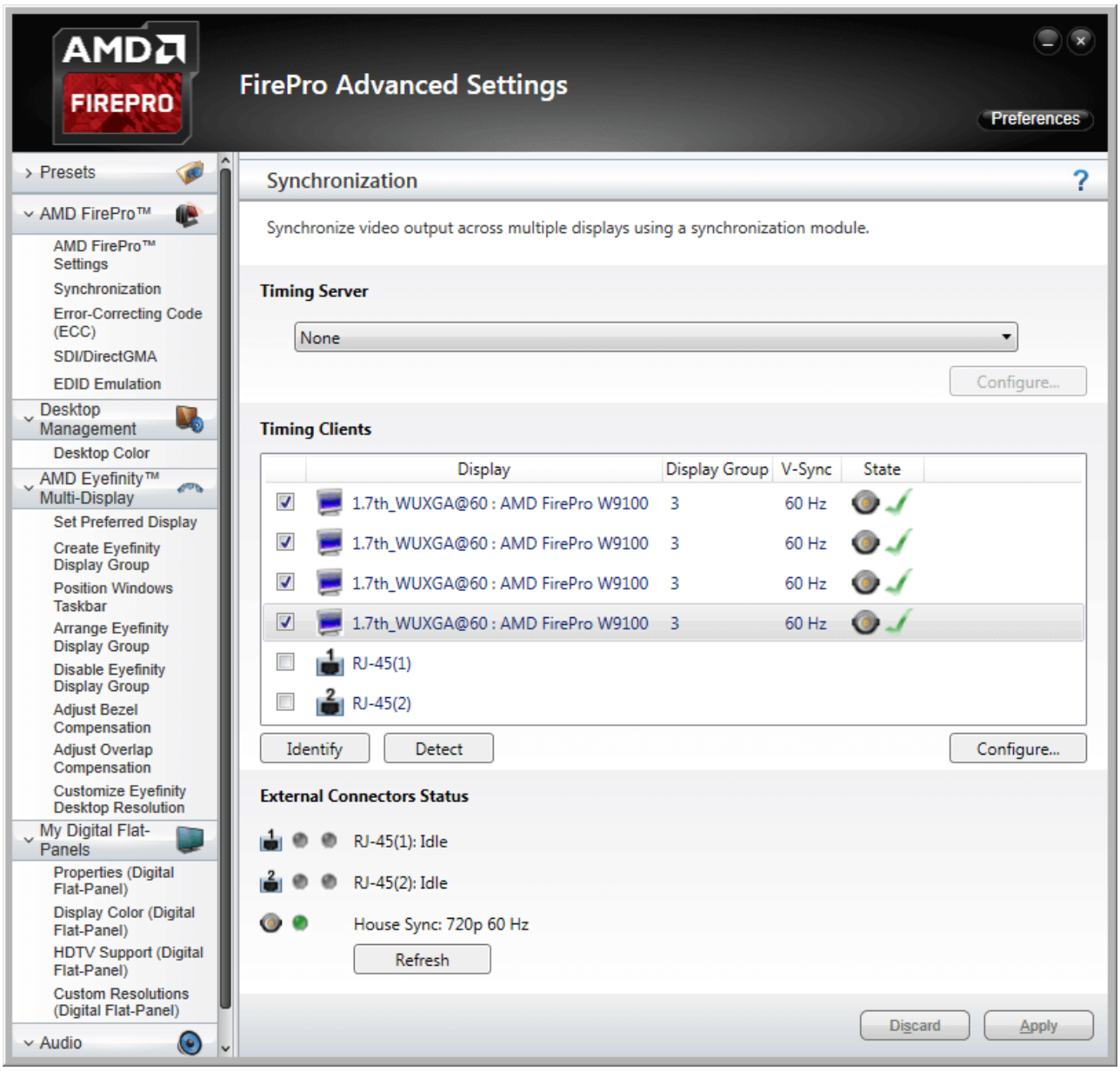
Examples:

EDID is 1920x1080@25, House Sync must be 25 Hz (1:1) or 50 Hz (1:2).

EDID is 1920x1080@120, House Sync must be 120 Hz (1:1) or 60 Hz (2:1).

Check ‘Use these settings for all timing clients’.

Click ‘Apply’. The red crosses will all now be green ticks, and the green light for House Sync will flash on and off:



All ports are now synced together.

Restart the server, then navigate back to the Advanced Settings and check that the connections are still present.

House Sync

House sync is shown along bottom, this is updated as soon as ‘Refresh’ is clicked, and the House Sync indicator will flash green. The LED on the S400 card in the server will now be illuminated steady green. So if the incoming signal from the generator changes, the House Sync will reflect this.

Genlock Polling via DeltaMonitor

Remote server control via the Stack web interface enables AMD graphics sync systems to be addressed remotely. By enabling DeltaMonitor's Genlock Polling you can ensure that any temporary loss of sync signal can be re-established automatically.

Lost Sync?

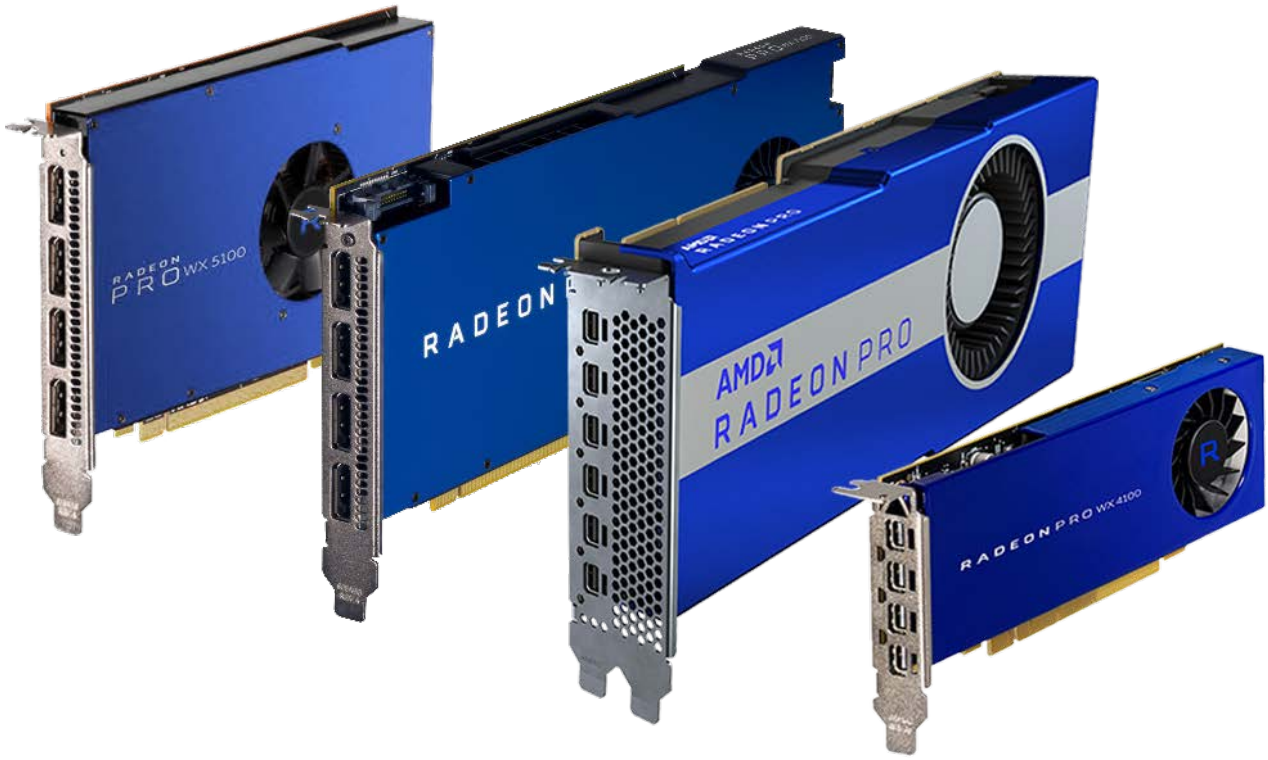
Genlock can be lost if the signal is interrupted (for example if a cable falls out or the sync generator rate is changed): this S400 LED will change from steady green to a slow flash.

If genlock is lost, check all connections and sync generator settings. Restart the server to re-grab the genlock settings.

Note: It is good practice to check all linked servers if there has been genlock loss. If it was due to the source sync generator, genlock will be lost and need resetting on all master and slave servers.

AMD Radeon Pro 18.Q2.1

For AMD Radeon™ Pro WX4100, WX 5100, VII and WX 7100 graphics cards, and for FirePro™ W600, using Radeon Pro Software, Enterprise Edition, version 18.Q2.1, under Windows 10.

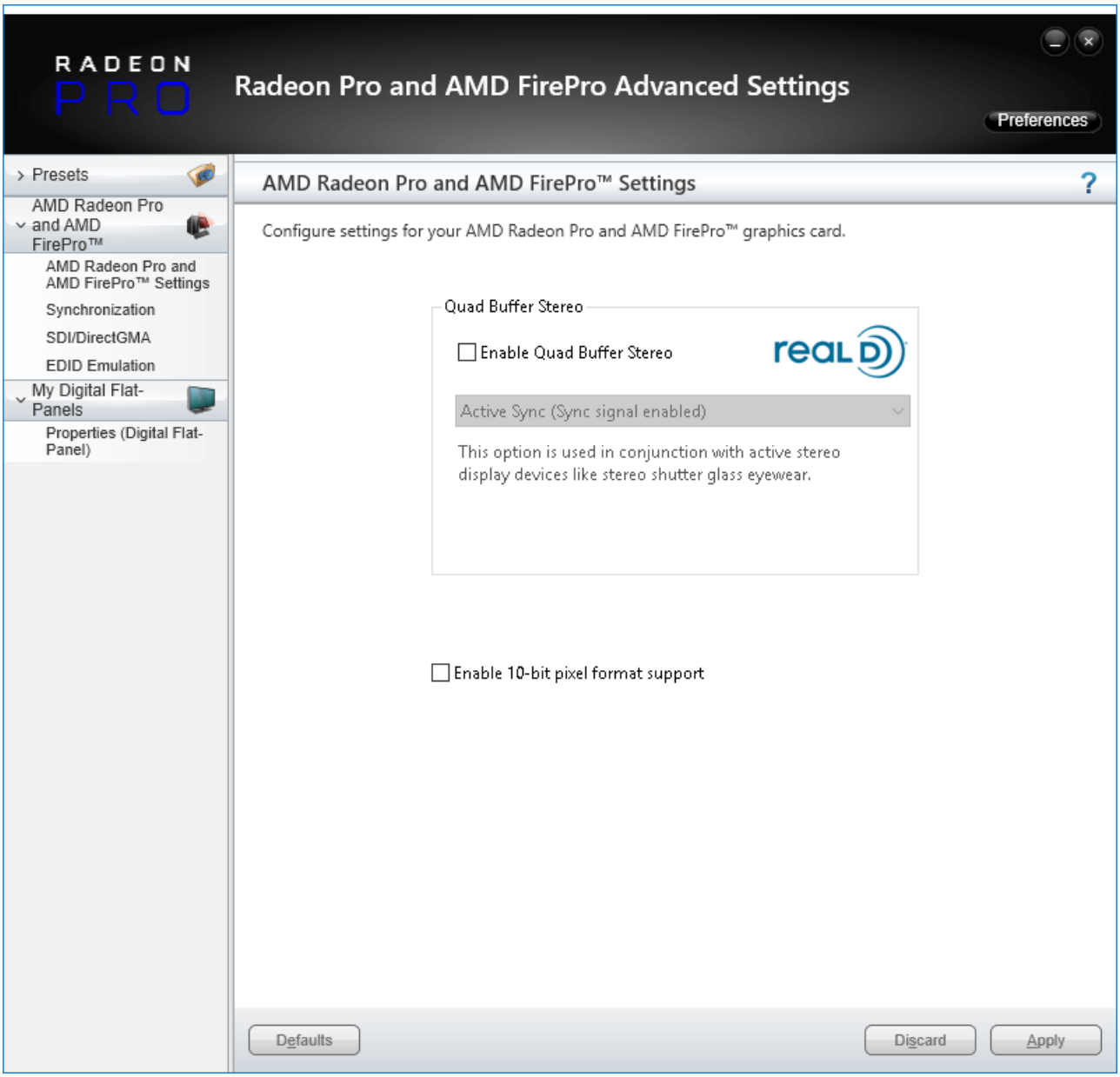


Note that currently only one of these cards can be used per server in Windows 10. A single GPU can be synced, but not two in the same server.

Advanced Settings

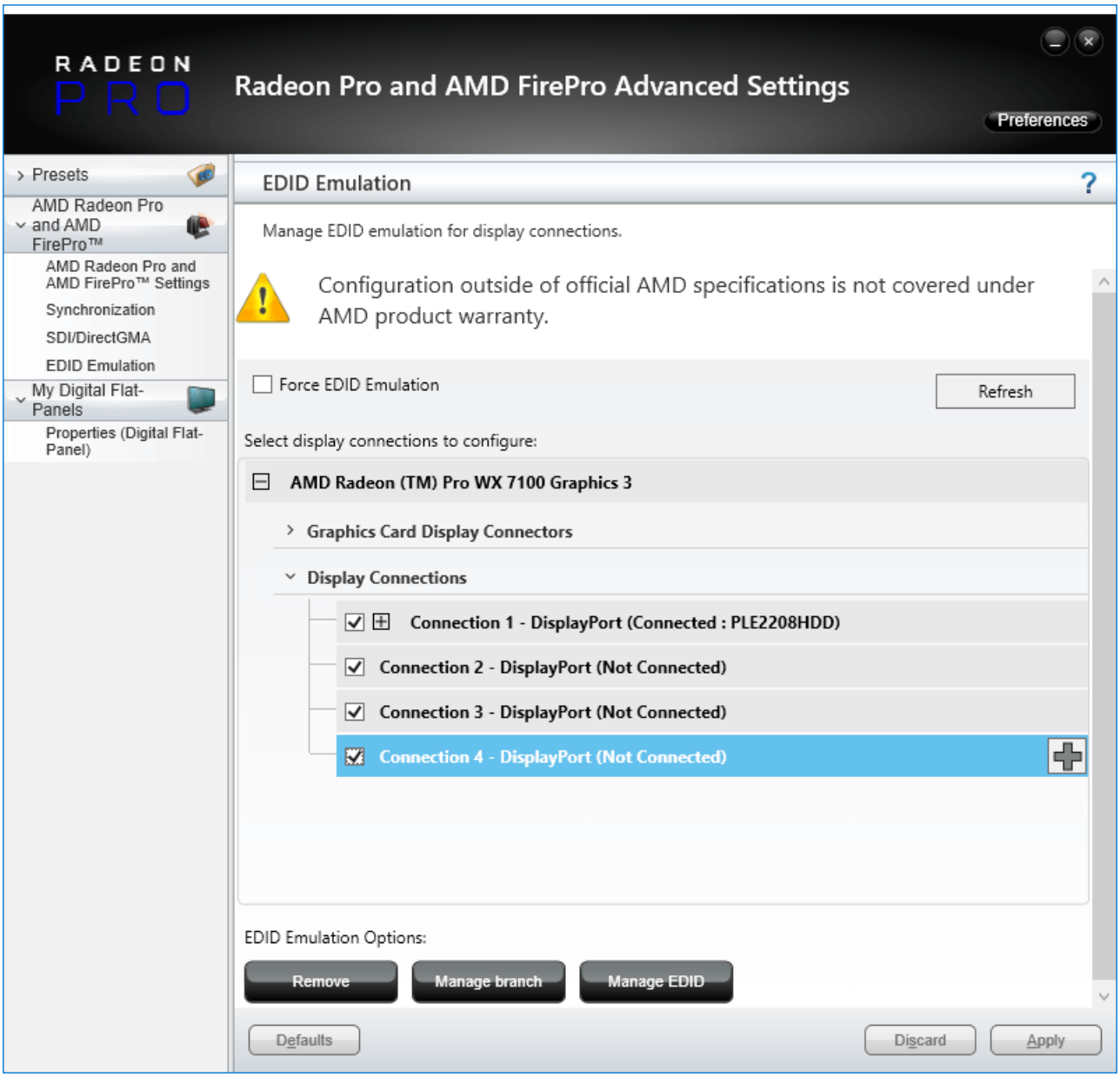
First connect display adapters into all required GPU ports. These must all be of the same type.

From Windows Start, open AMD Radeon Settings:



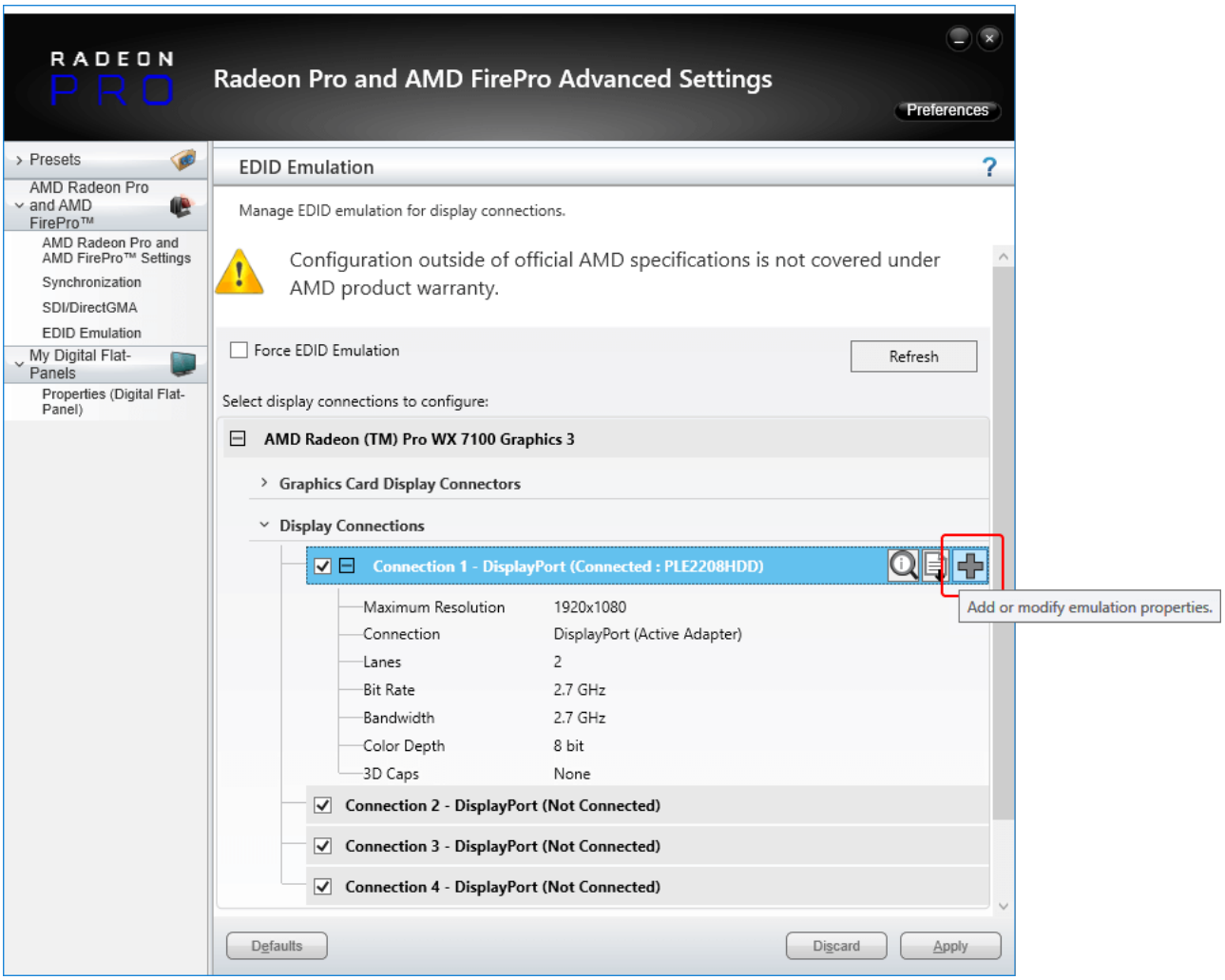
EDID Emulation

Select EDID Emulation from the left-hand menu, then click to small + box under ‘Select display connections to configure’, to expand the available GPU connections:

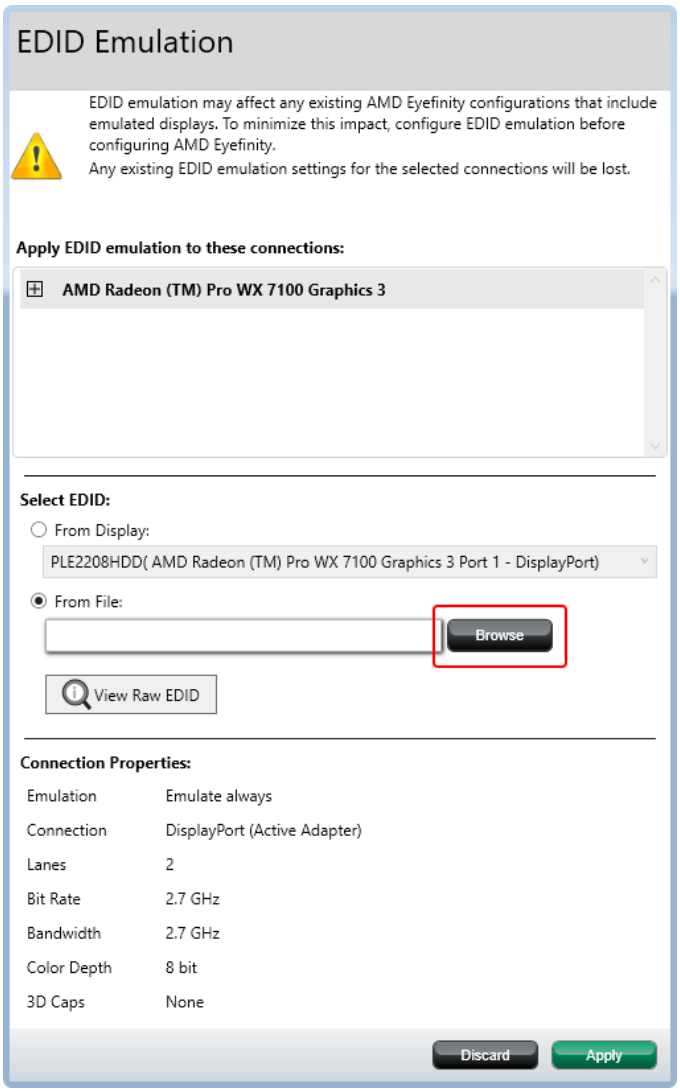


In this example, a single Radeon WX 7100 in installed, and you can see that whilst we have four adapters in the GPU ports, only one is connected. Select the connected port:

- the magnifier shows raw information about the current EDID
- the page icon downloads the current EDID, in this case, the PLE2208HDD EDID from the connected monitor
- the large **+** will add an EDID to connections with a ticked check box. Click this to open a dialog:



From the dialog, select EDID ‘From File’ (file type *.bin) and browse to C:\Program Files\7thSense\Delta\Utilities\EDID Files:



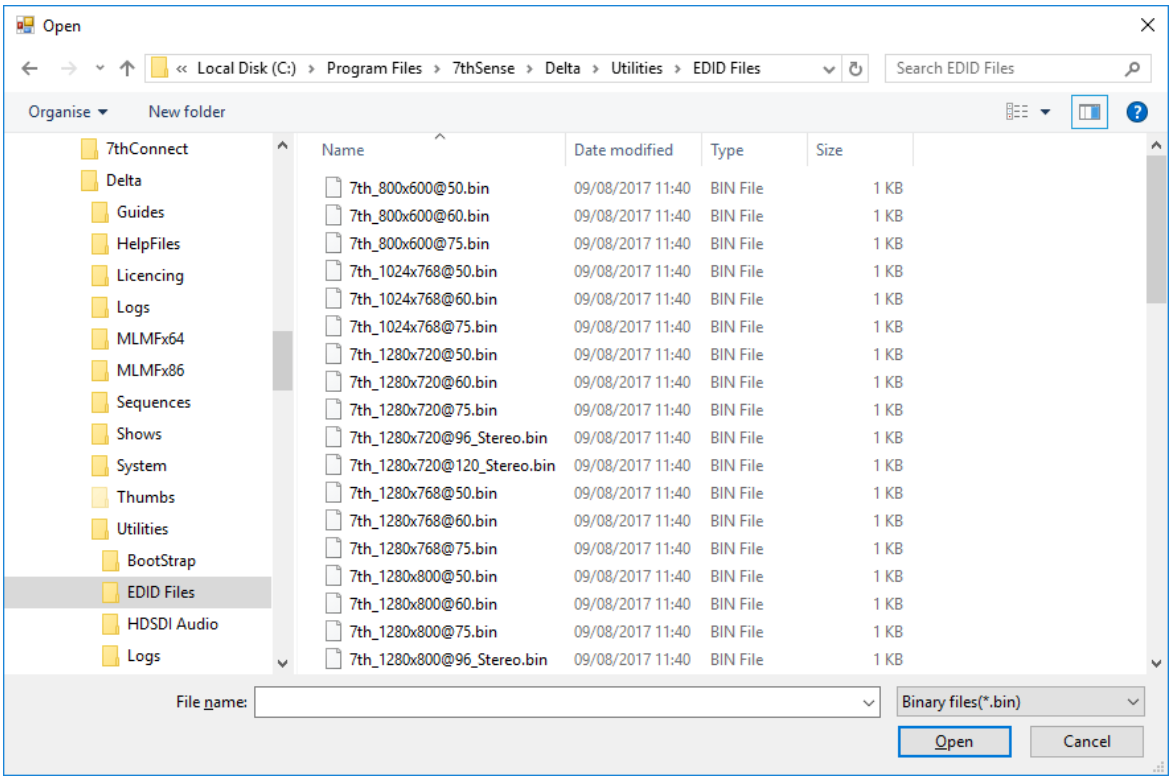
In the Connection Properties:

- **Lanes** should be set to 4.
- **Bit Rate**: dual link or above, 5.4 GHz, otherwise 2.7 GHz.
- **Bandwidth** should be changed to 5.4 GHz for higher output EDIDs, e.g. 4096 × 2160@60.
- **Color Depth** 8-bit or 10-bit depending on output required. This is important for Working in 10-bit Colour Depth.

Select the EDID that you want to use and change the properties underneath. You can either apply the EDID from the display (if connected) or load a *.bin file in the local directory (select 'From File' and Browse to the file).

Finding the right EDID

7thSense provides a collection of available EDIDs, located in: C:\Program Files\7thSense\Delta\Utilities\EDID Files. Change the file type (bottom right) to binary to see these files:



Select the EDID for the right resolution, bit depth and frame rate. Some EDIDs indicate specific interface types (HDMI, DVI); take care to select the correct option. Display devices (projectors, monitors) have their own set of embedded EDIDs that can also be used. Open the selected EDID then ‘Apply’, to apply it to all of the selected AMD display connections.

The Advanced Settings page will now display which EDID is connected to the relevant ports.

Unexpected screen resolution?

If, after emulation, the resolution is different from what you are expecting (an EDID can contain multiple resolutions and refresh rates), you will need adjust Windows display settings.

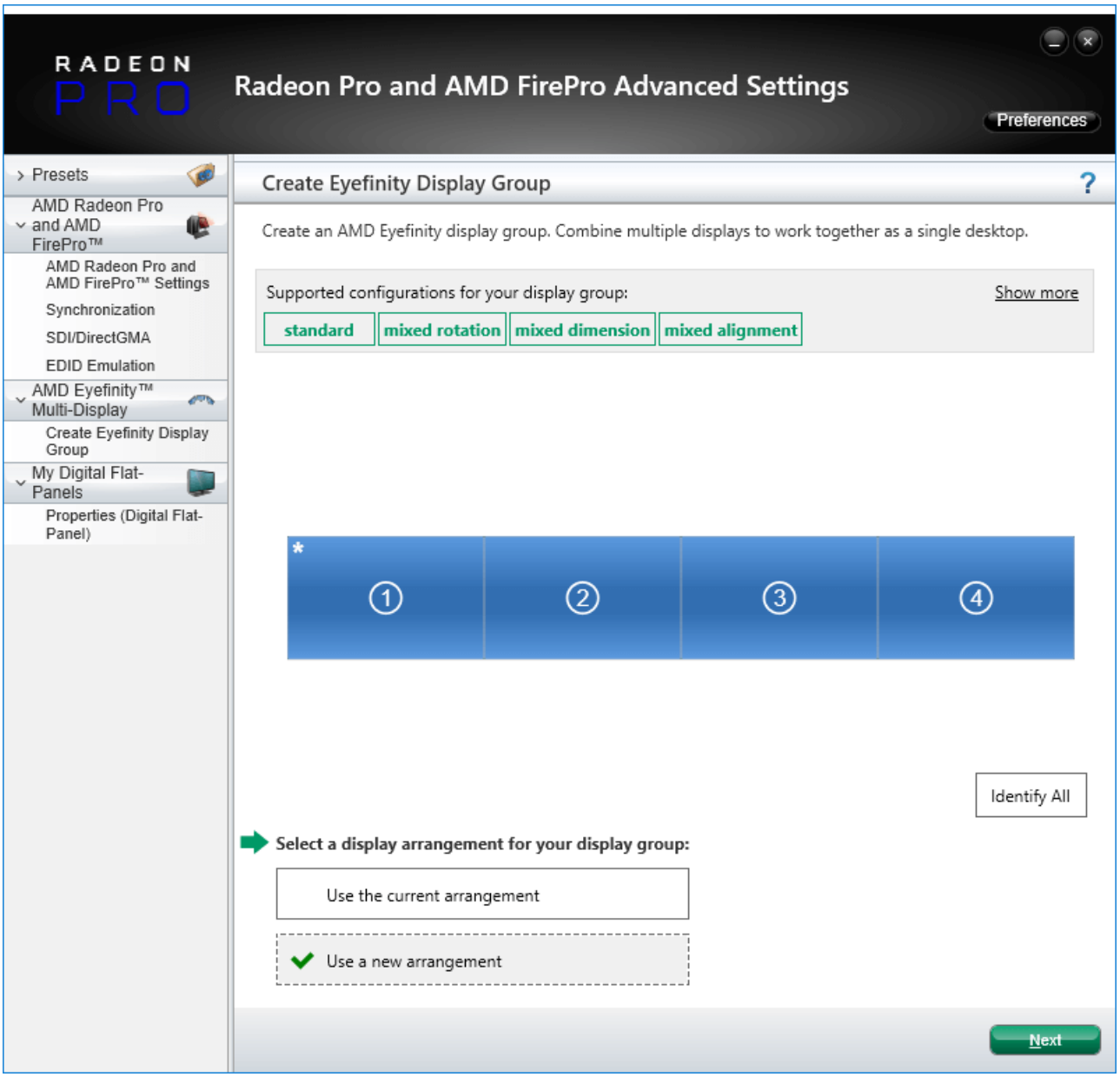
Right-click on the desktop and select ‘Display Settings’. In ‘Customize your display’, scroll down to the bottom of the page and select ‘Advanced Display Settings’. Then select ‘Display Adapter Properties.

In the Display Adapter Properties window, click ‘List all Modes’ at the bottom and then select the resolution from the drop-down menu (this may need to be applied per output).

With the correct resolution now set for each output, proceed to grouping configuration your displays.

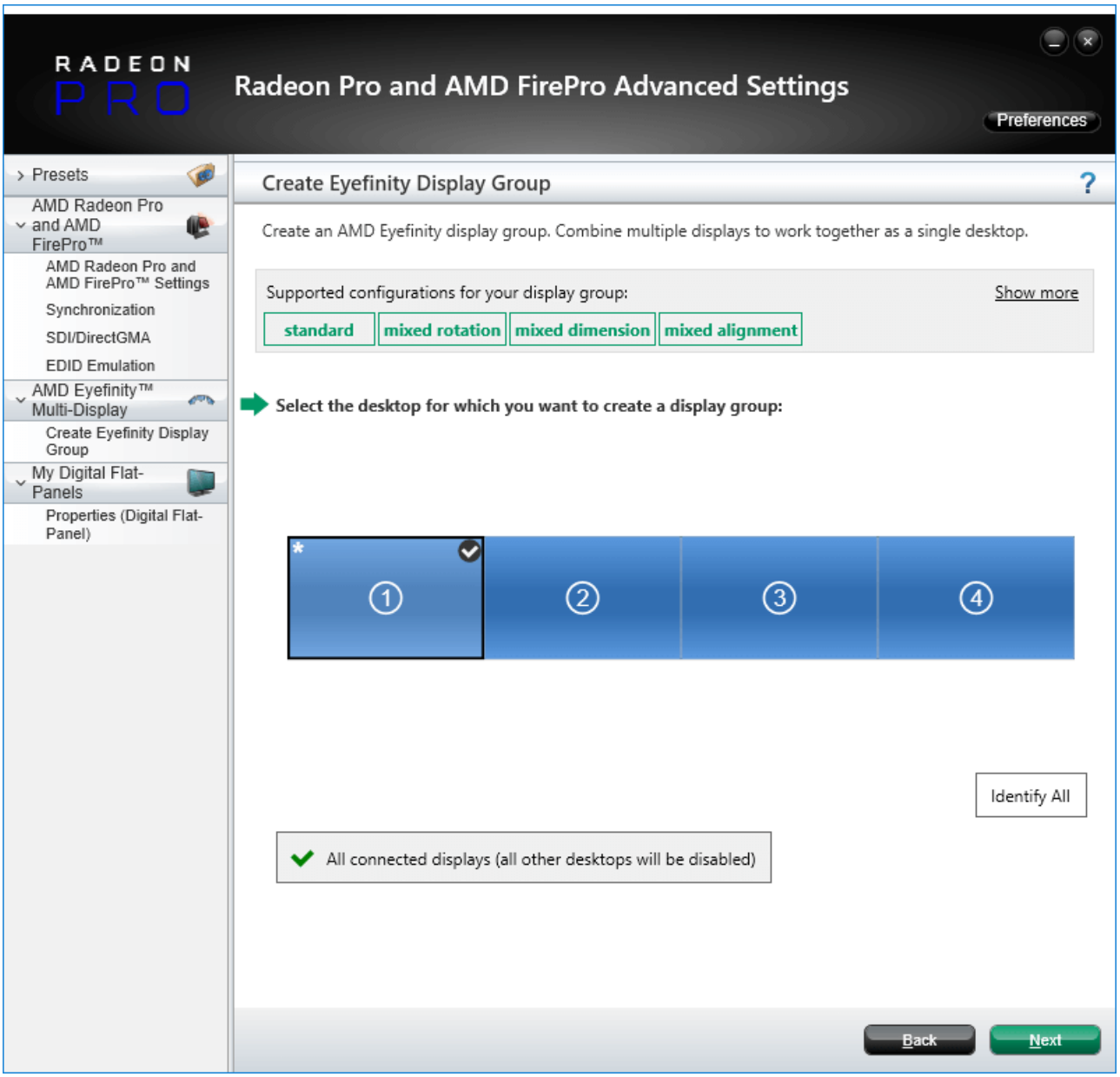
Display Grouping

From AMD Radeon Settings, select from the left-hand menu, ‘Create Eyefinity Display Group’:

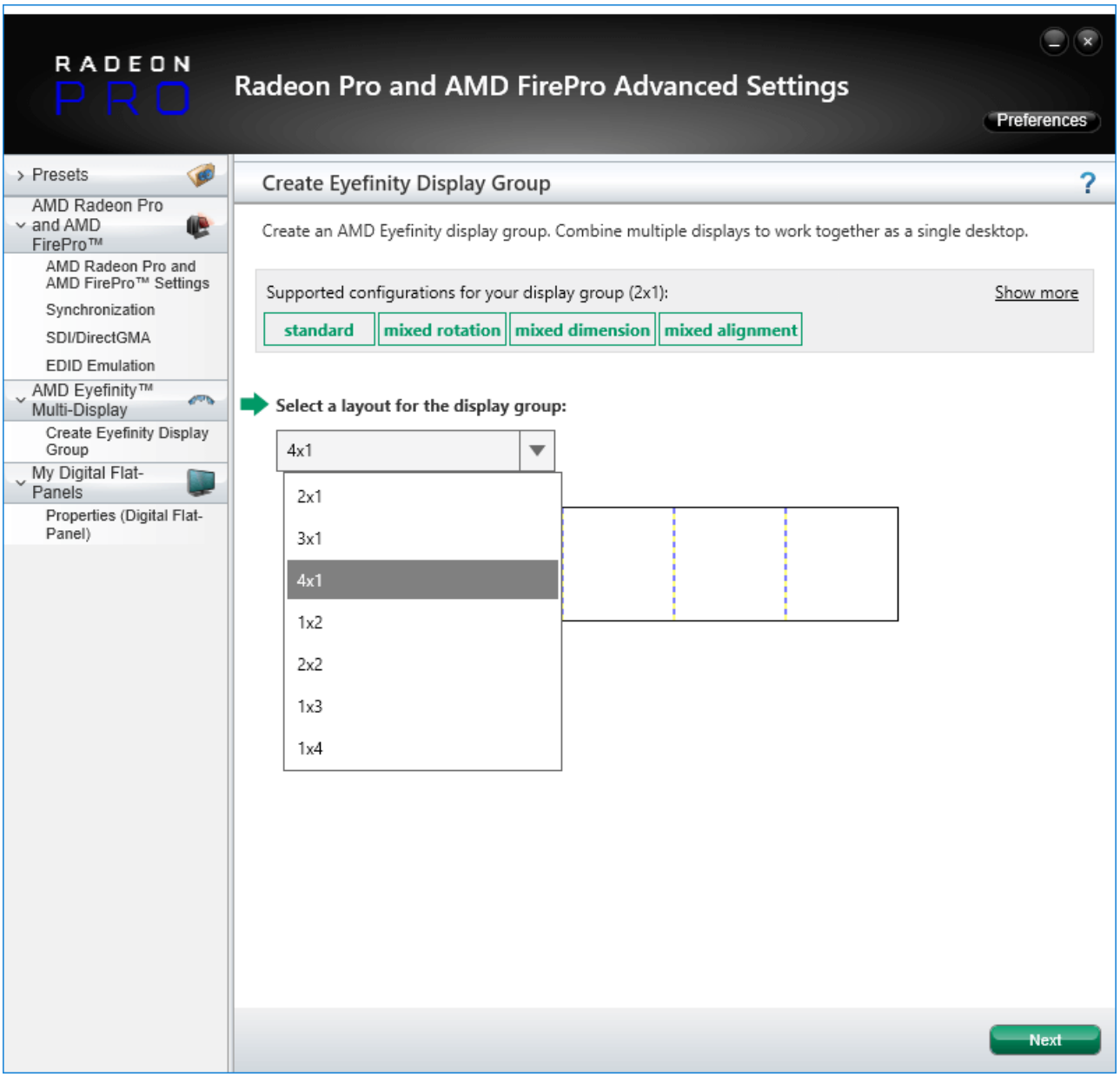


Select ‘Use a new arrangement’ and click ‘Next’.

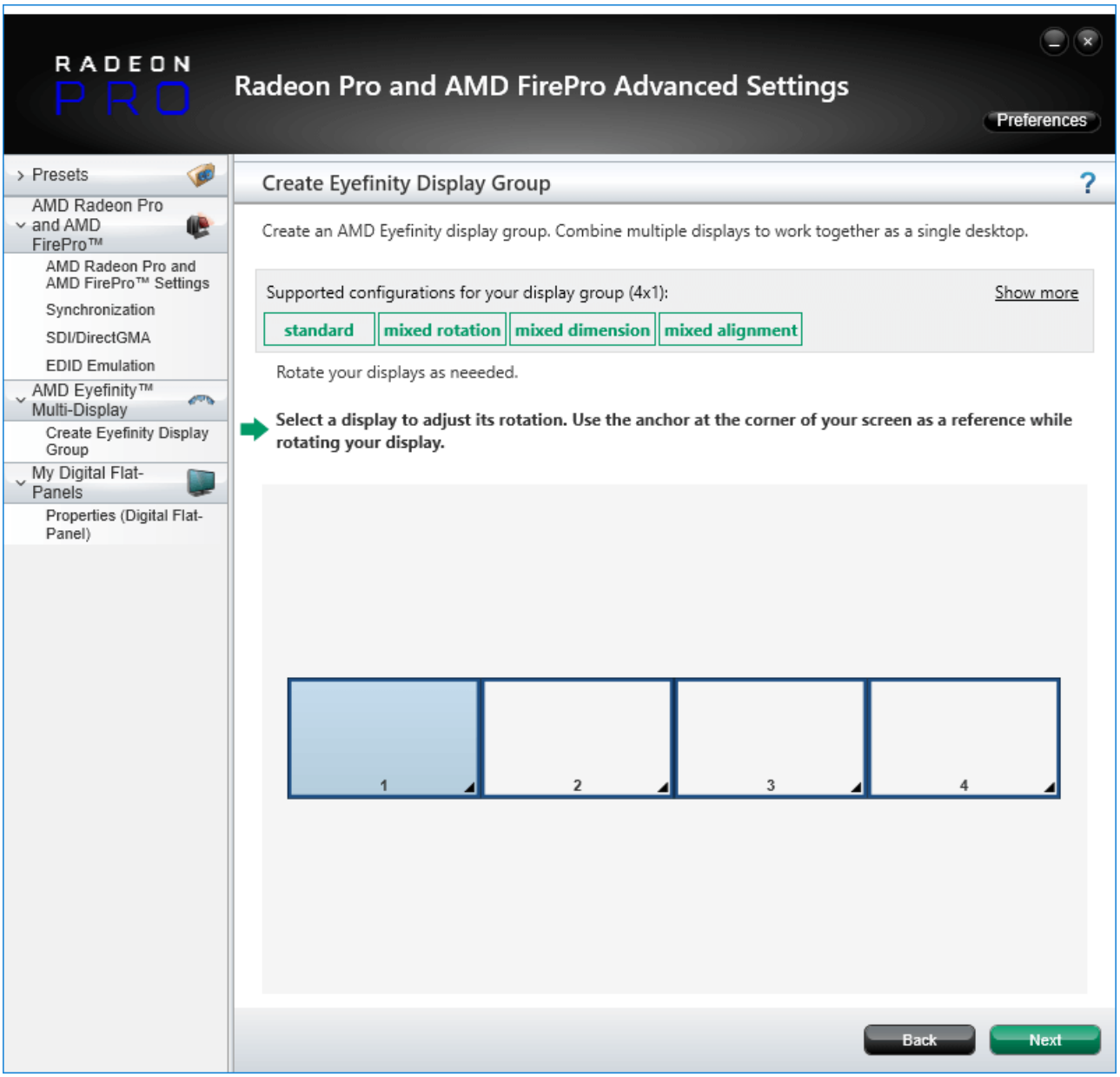
Now select your primary display (the one marked with an asterisk in its top left-hand corner) and click Next:



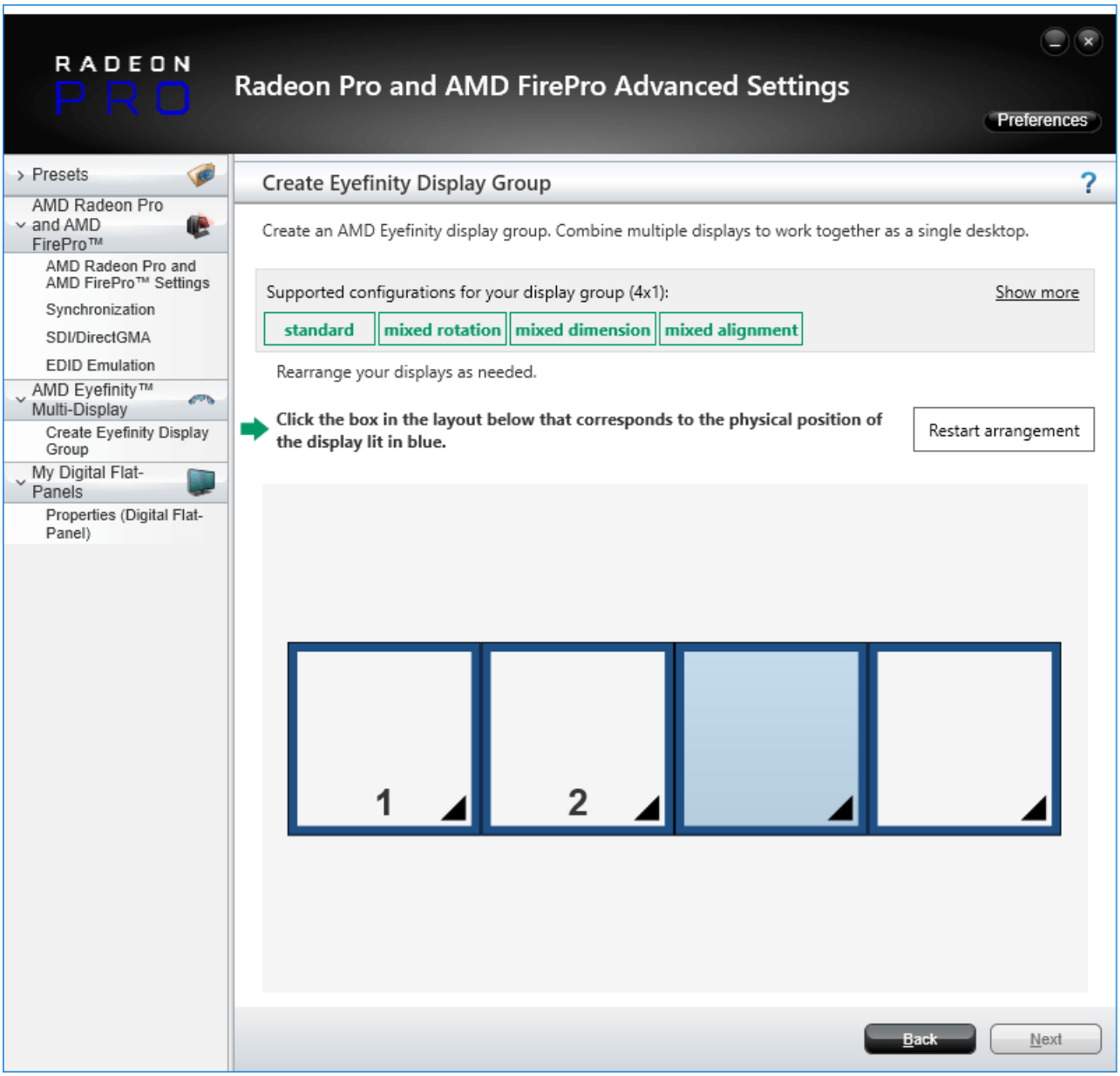
Select your desired matrix from the dropdown menu and press ‘Next’:



If you need to rotate any display, do this here, or just click ‘Next’:



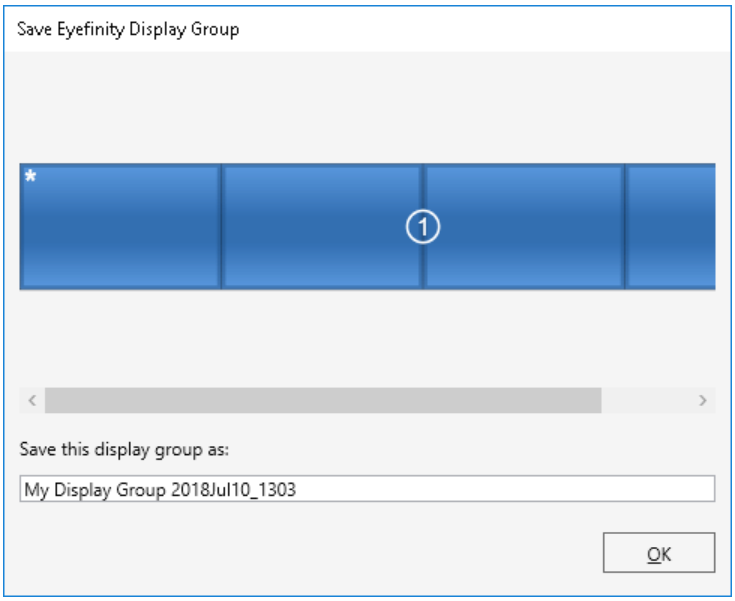
Click ‘Start Arrangement’ which will cause each screen to turn blue:



Click each display in sequence for its matrix position. When correct, click Next.

The next step allows for alignment should you require it. Finally click ‘Next’.

The displays will go black, the group will now configure itself, and once complete, will bring up a window where you can save the group name as ‘My Display Group [Date]’ – or as you prefer – and press ‘OK’:



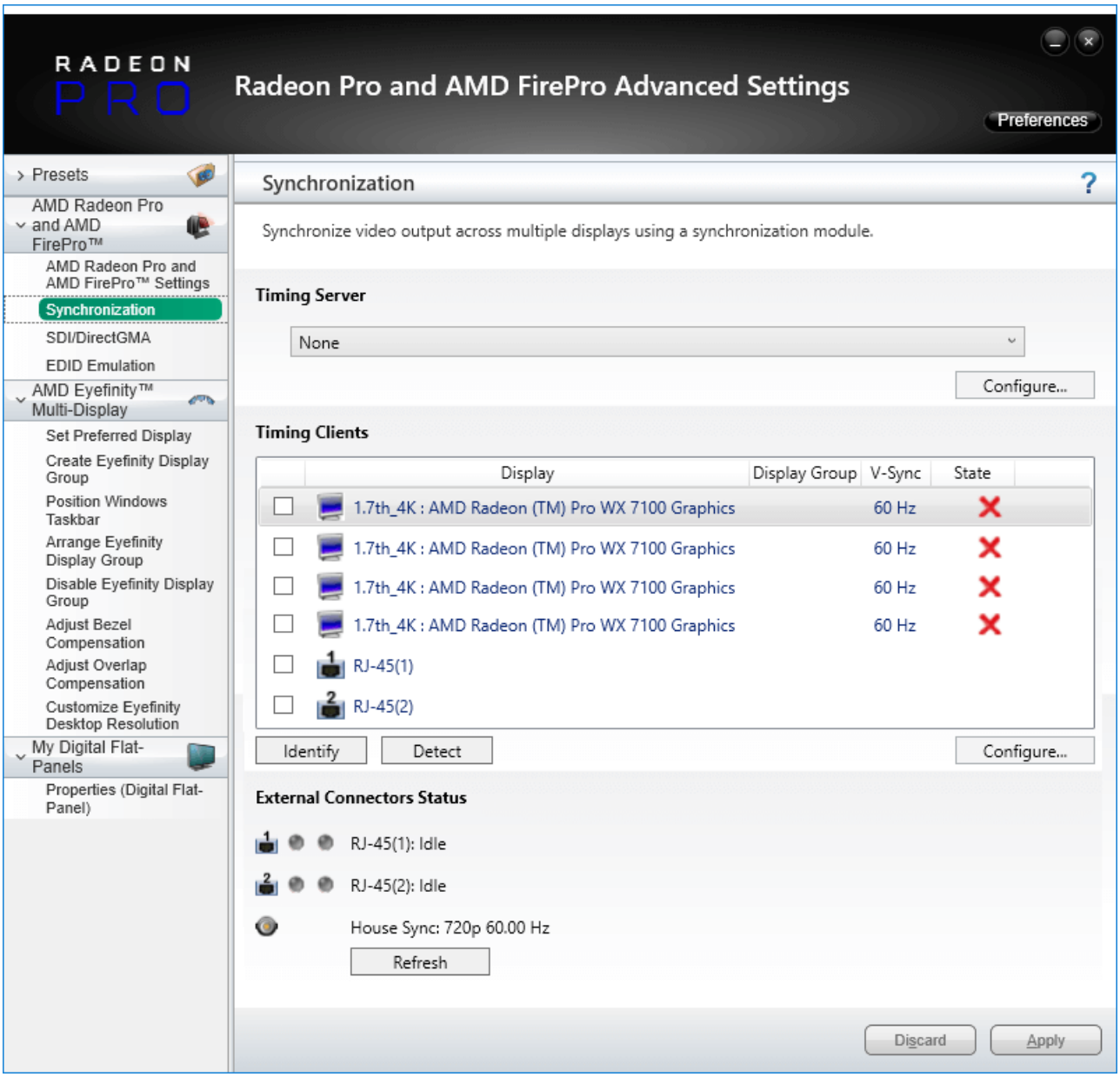
Synchronization (Genlocking)

Synchronization with an external signal source (genlocking) requires installation of an AMD FirePro S400 Synchronization Module in each Delta Media Server. This is linked to a central house sync/reference generator.

Genlocking your system ensures that all output/displays play at precisely the same rate to prevent media tearing. 7thSense Design recommend using House Sync genlocking via the BNC reference port, rather than the framelocking method using the RJ45 ports. This procedure will synchronise your server(s) to a house sync source when using AMD GPUs.

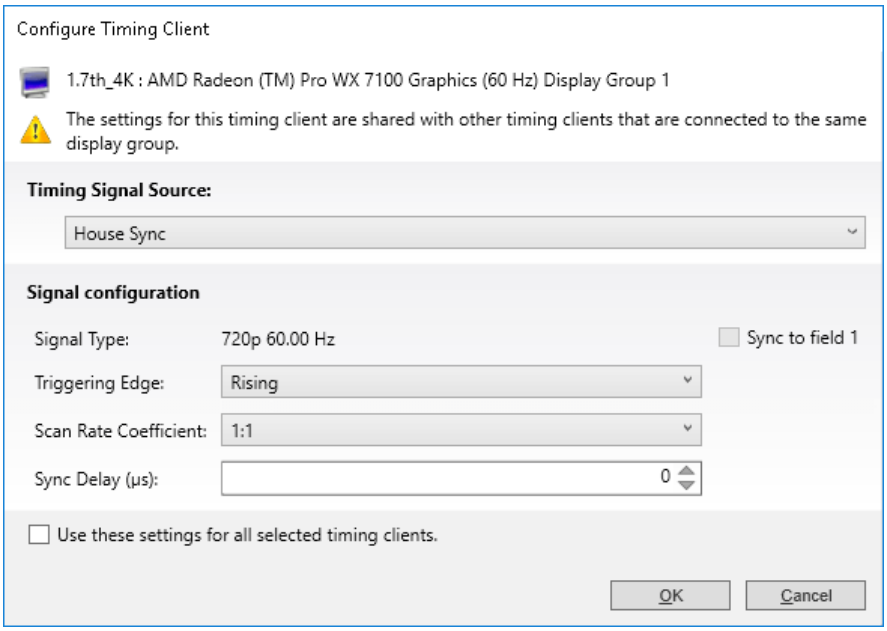
Timing Clients

From the Radeon Pro Advanced Settings, select Synchronization. Each port that has been connected will be displayed. They will always appear as a red cross at first, this is just to show that they are being registered in the Advanced settings.



Check the displays you want to sync.

Click the ‘Configure’ button to select the sync source:



Timing Source Signal

can either be the first display and sync from that or just the normal House Sync. The signal type is displayed here as resolution and refresh rate, e.g. 720p 60 Hz.

Triggering Edge

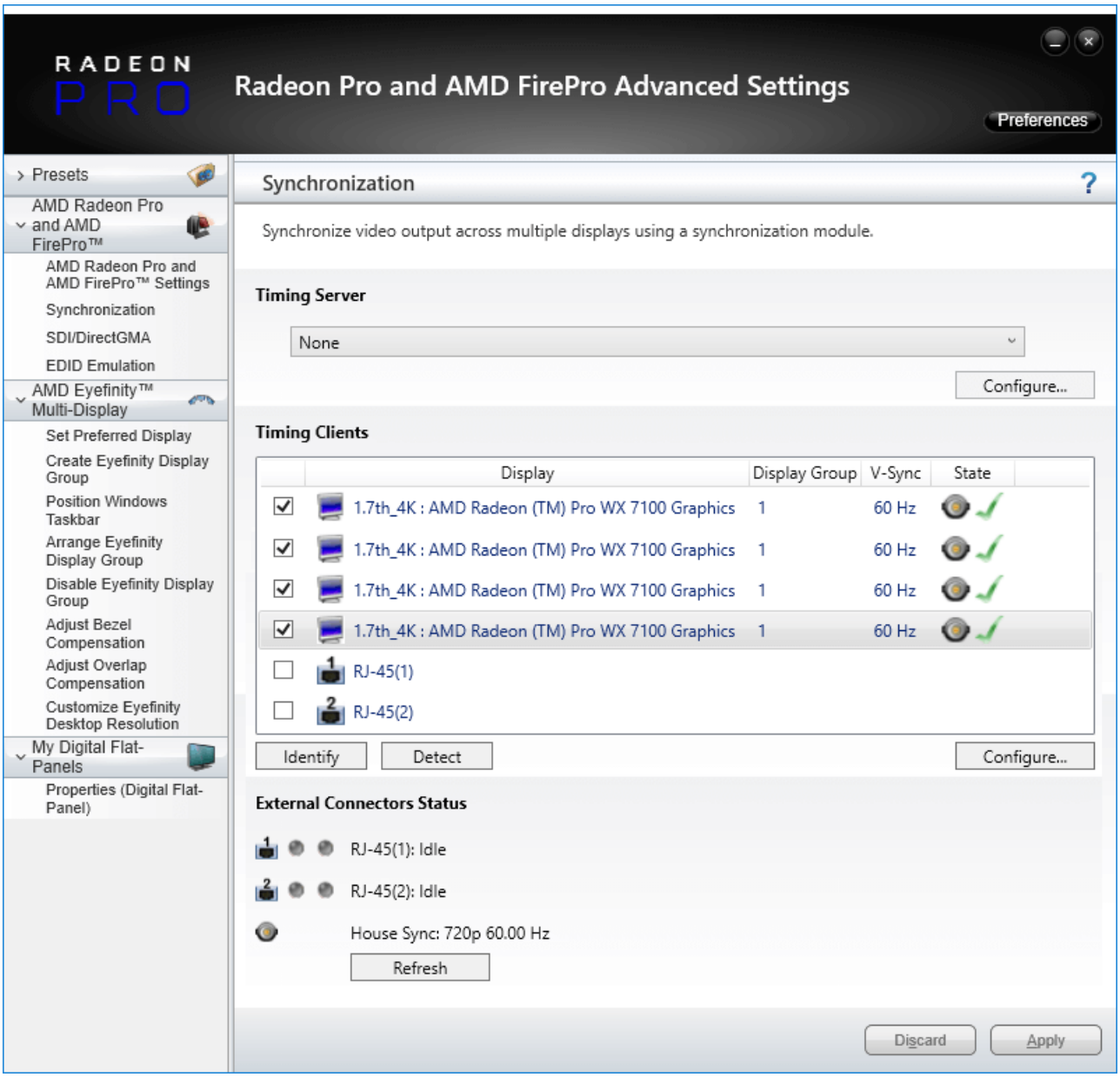
by default, Rising. Only critical in mixed-GPU scenarios where another default differs.

Scan Rate Coefficient

The EDID rate and Sync rate must match or (a feature of AMD GPUs) be a valid multiple.
Examples:
EDID is 1920x1080@25, House Sync must be 25 Hz (1:1) or 50 Hz (1:2).
EDID is 1920x1080@60, House Sync must be 60 Hz (1:1) or 30 Hz (2:1).

Check ‘Use these settings for all timing clients’.

Click ‘Apply’. The red crosses will all now be green ticks:



All ports are now synced together.

Restart the server, then navigate back to the Advanced Settings and check that the connections are still present.

House Sync

House sync is shown along bottom, this is updated as soon as ‘Refresh’ is clicked, and the House Sync indicator will flash green. The LED on the S400 card in the server will now be illuminated steady green. So if the incoming signal from the generator changes, the House Sync will reflect this.

Genlock Polling via DeltaMonitor

Remote server control via the Stack web interface enables AMD graphics sync systems to be addressed remotely. By enabling DeltaMonitor's Genlock Polling you can ensure that any temporary loss of sync signal can be re-established automatically.

Lost Sync?

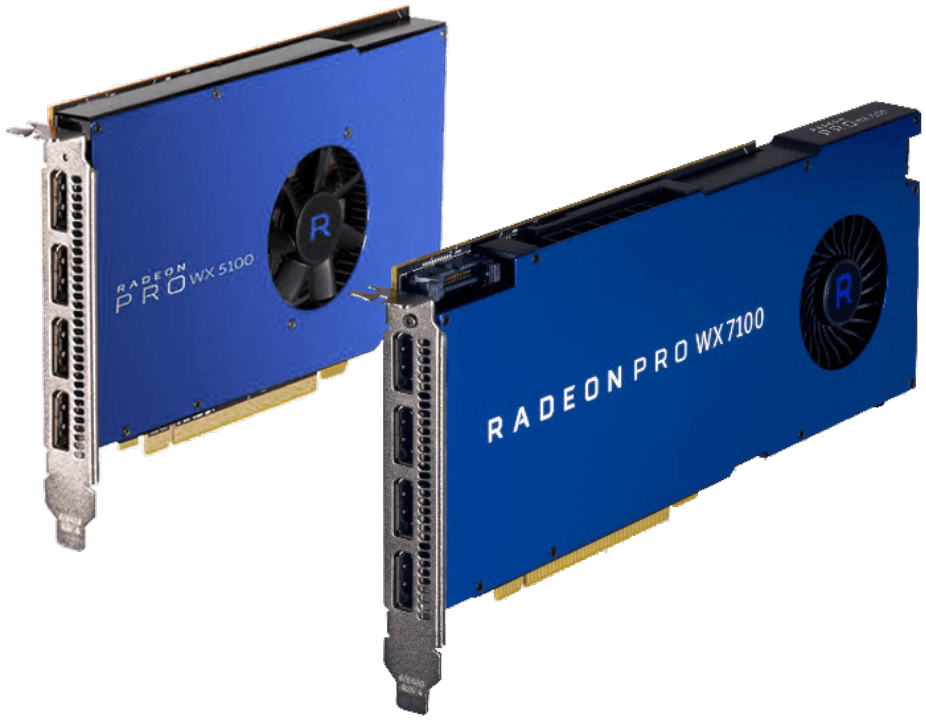
Genlock can be lost if the signal is interrupted (for example if a cable falls out or the sync generator rate is changed): this S400 LED will change from steady green to a slow flash.

If genlock is lost, check all connections and sync generator settings. Restart the server to re-grab the genlock settings.

Note: It is good practice to check all linked servers if there has been genlock loss. If it was due to the source sync generator, genlock will be lost and need resetting on all master and slave servers.

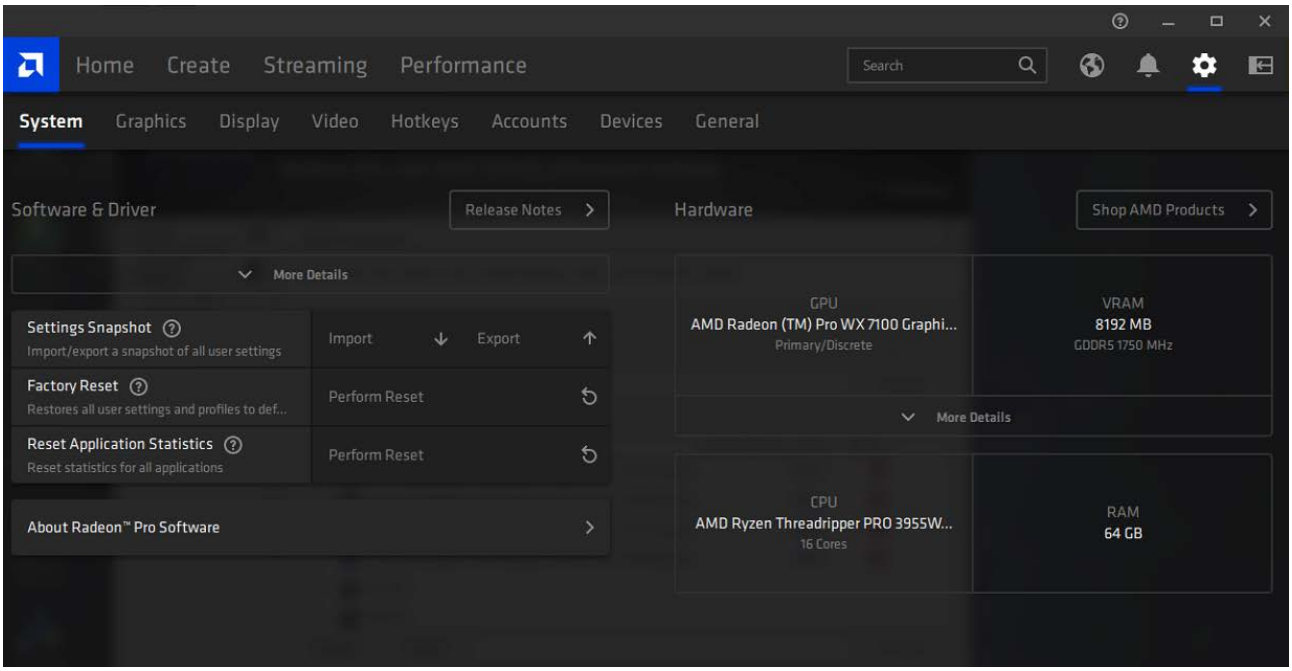
AMD Radeon Pro 21.Q1.2

For AMD Radeon™ Pro WX 5100 and WX 7100 graphics cards, using Radeon Pro Software, Enterprise Edition, version 11.Q1.2.

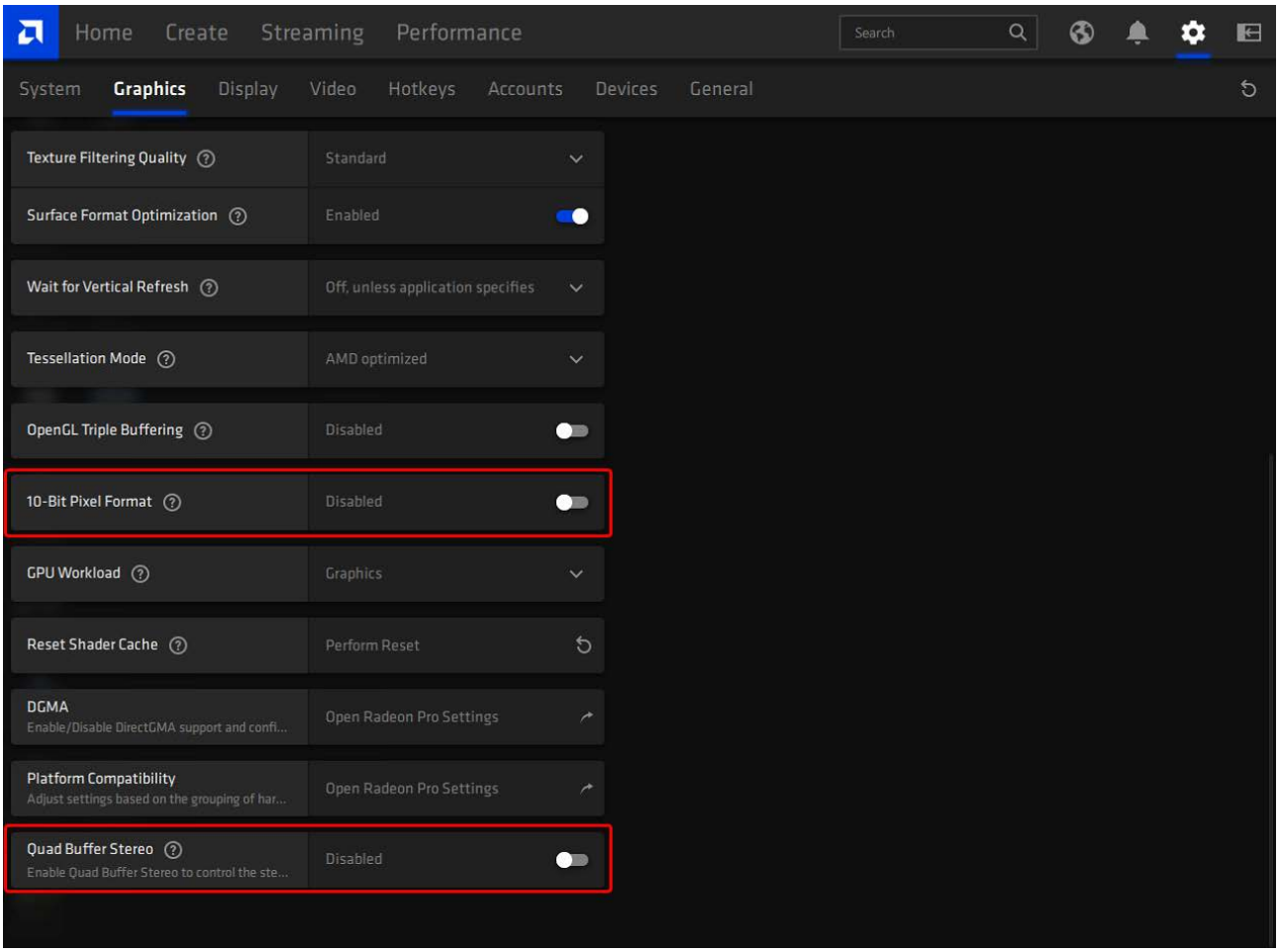


Note that currently only one of these cards can be used per server in Windows 10. A single GPU can be synced, but not two in the same server.

On the Delta server, find the AMD Radeon Pro Settings Desktop app, and select the ‘Settings’ gear-wheel icon:

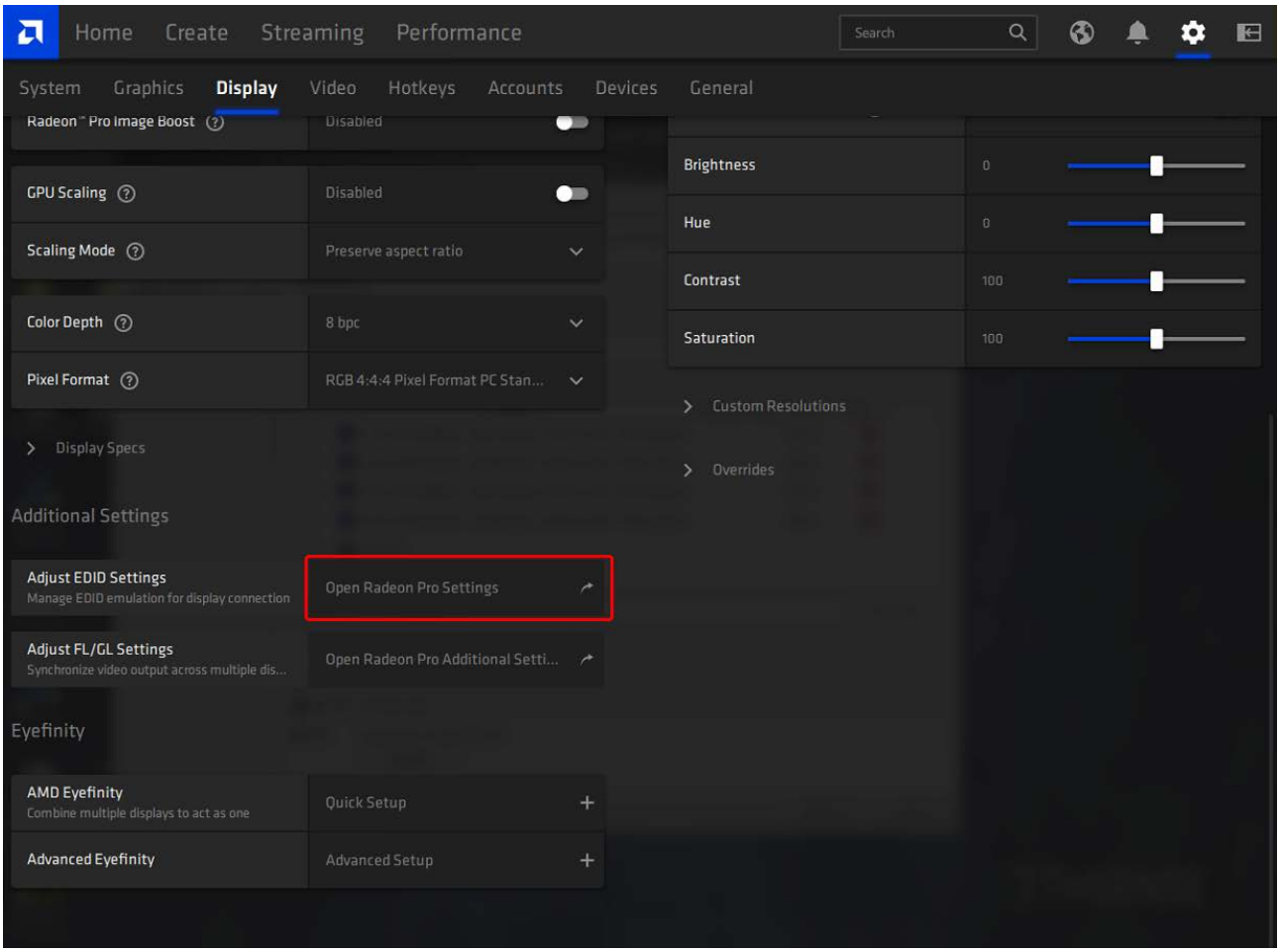


In the Graphics tab, you may need to select Quad buffer (if using 3D stereo), or 10-bit format:

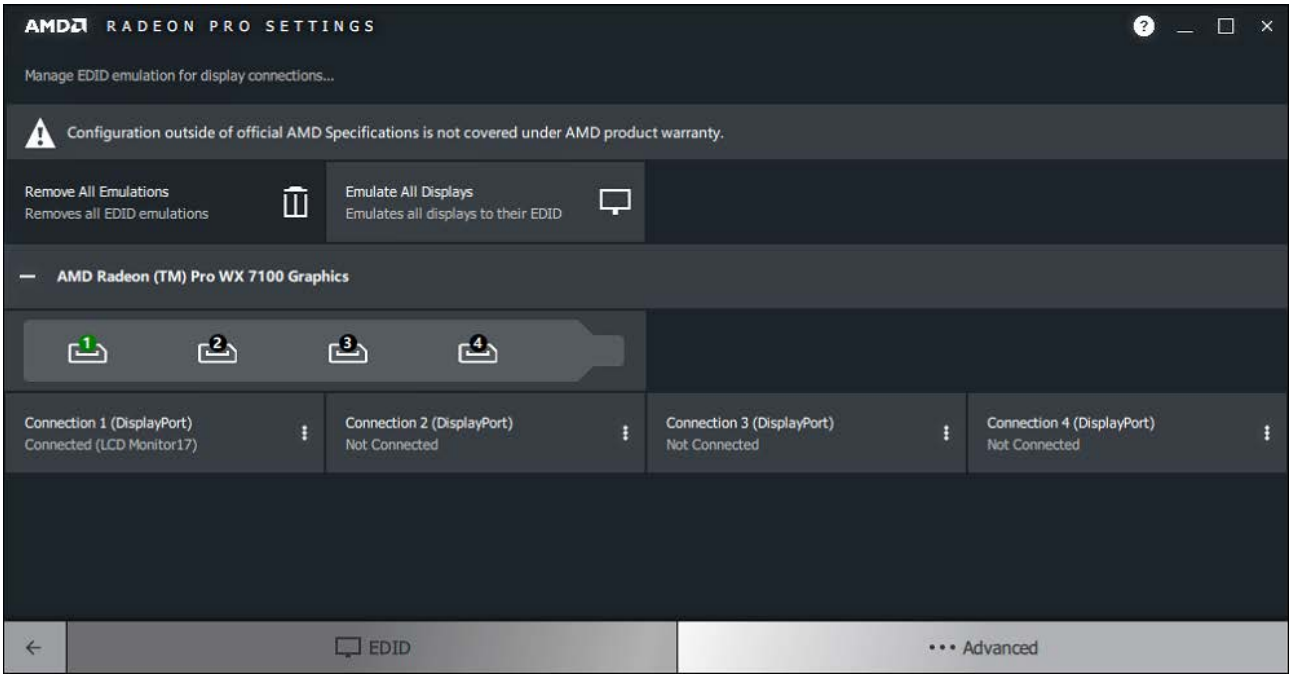


EDID Emulation

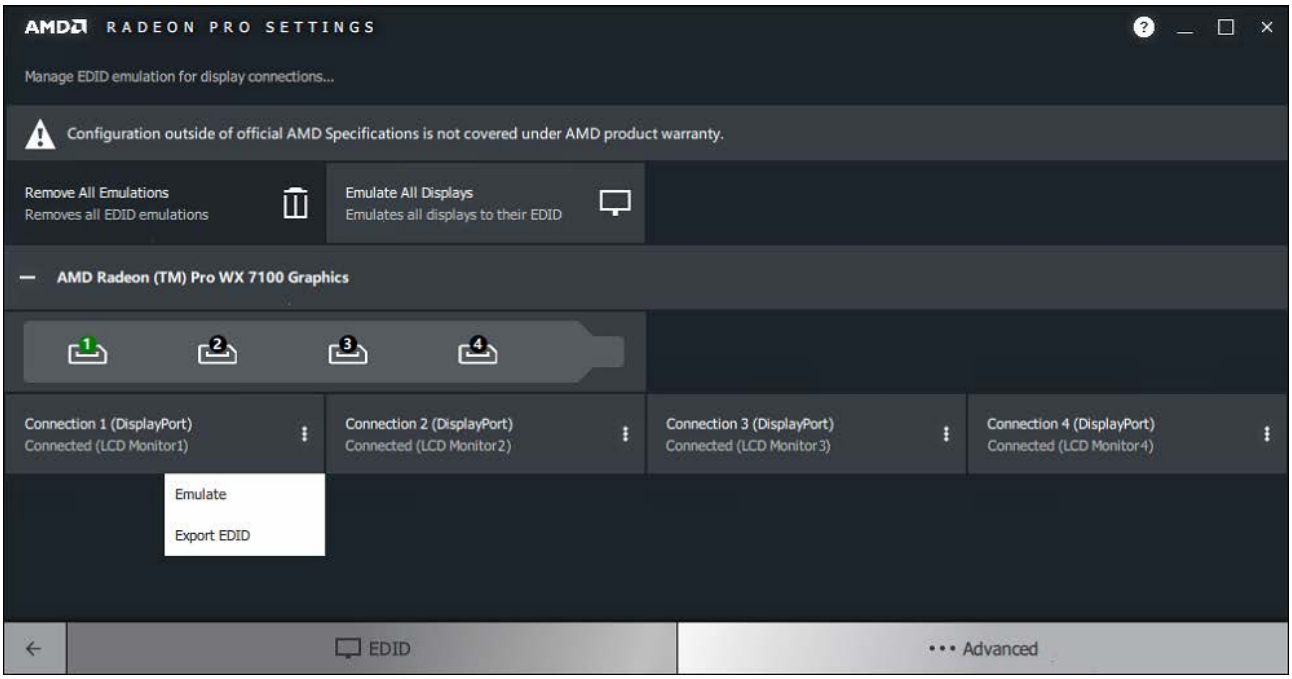
Select Display on the top menu, and scroll down to ‘Additional Settings’ to ‘Adjust EDID Settings’:



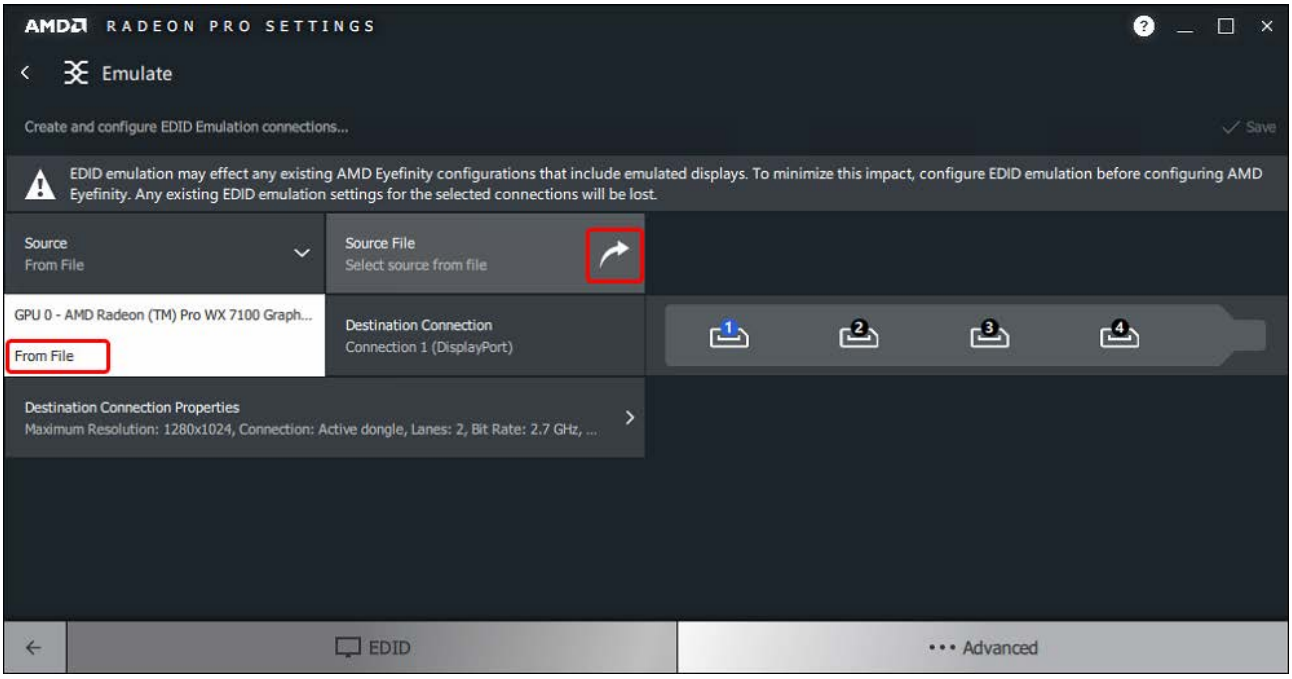
Open Radeon Pro Settings, and expand the GPU section:



Select ‘Emulate All Displays’ then click the 3-dot selector in the first display and choose ‘Emulate’:



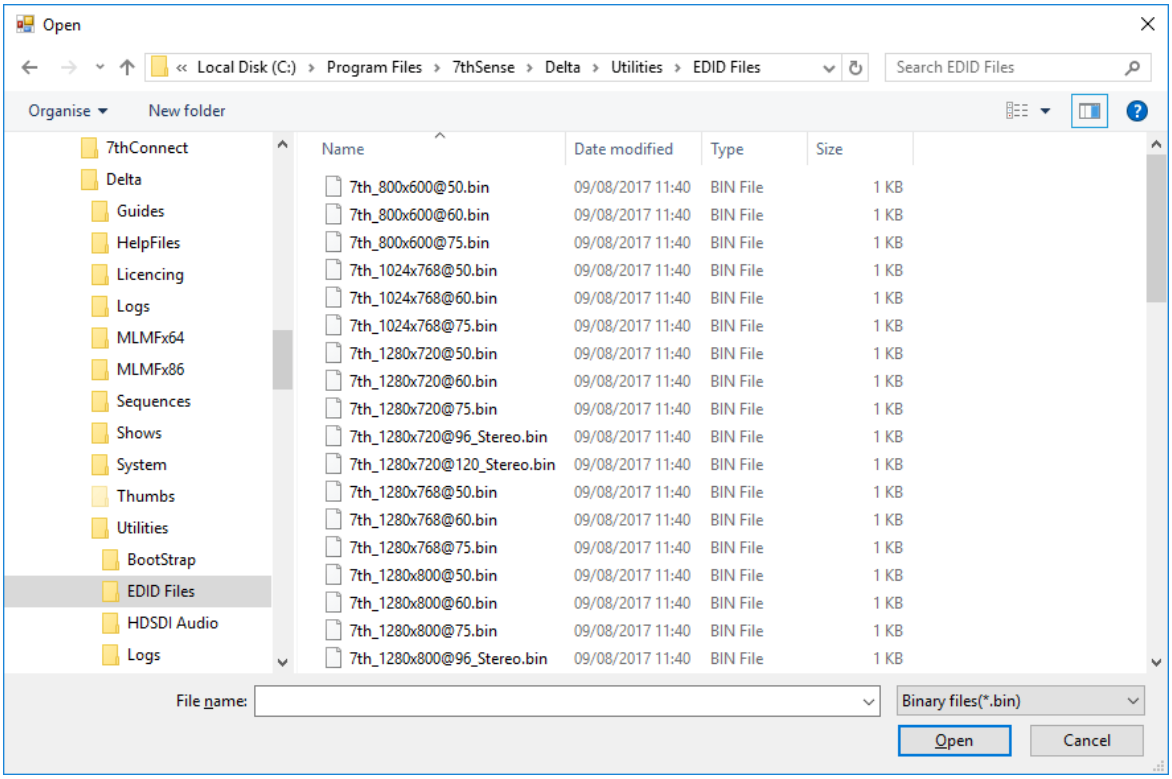
Now select ‘Source’, choose ‘From File’ and then the source file arrow, to browse to select the correct EDID:



Select the EDID (*.bin file) that you want to use. 7thSense supplied EDID are found in C:\Program Files\7thSense\Delta\Utilities\EDID Files.

Finding the right EDID

7thSense provides a collection of available EDIDs, located in: C:\Program Files\7thSense\Delta\Utilities\EDID Files. Change the file type (bottom right) to binary to see these files:

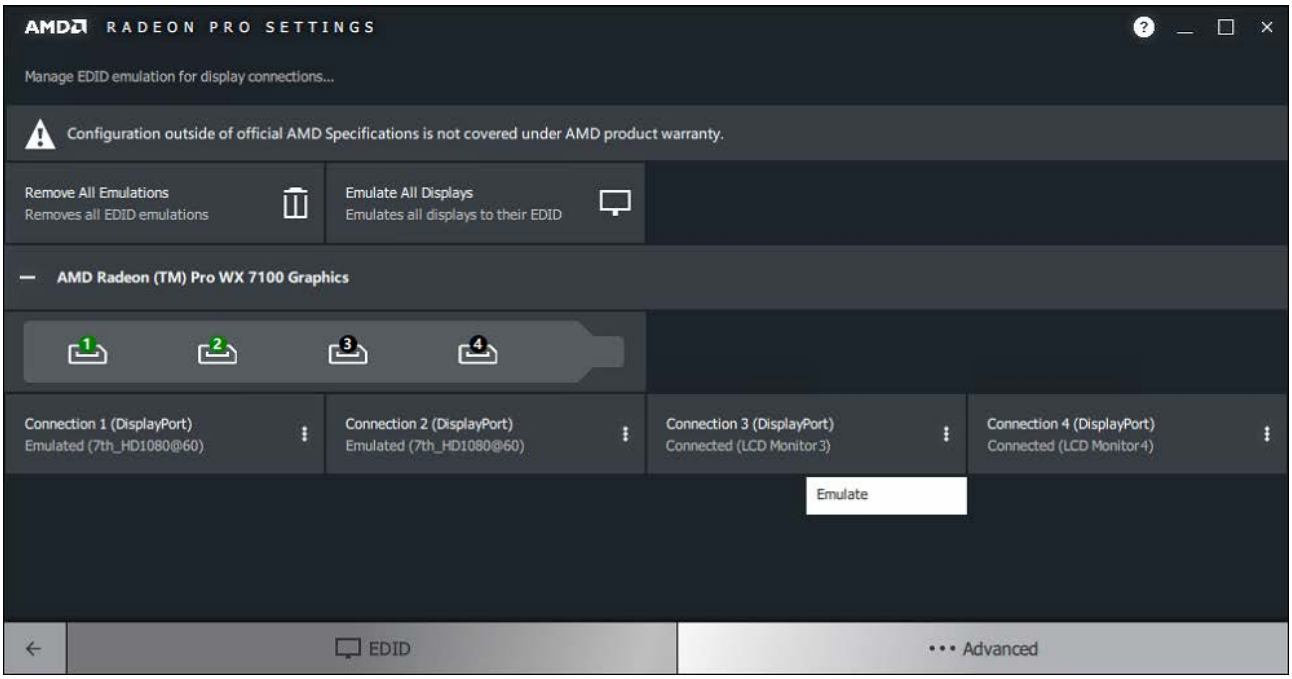


Select the EDID for the right resolution, bit depth and frame rate. Some EDIDs indicate specific interface types (HDMI, DVI); take care to select the correct option. Display devices (projectors, monitors) have their own set of embedded EDIDs that can also be used. Open the selected EDID then ‘Apply’, to apply it to all of the selected AMD display connections.

Note that the Destination Connection Properties will show the current values of the display being addressed. Typical post-emulation properties will be:

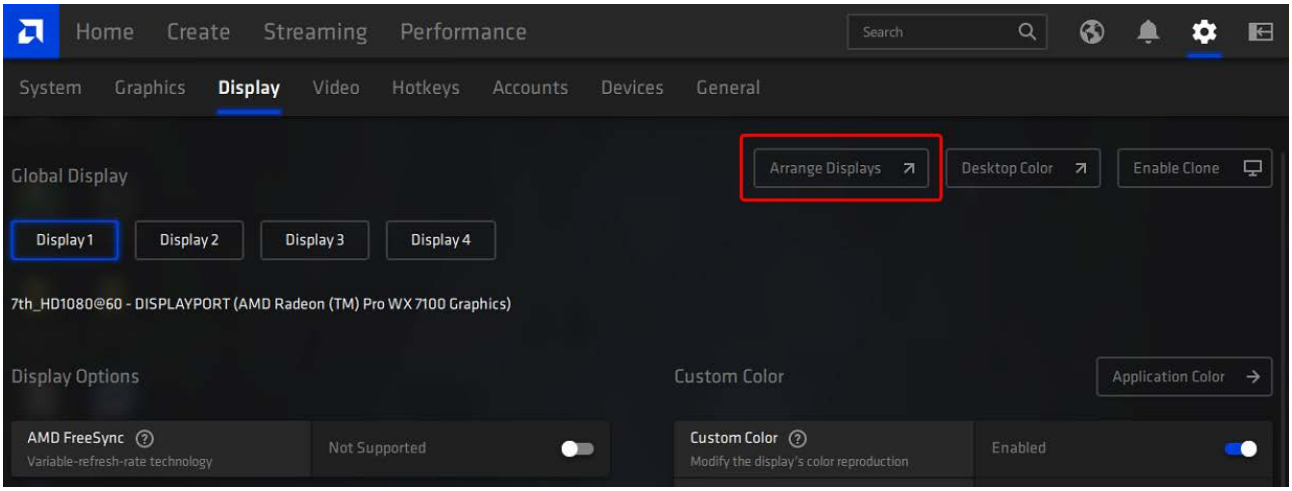
- **Lanes**: 4
- **Bit Rate**: dual link or above, 5.4 GHz, otherwise 2.7 GHz
- **Bandwidth** should be changed to 5.4 GHz for higher output EDIDs, e.g. 4096 × 2160@60
- **Color Depth** 8-bit or 10-bit depending on output required. This is important for Working in 10-bit Colour Depth.

Repeat for all displays:



Unexpected screen resolution?

If, after emulation, the resolution is different from what you are expecting (an EDID can contain multiple resolutions and refresh rates), you will need adjust Windows display settings, accessible from here, and go to the Windows ‘Advanced Display Settings’ and find ‘Display Adapter Properties’ at the bopttom:

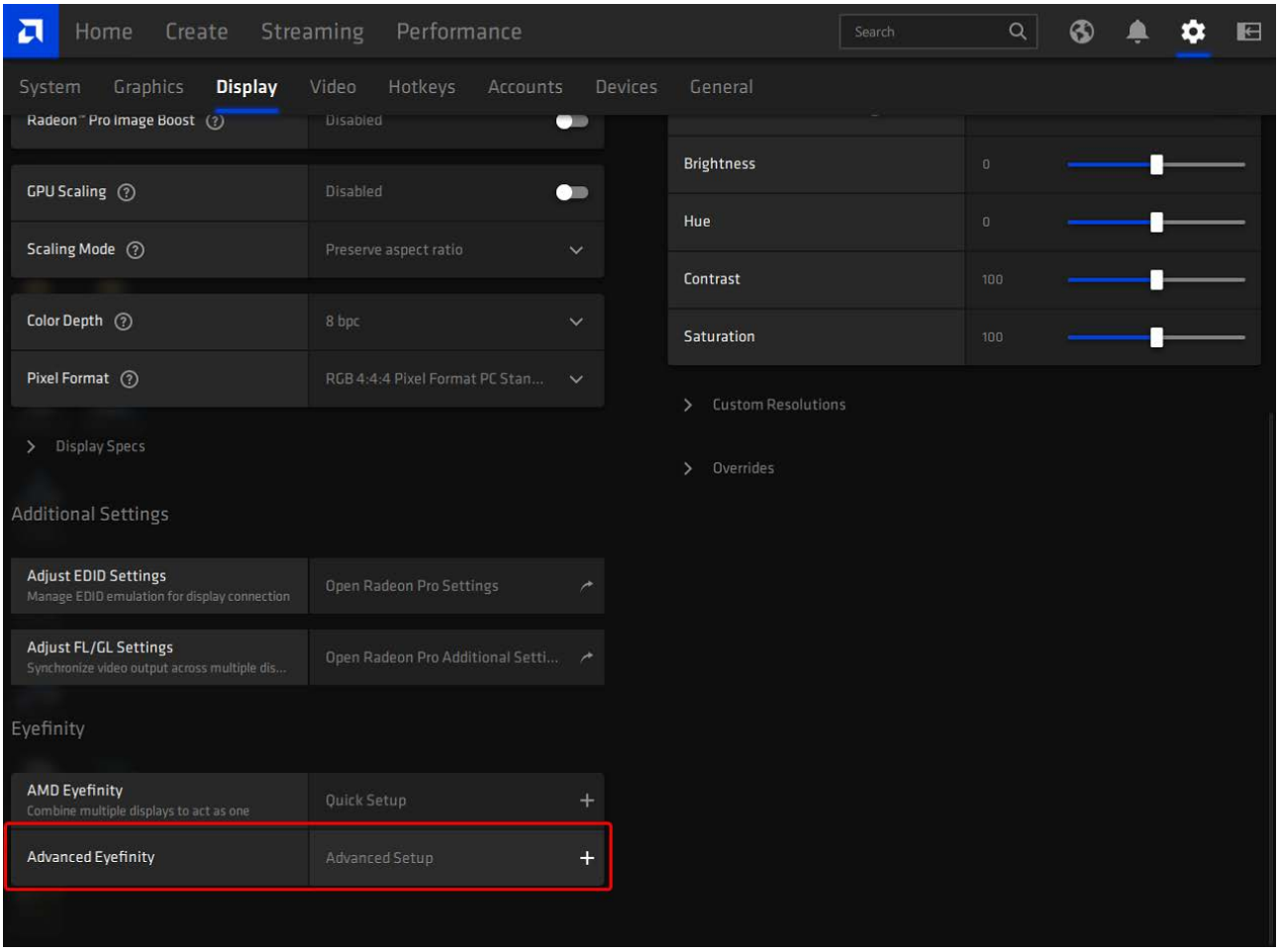


In the Display Adapter Properties window, click ‘List all Modes’ at the bottom, and then select the resolution from the drop-down menu (this may need to be applied per output).

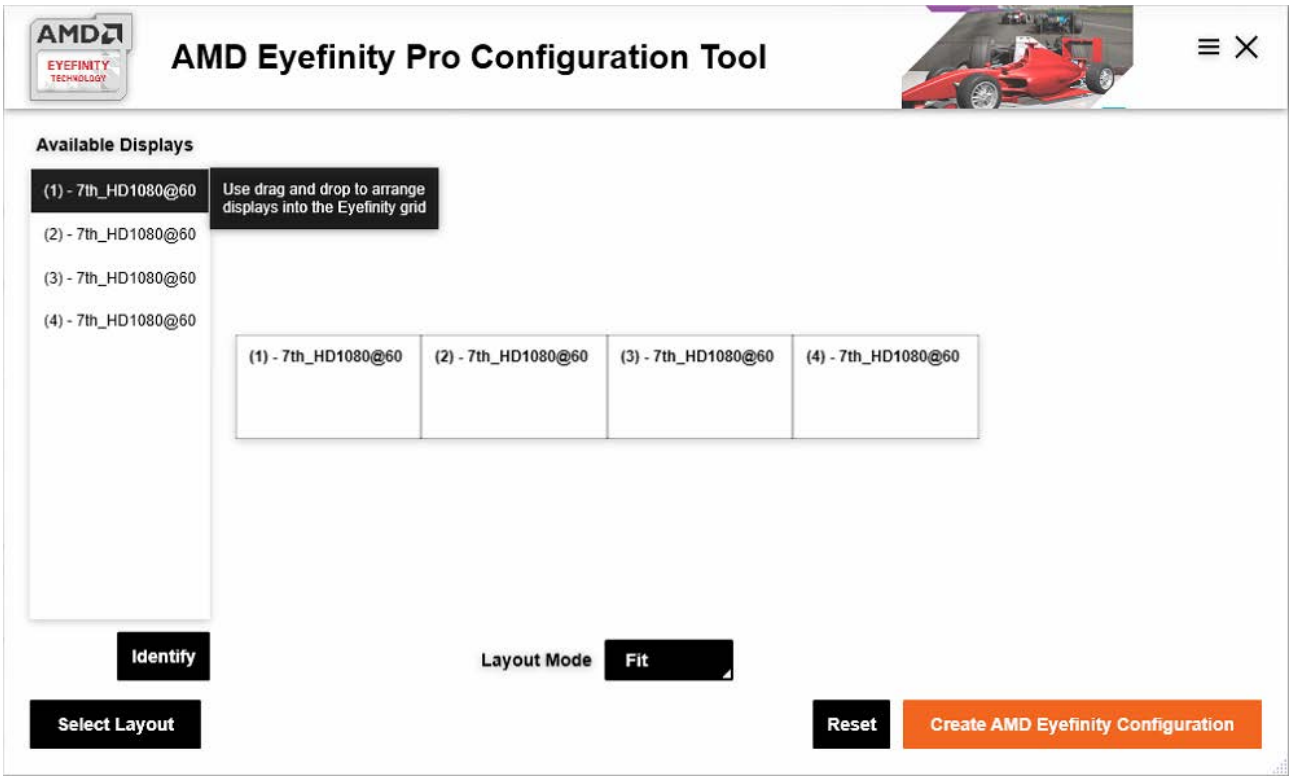
With the correct resolution now set for each output, proceed to grouping configuration your displays.

Display Grouping

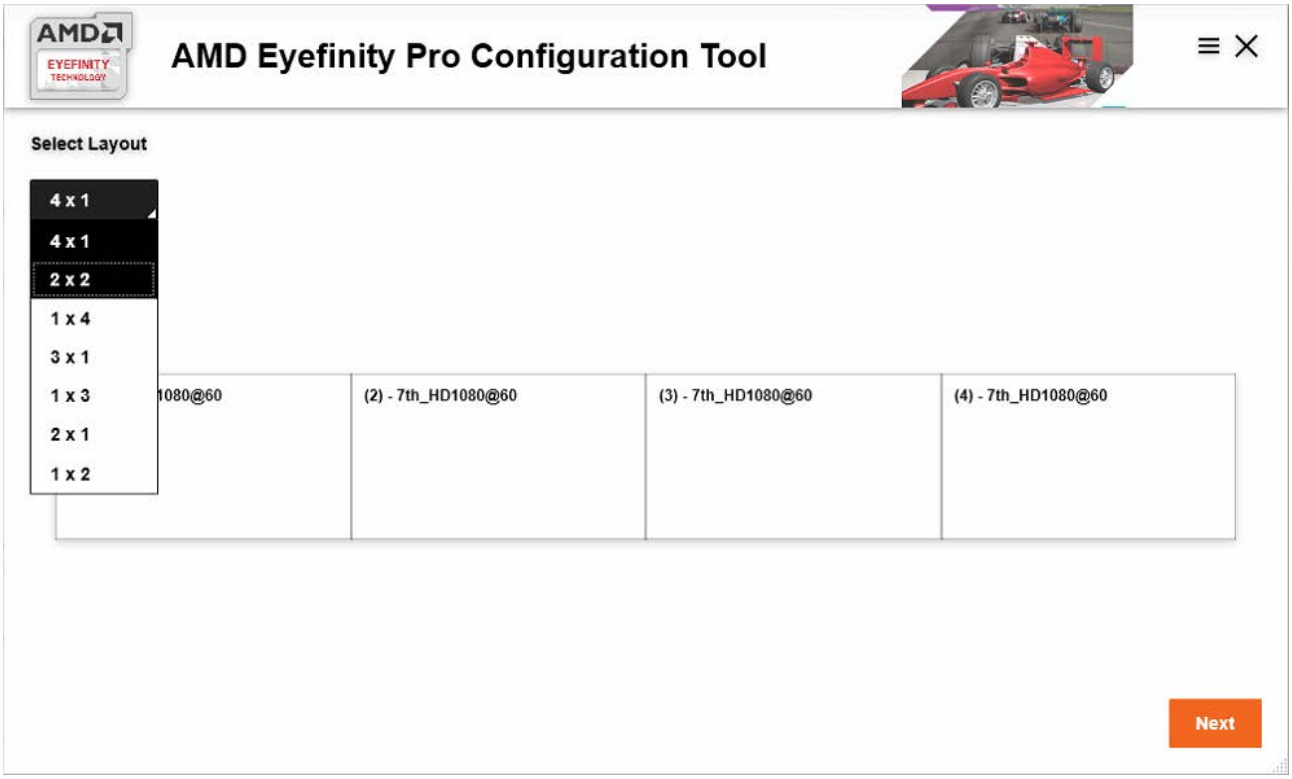
From the main page of Display, scroll down to ‘Additional Settings’, ‘Eyefinity’, and select ‘Advanced Setup’:



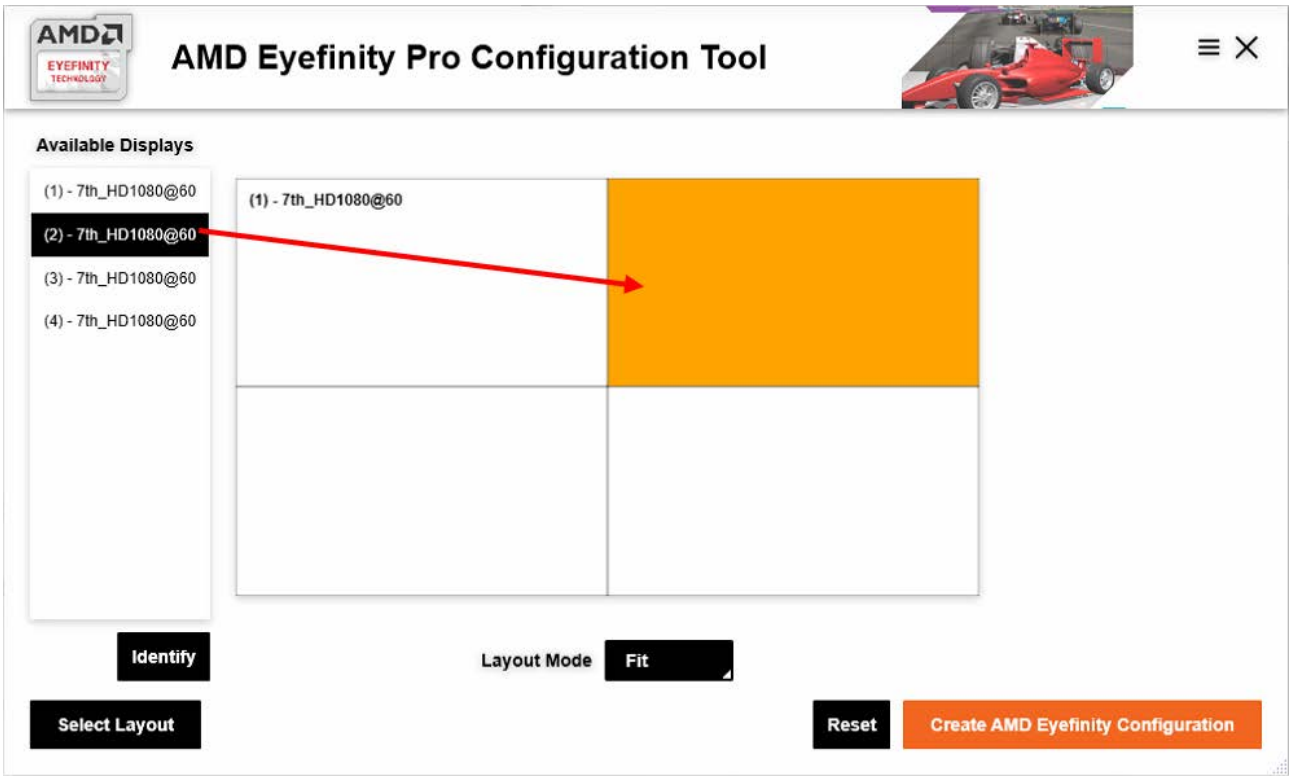
This will show your displays in a default row. Use ‘Select Layout’ for a different arrangement.



Select the arrangement of the required displays (example: 2 × 2):



You can now drag the displays into the correct locations:



Use the ‘Identify’ button if unsure of the physical correspondence. Then click the red ‘Create’ button to complete the layout.

Synchronization (Genlocking)

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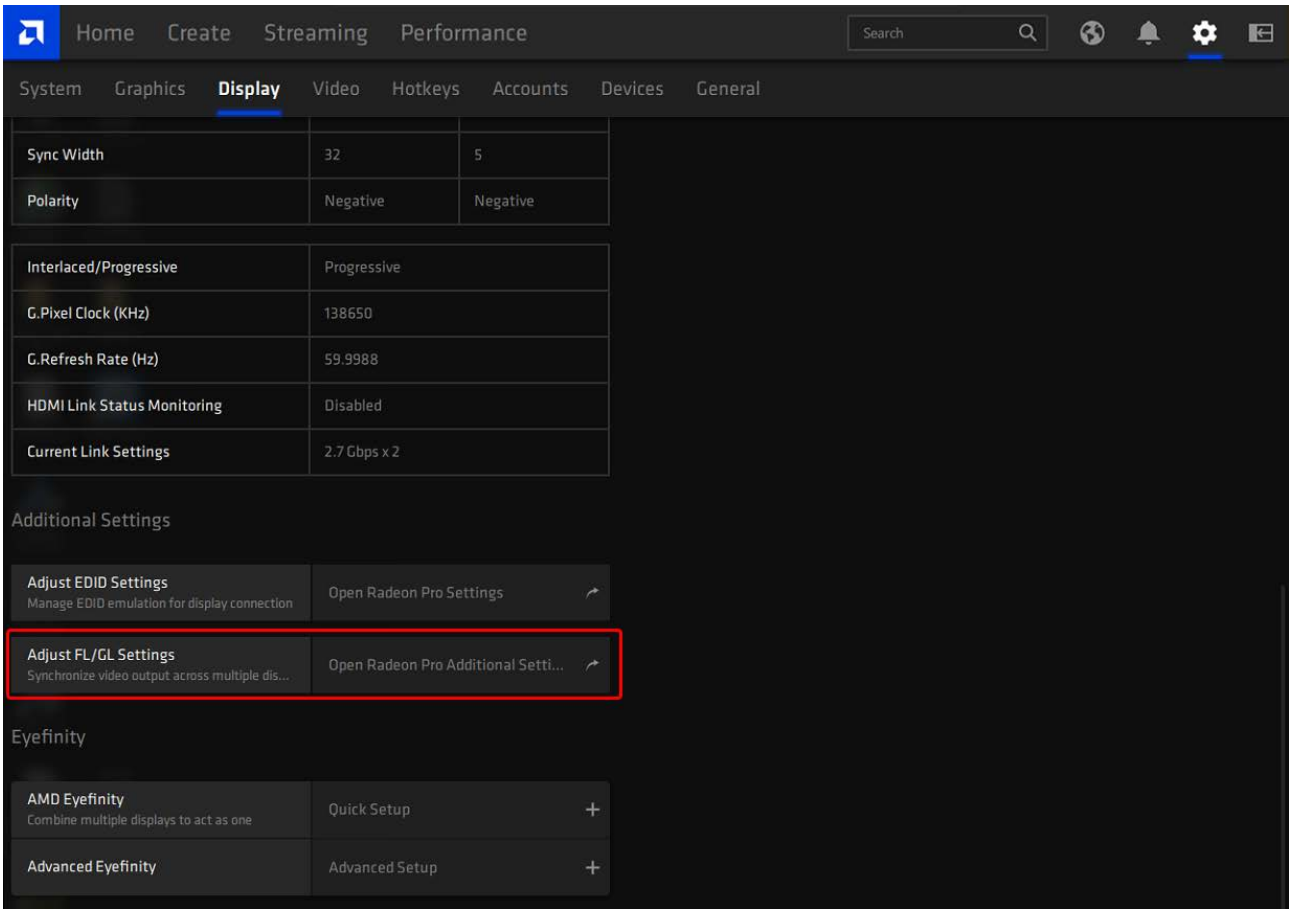
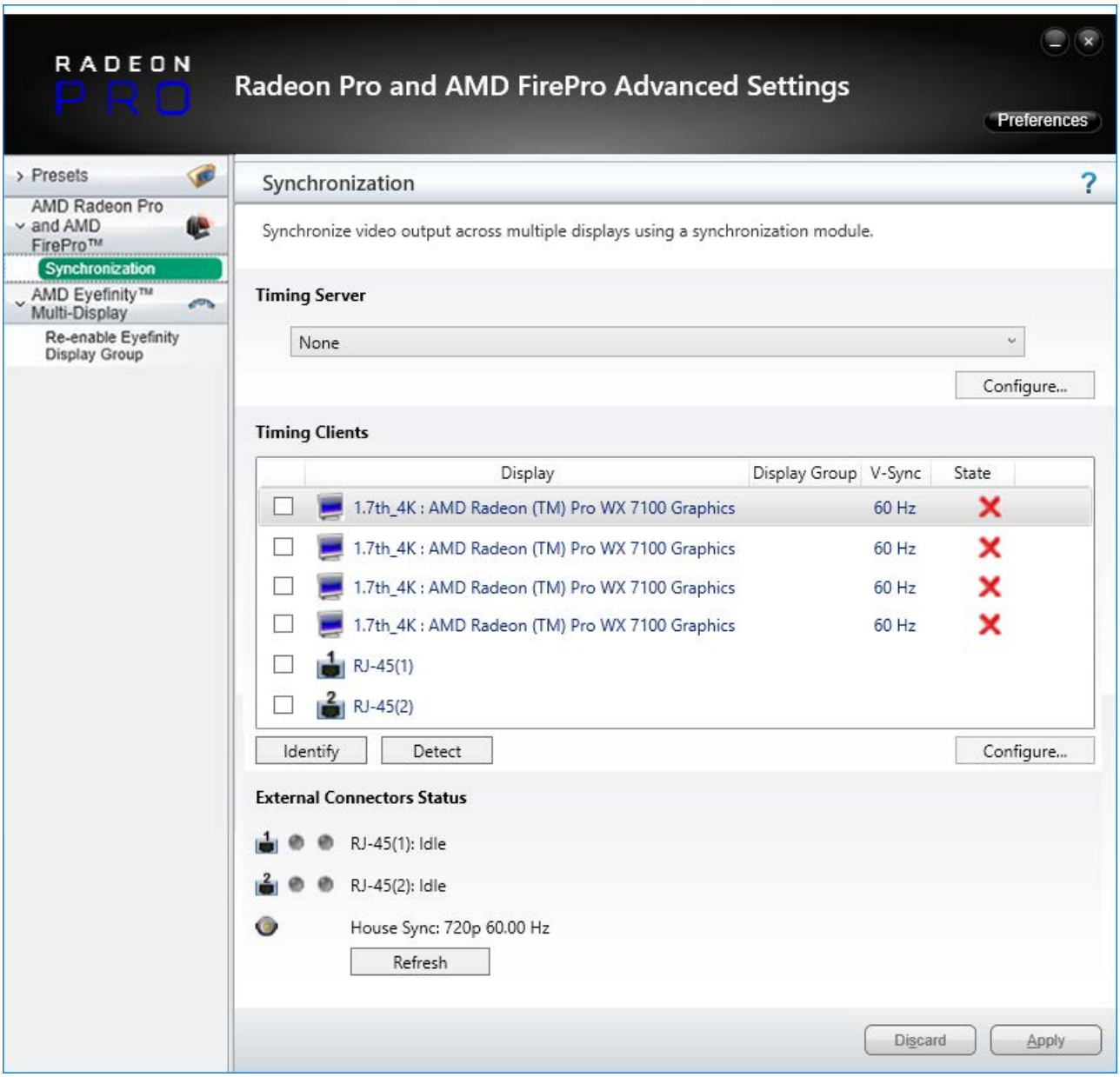
From the main page Display tab, scroll down to ‘Additional Settings’, ‘Adjust FL/GL Settings’:



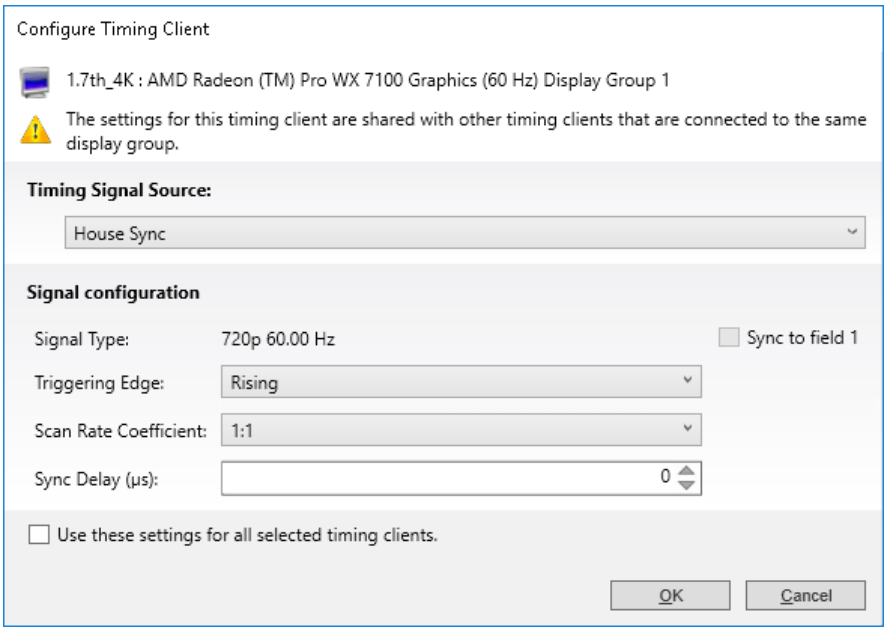
Timing Clients

From the Radeon Pro Advanced Settings, select Synchronization. Each port that has been connected will be displayed. They will always appear as a red cross at first, this is just to show that they are being registered in the Advanced settings.



Check the displays you want to sync.

Click the ‘Configure’ button to select the sync source:



Timing Source Signal

can either be the first display and sync from that or just the normal House Sync. The signal type is displayed here as resolution and refresh rate, e.g. 720p 60 Hz.

Triggering Edge

by default, Rising. Only critical in mixed-GPU scenarios where another default differs.

Scan Rate Coefficient

The EDID rate and Sync rate must match or (a feature of AMD GPUs) be a valid multiple.
Examples:
EDID is 1920x1080@25, House Sync must be 25 Hz (1:1) or 50 Hz (1:2).
EDID is 1920x1080@60, House Sync must be 60 Hz (1:1) or 30 Hz (2:1).

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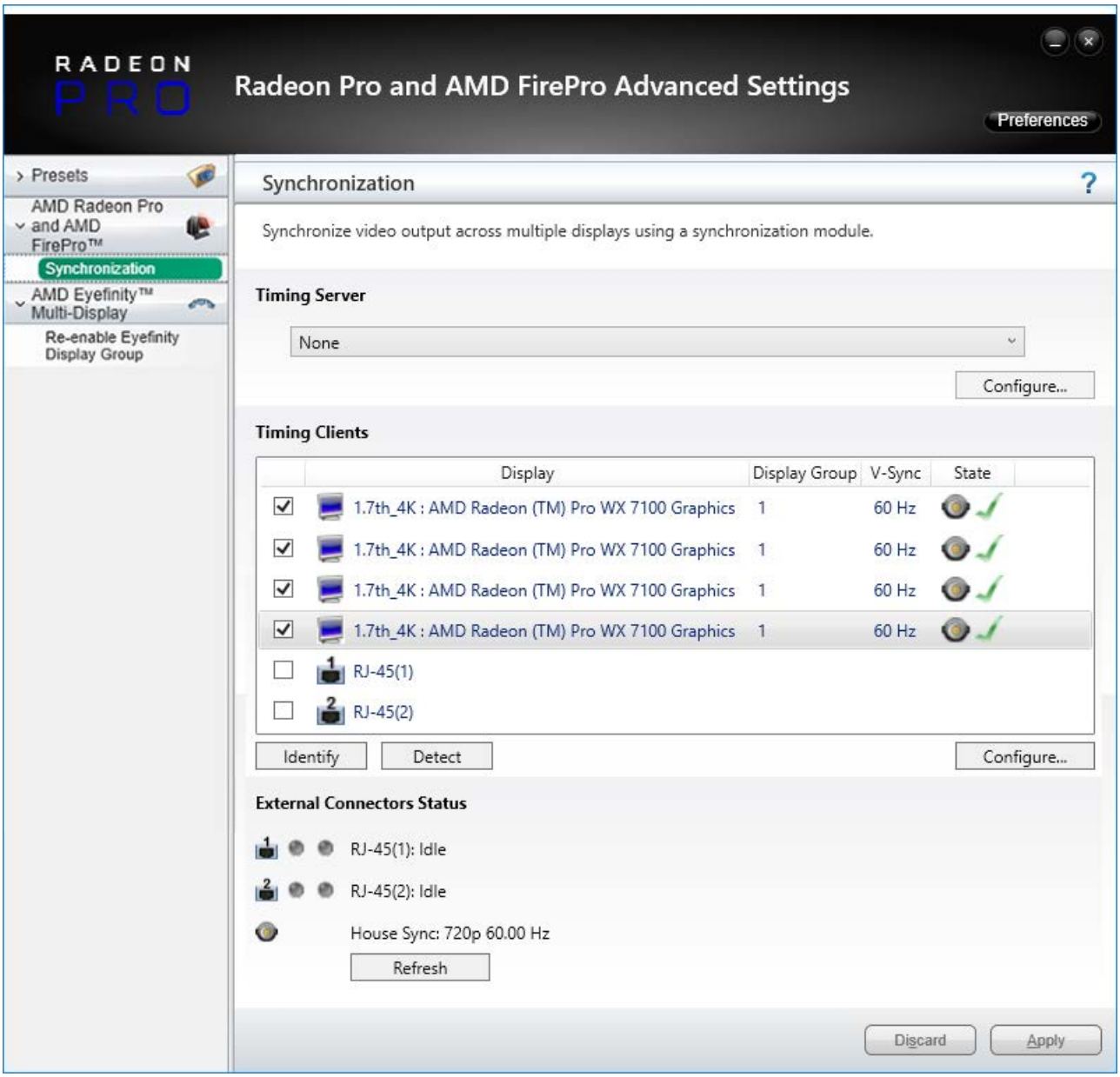
Click ‘Apply’. The red crosses will all now be green ticks:



All ports are now synced together.

Restart the server, then navigate back to the Advanced Settings and check that the connections are still present.

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Note: It is good practice to check all linked servers if there has been genlock loss. If it was due to the source sync generator, genlock will be lost and need resetting on all master and slave servers.

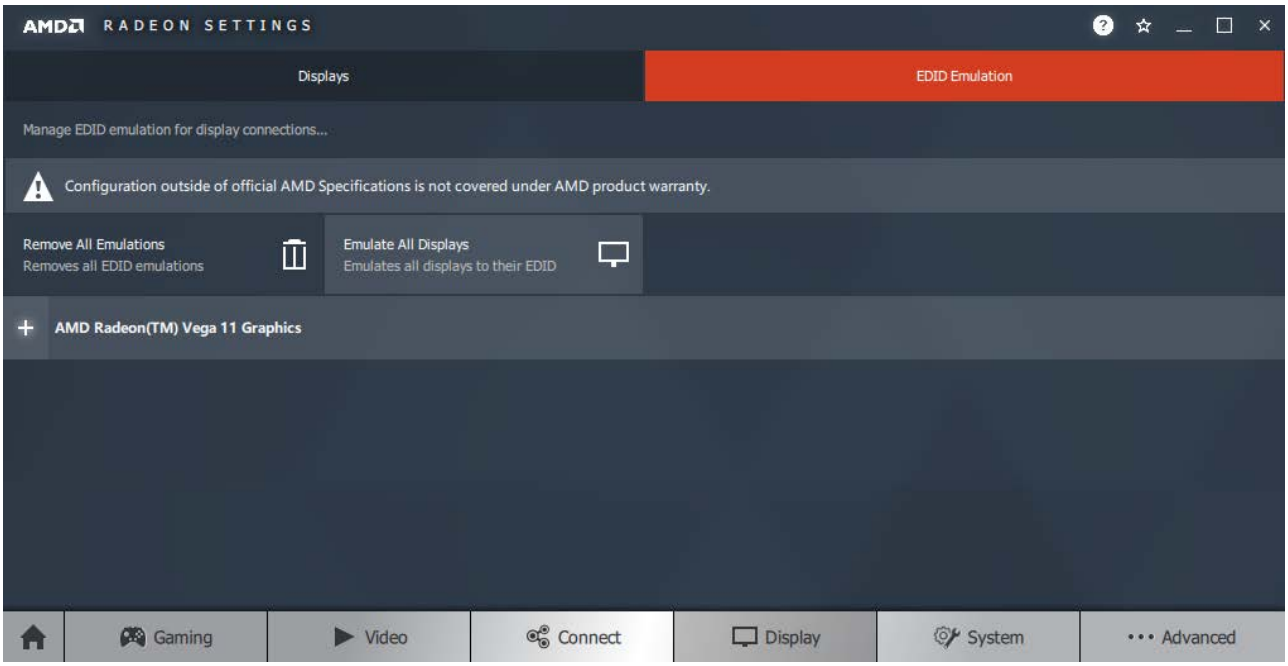
Pico AMD Radeon

Note that we only support active adapters for the Pico.

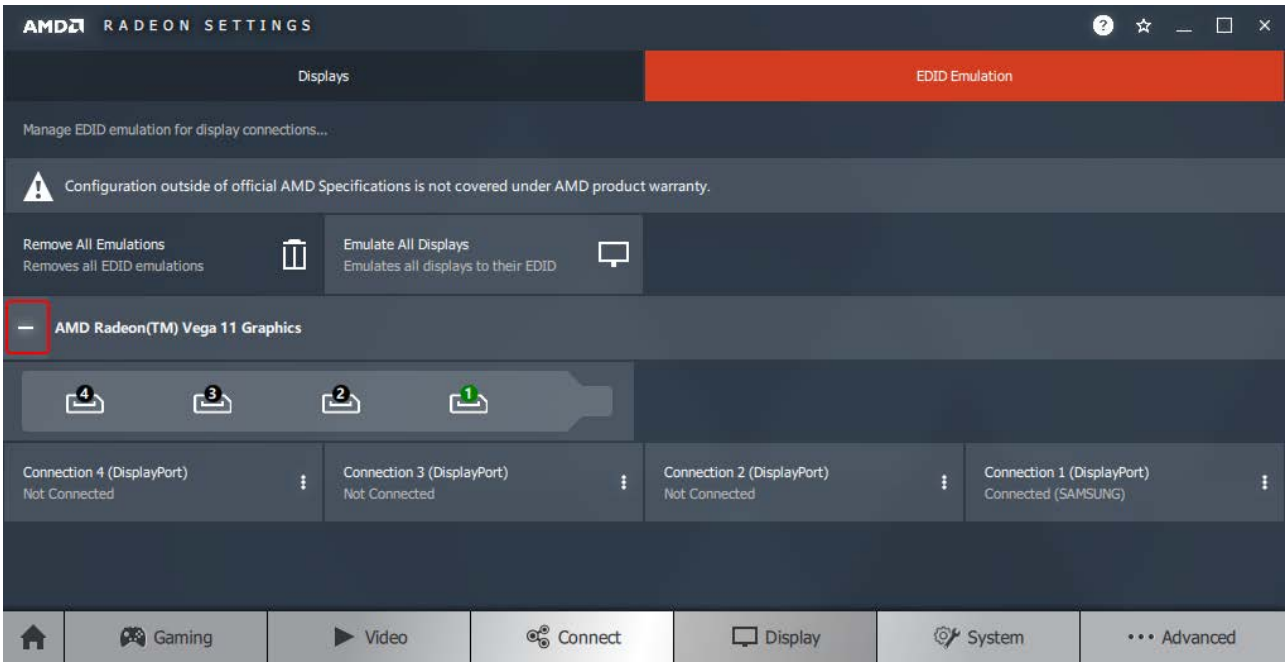
Emulating and grouping AMD Radeon displays with the Pico is slightly different. From Windows Start (or right-click the desktop), open AMD Radeon Settings:

Display

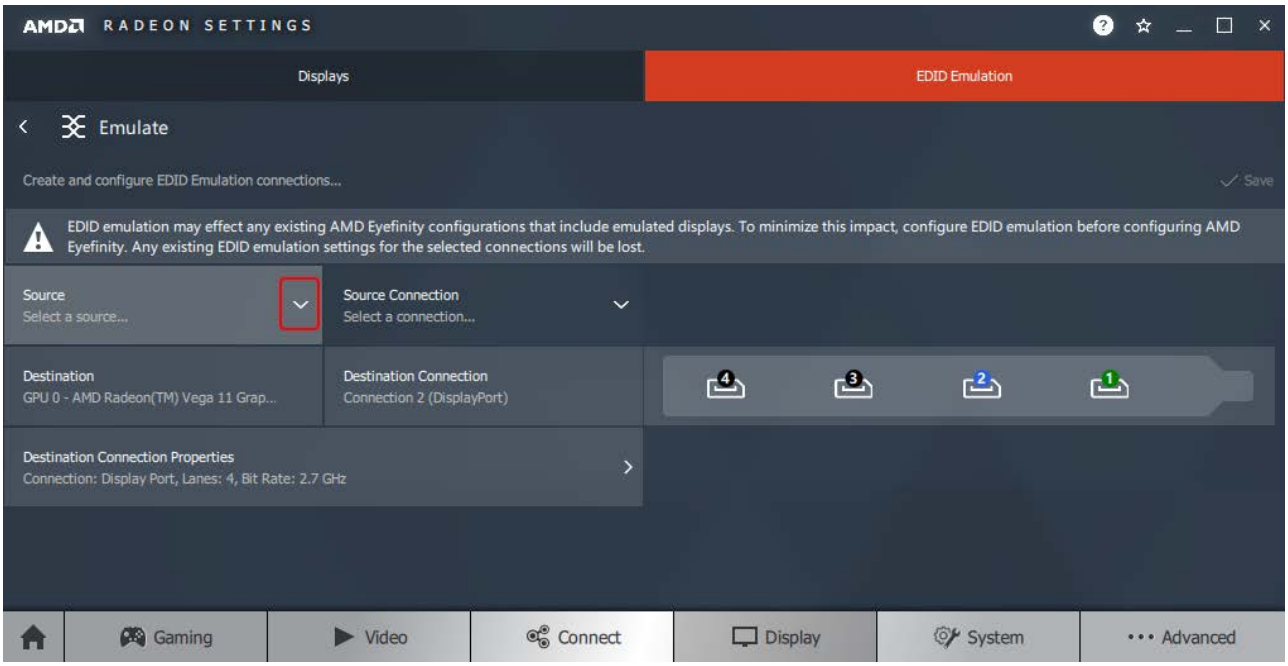
Select Display and then EDID Emulation:



Emulate all four connections, or select a port to configure by expanding the Radeon bar:

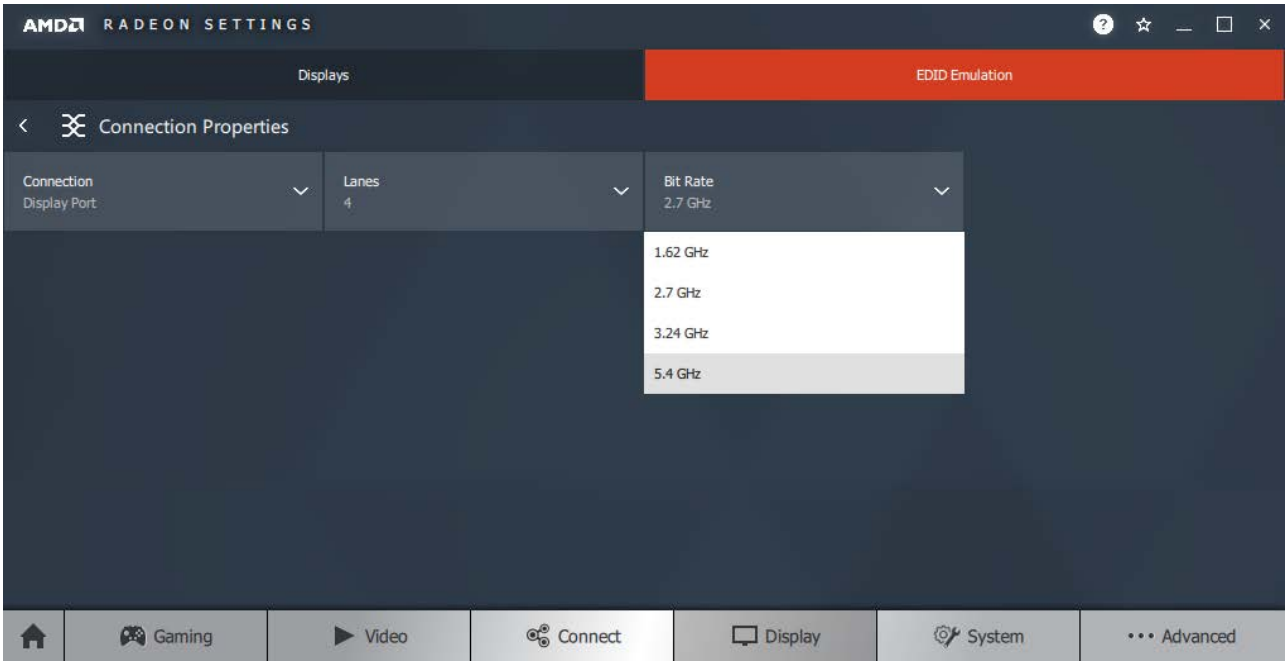


For the required connection, click the three dots and then ‘Emulate’. Reading across, you have the Destination, the Connection and the graphic, with highlights in green (connected), blue (current selected) and black (not connected). Click ‘Source’ for the EDID of the selected connection:

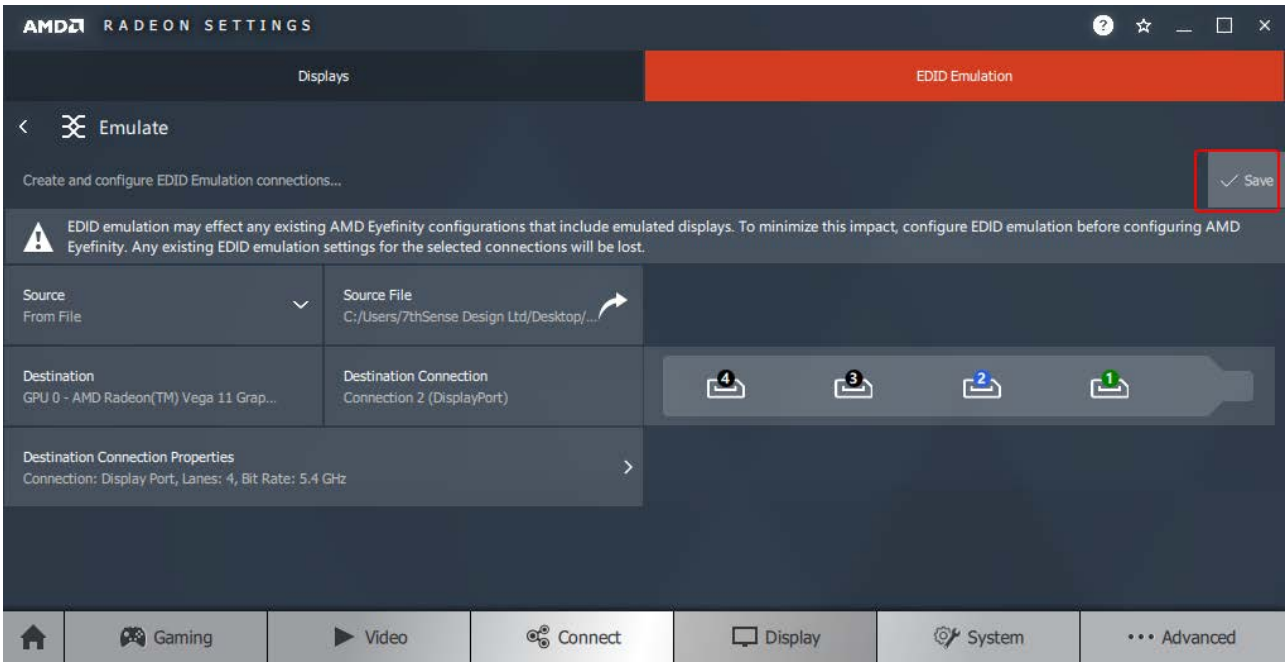


‘Source Connection’ changes to ‘Source File’; click and browse to select the txt format EDID file you want.

Next, Click on Destination Connection Properties, and make sure the Bit Rate is correct. This needs to be 5.4 GHz for anything above WQHD (2560 × 1440):

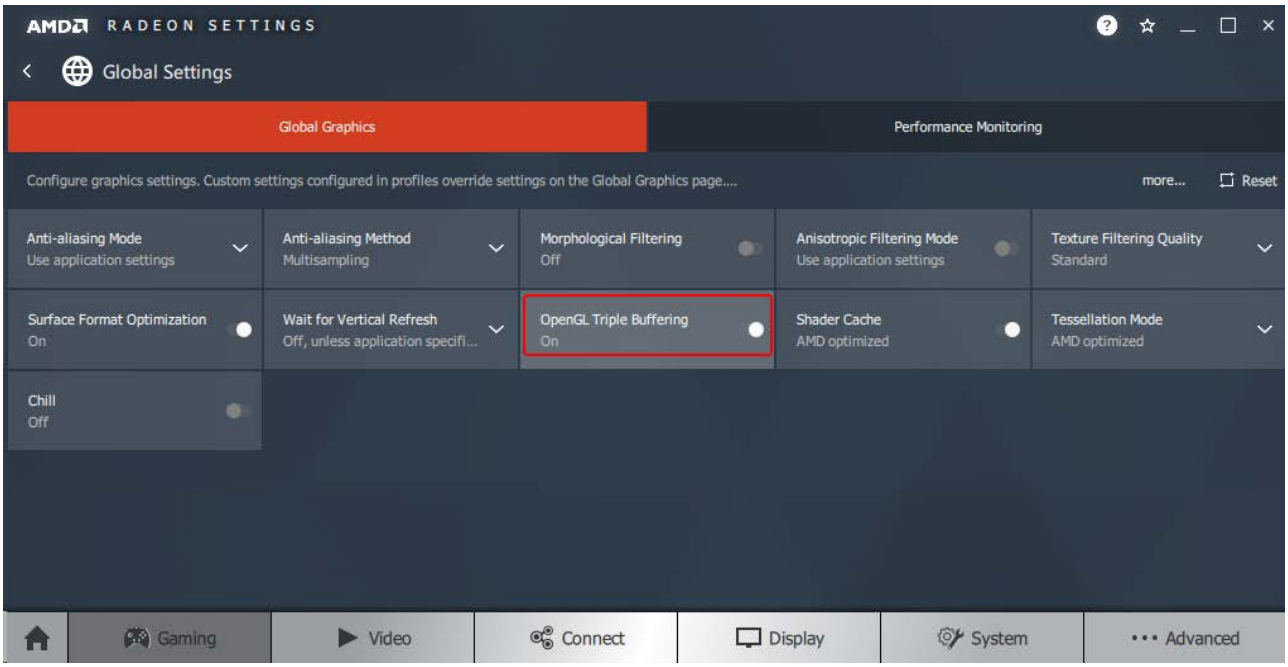


Now step back to the ‘Emulate’ page (there is no user confirmation) and click ‘Save’ on the right:



Gaming

For UHD or higher, there is just one setting here. Click ‘Gaming’ and in Global Settings, switch on ‘Triple Buffer’:

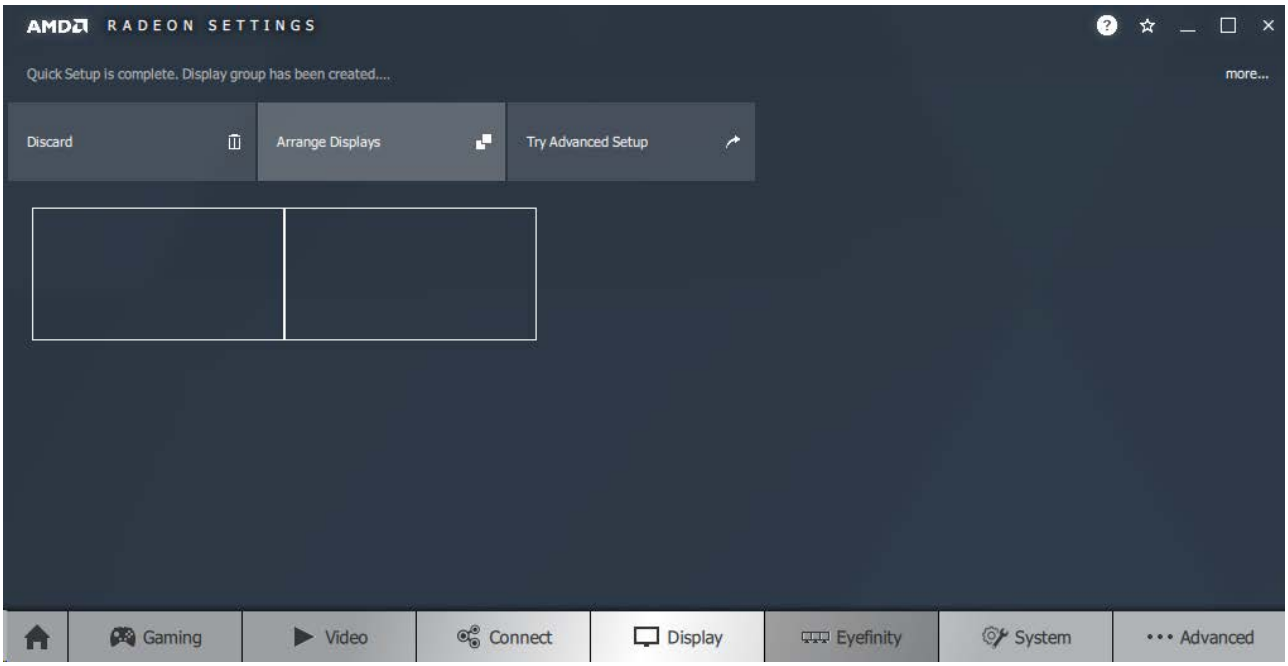


Eyefinity Display Grouping

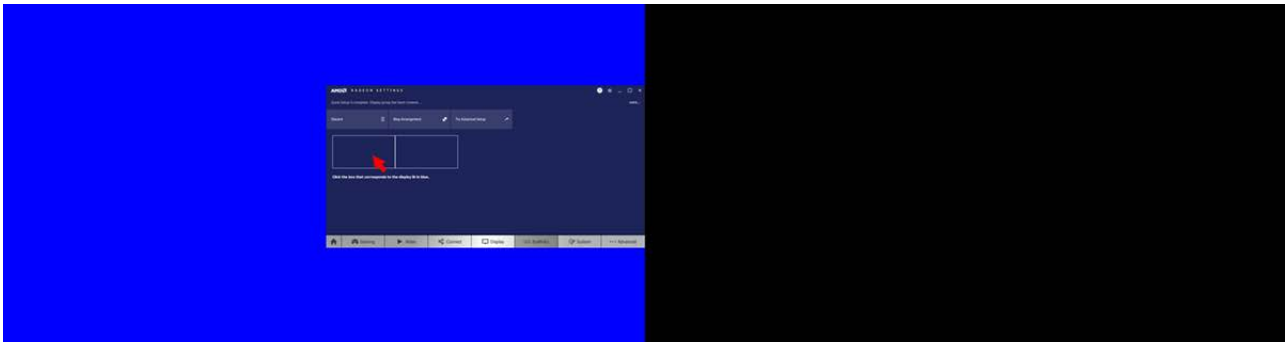
Having more than one connection now adds the ‘Eyefinity’ button.

The AMD driver for Pico currently only supports a single horizontal row of displays. [October 2019]

Click ‘Eyefinity’ and then on ‘Quick Setup’ to arrange the displays.



Click a display to identify the actual output that is lit up blue:



The final display needs no identification.

Close Radeon Settings and restart the Pico.

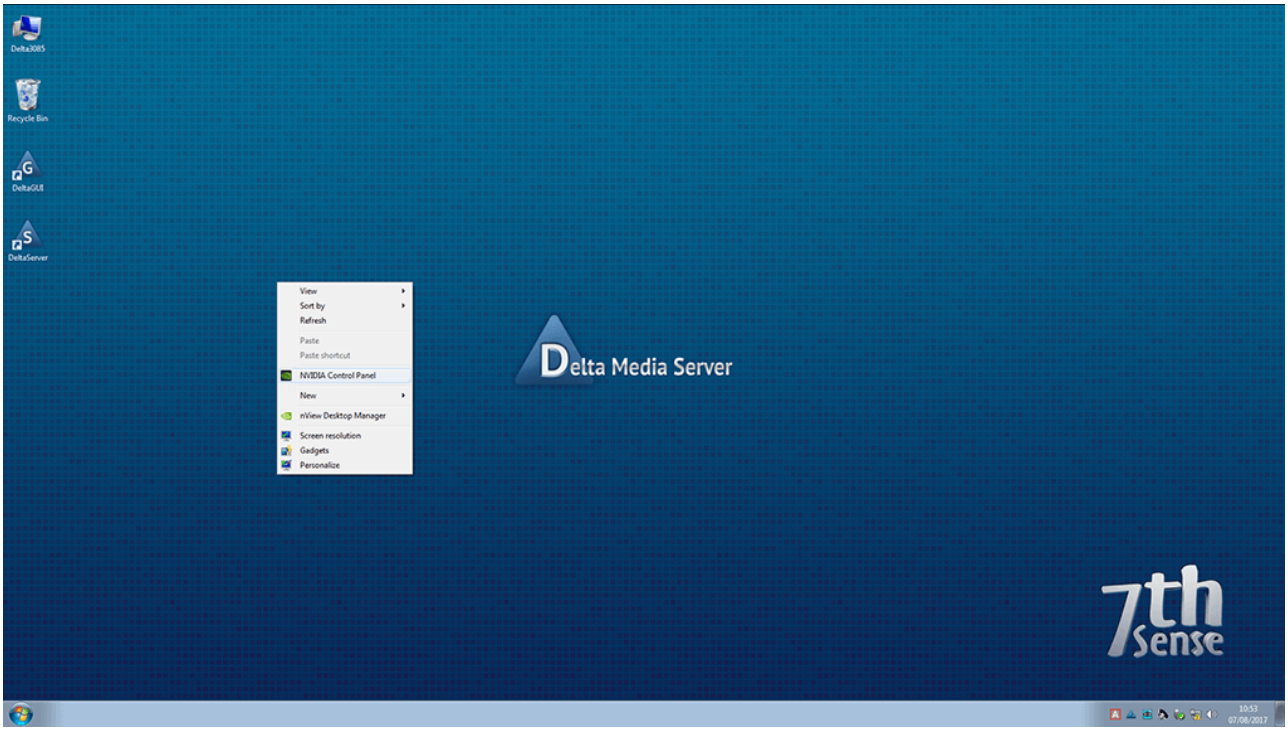
Emulating and Grouping Displays with NVIDIA

Please note that this document demonstrates how to emulate and group displays using NVIDIA Driver 368.86 as an example. For each graphics driver, location of functionality may vary so please see manufacturers guidance if you cannot find emulation and grouping options.

Note that the sequence: Emulate > Group > Sync should be followed.

NVIDIA Control Panel

Right click the Desktop, and left-click NVIDIA Control Panel:



EDID Emulation (Spoofing)

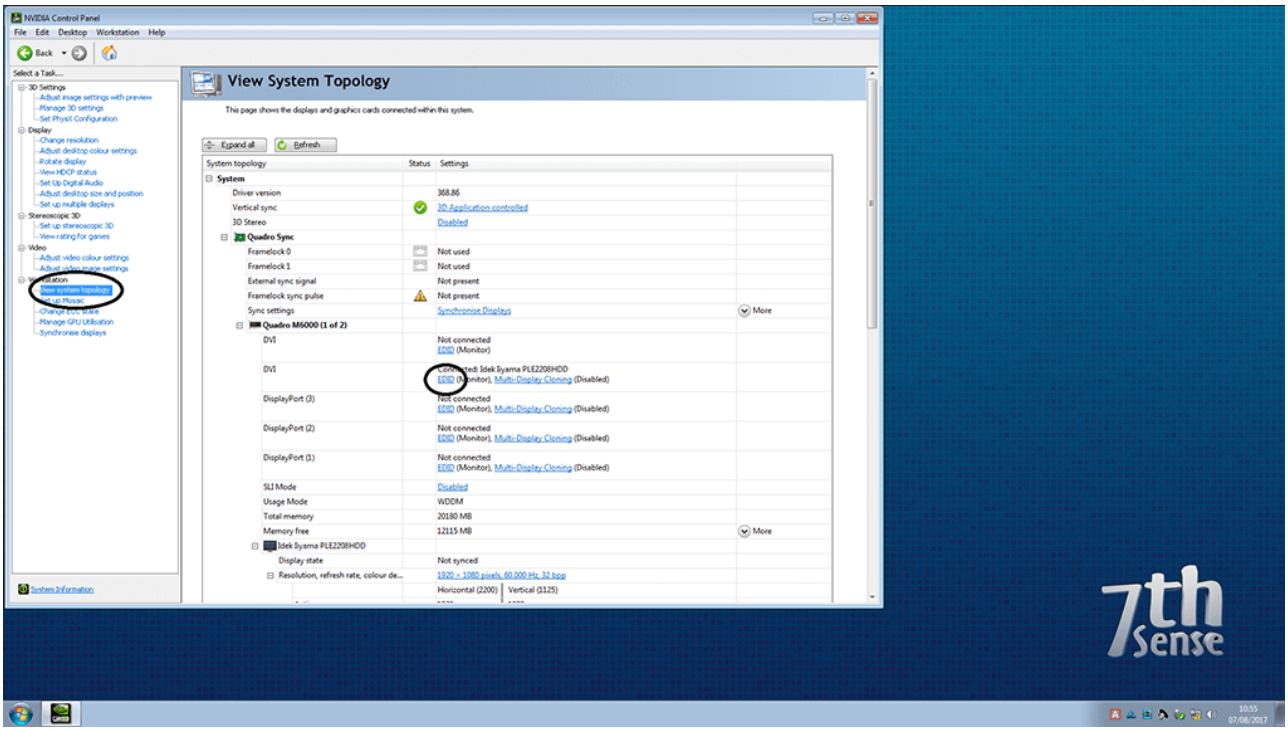
EDID (**E**xtended **D**isplay **I**dentification **D**ata):

- is a protocol to allow communication between a device (graphics card) and its connected displays (monitors)
- records display information to the GPU so that it doesn't have to repeatedly communicate with displays when drawing to them
- maintains the required arrangement on working displays if one (or more) display fails:

- If the displays are not spoofed, and connection between server and a display is broken, then the display arrangement reverts to single display mode, causing media distortion across the working displays, or black output across multiple displays.
- When spoofed, working displays maintain the output as if the broken connection (missing display) was still working, minimising disruption to the main output.

Note: it is advisable to keep a note of the relevant IP address of the server so that you can still VNC into the server if you happen to lose visuals – which can happen if an incorrect EDID is applied, such as a resolution forced that was unsupported by the connected display.

In the NVIDIA Control Panel go to *Workstation* > *View System Topology*:

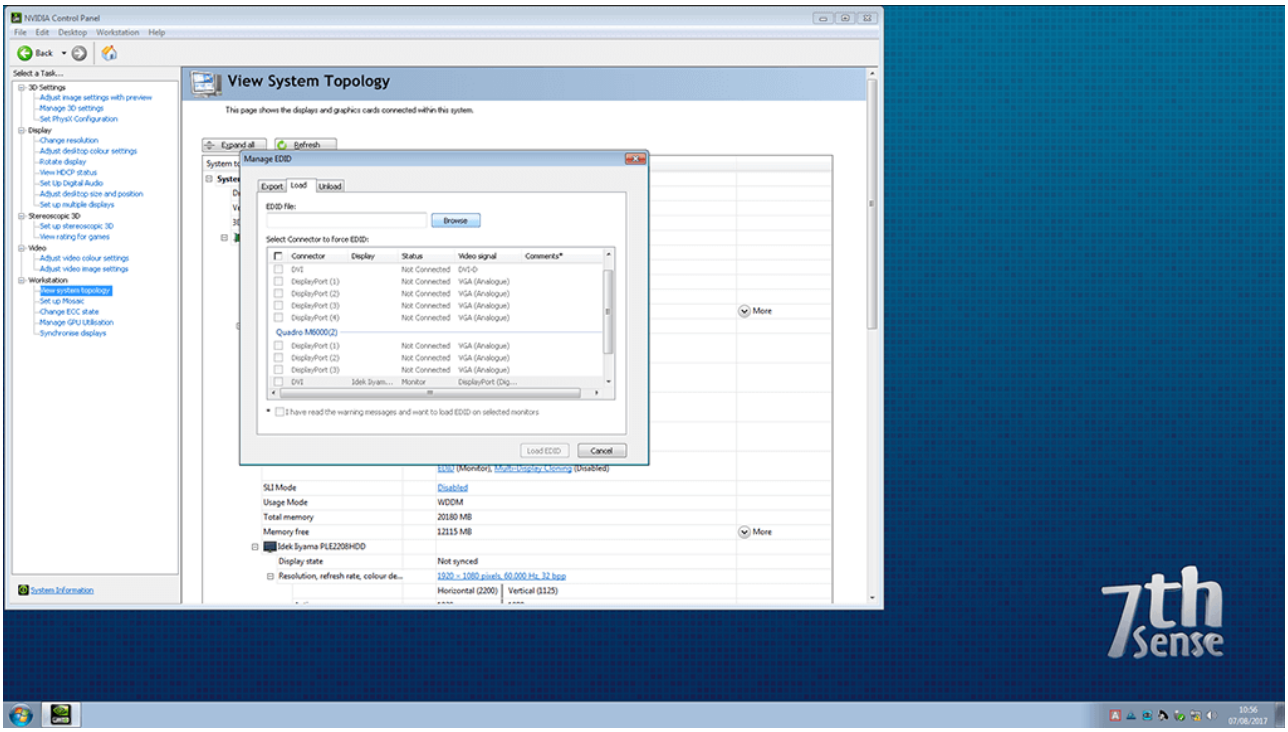


Note: NVIDIA SDI Systems

These require Port 1 to be EDID-spoofed to 7thSense standard 1366 × 768@59.94 EDID to ensure performance during Delta playback. Without an EDID the driver does not load.

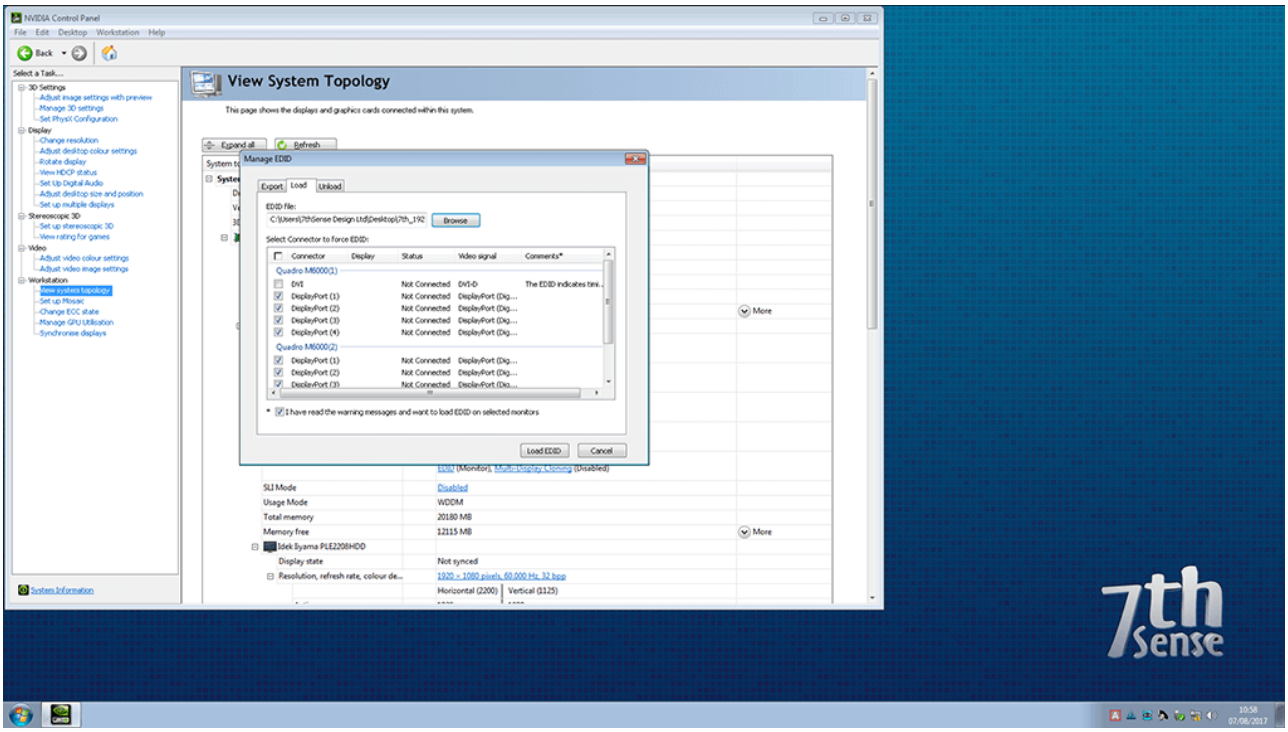
Begin EDID Emulation

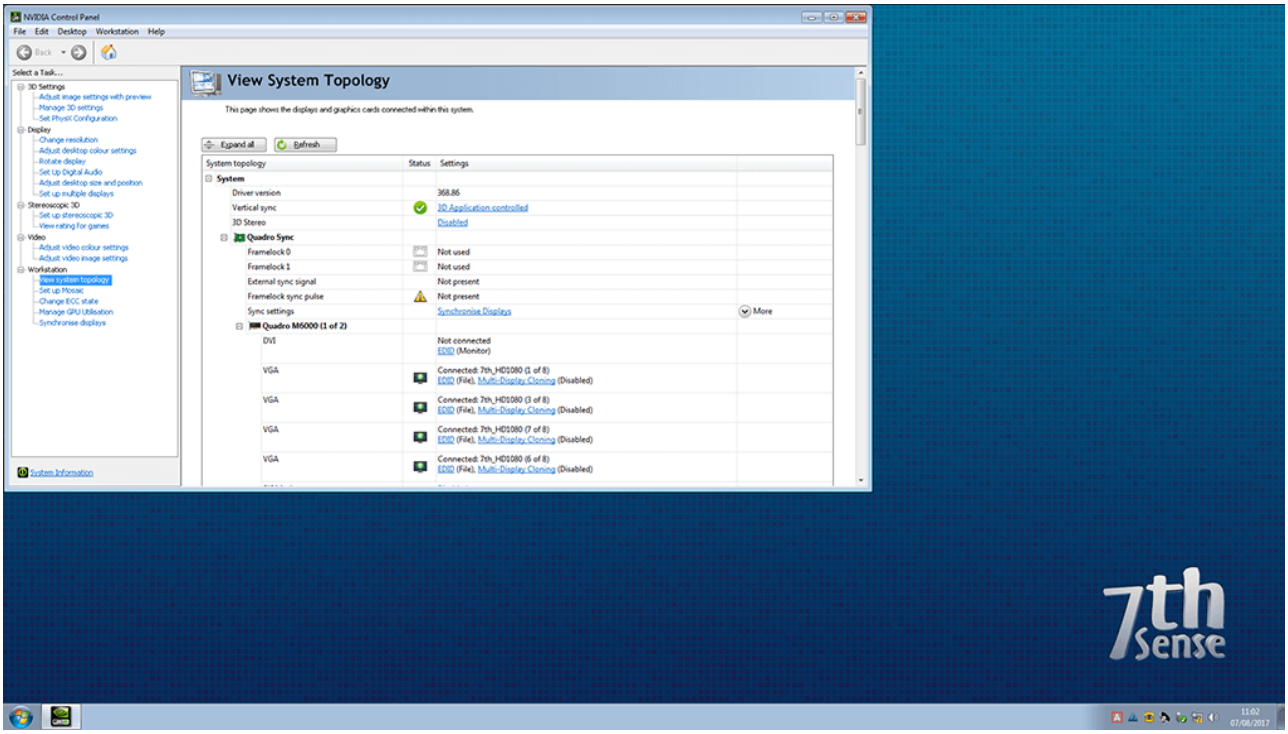
Click *View System Topology* and then click EDID on the first output. NVIDIA cards tend to have 5 output connectors, 4 × DP + 1 × DVI ports on them; be wary not to spoof the wrong output, or more than are required. Notice the connector type mentioned for each output above. Please be advised that when spoofing outputs, **it is important that all necessary outputs are connected to the displays**, and that the adapter types are the same for all. It is not possible to spoof outputs with mixed resolutions or mixed adapter types.



This will then open the **Manage EDID** window. Ideally when spoofing EDIDs, you want to use the native display EDID file. 7thSense do provide a wide library of common EDID files on the server, though these should be used only If necessary.

As mentioned previously, ideally, we should spoof the outputs with the native EDID from the connected display. To do this, select / tick one of the outputs which currently has the appropriate an active display attached, then click the Export tab and save the file to an accessible location on the server. You should now be able to 'Load' this saved EDID into the wizard, and apply it to all the necessary GPU outputs. Again, be sure that all adapter types are correct before applying the EDID.





Once the EDID is applied, the outputs will flicker for anywhere up to 1 minute or so while it's being applied. When finished, all outputs will now show as: **Connected: (Name of EDID)**.

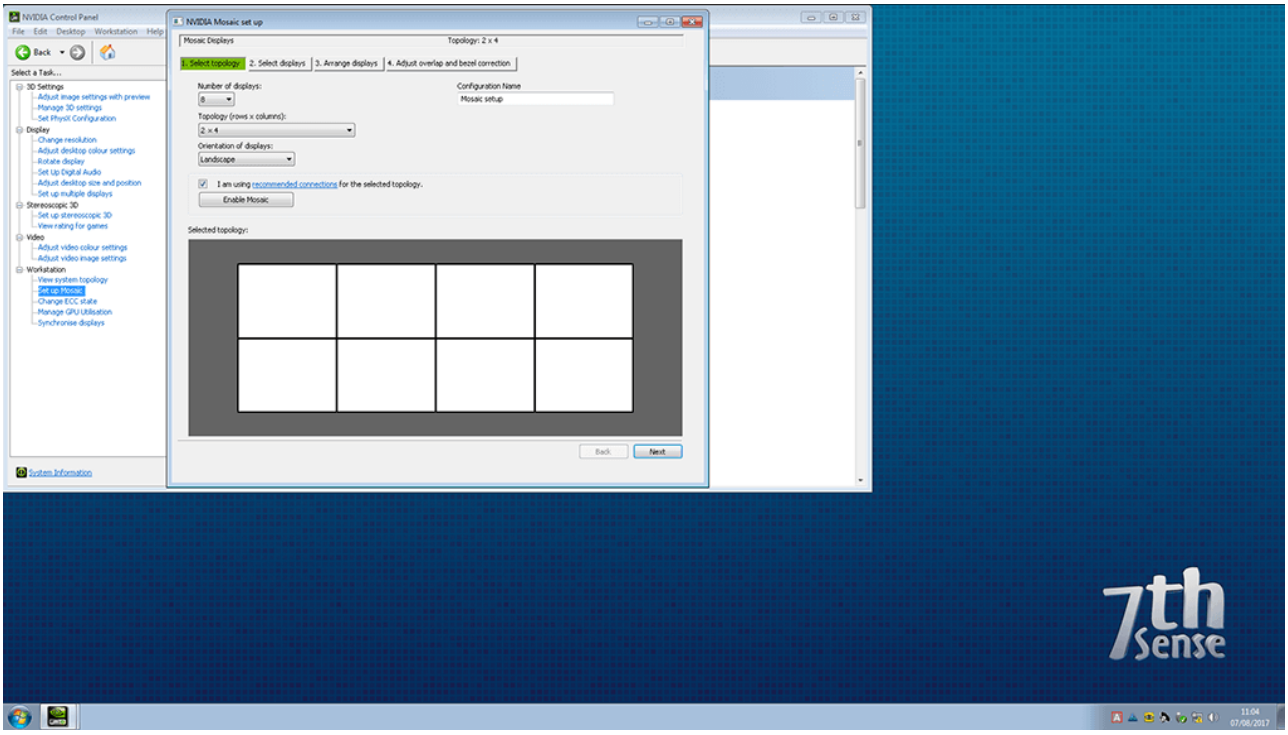
Finally open the 'Change Resolution' tab, and ensure that all connected displays are displaying at the correct resolution, refresh rate and bit depth – then hit apply. *It is important to do this before beginning the grouping process*.

Setting up a Mosaic (Grouping)

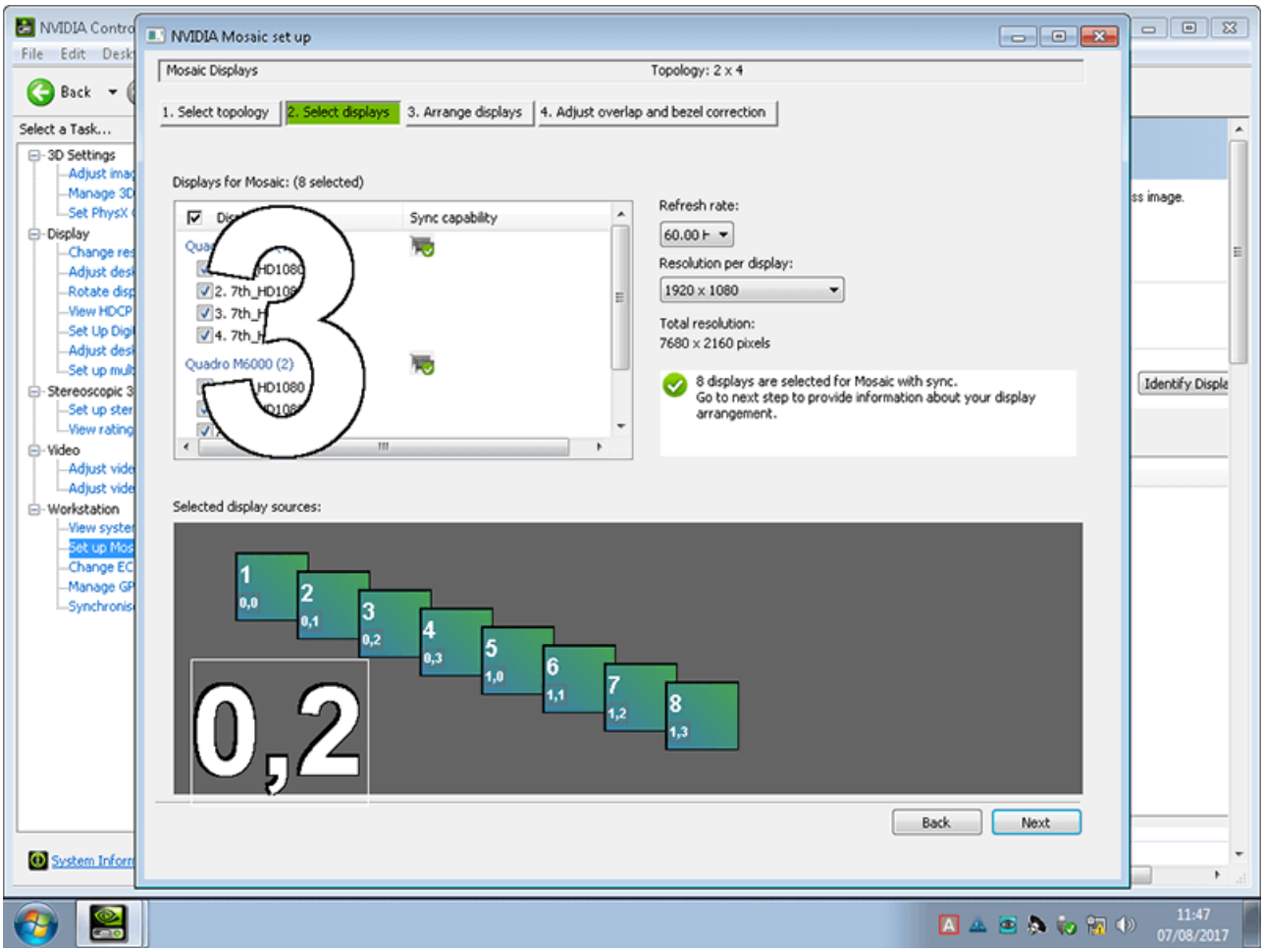
When media is to be displayed over more than one display, the display outputs need to be Grouped: this is achieved in NVIDIA by creating a ‘Mosaic’.

Multiple GPUs: unlike AMD, NVIDIA regards multiple GPUs in a server as a single system, enabling flexible grouping and layout of all available outputs together.

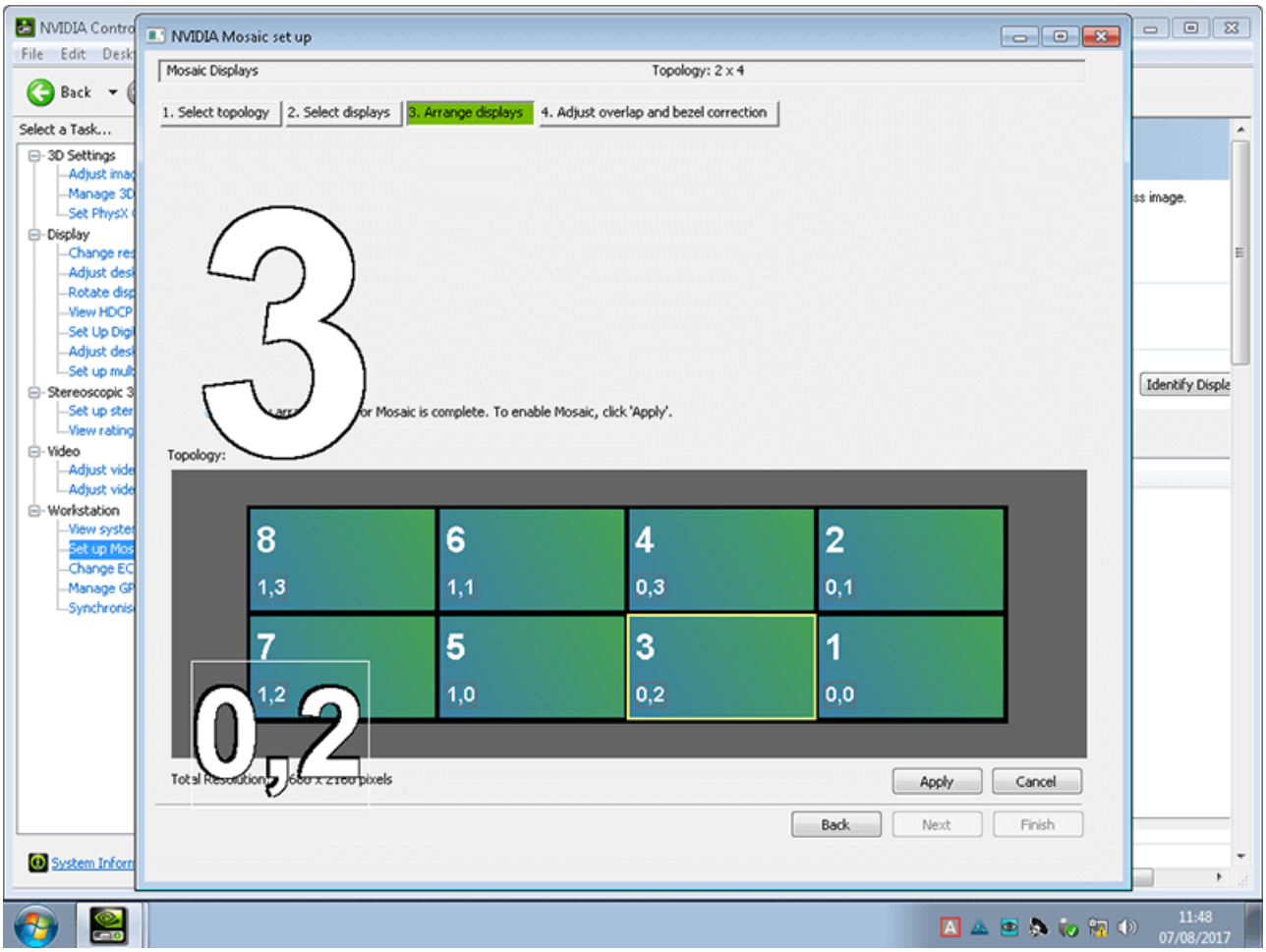
For example, a widescreen display with 3 projectors (left, centre, right channels) would use a 3 × 1 group, whilst a group of 8 monitors (as in this example) may use a 2 × 4 group. An NVIDIA ‘matrix’ is designated as rows × columns (the opposite of AMD systems, which would call the arrangement below 4 × 2).



Along the left-hand side, select *Set up Mosaic*. Select the number of outputs you wish to use, and then the arrangement you need. Click the tick box ‘I am using recommended connections for the selected topology’ and then click Next.

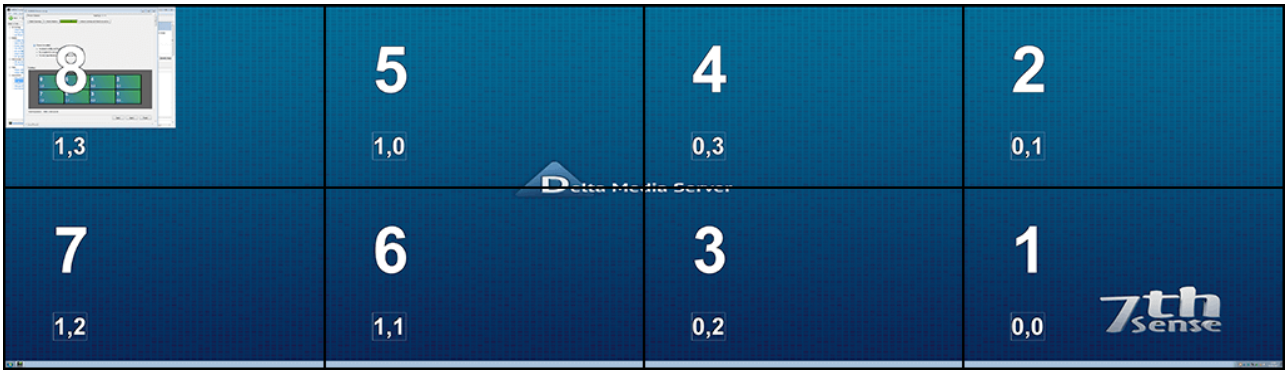


In the next stage, you can re check that the desired Refresh rate and Resolution will be set for each display. Each connected display will show with a number in the foreground for reference.



You will then need to drag the corresponding screen number on the top to the arrangement below to make sure the outputs are in the correct displayed order.

Then click Apply:



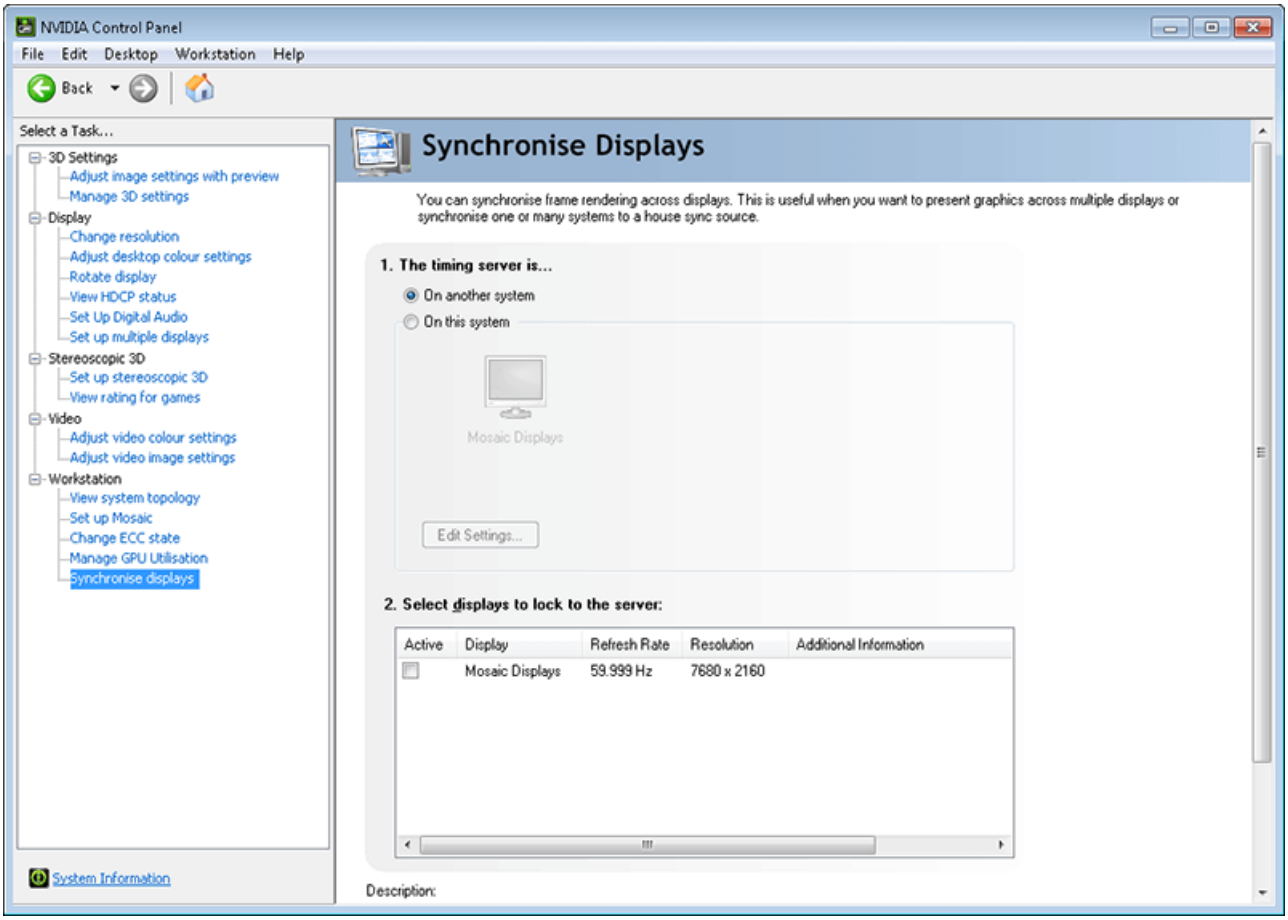
The outputs will then flash for up to 1 minute while the Mosaic is set up. When this is complete, double check all outputs are in the correct place. Once complete, click Finish. If bezel compensation if offered ignore it, it is advised that this is corrected for in the Delta canvas, rather than in the graphics driver. Once mosaic is complete, please restart the Delta server.

Synchronization (Genlocking)

Synchronization between GPUs, and/or with an external signal source (genlocking) requires installation of an NVIDIA® Quadro® Sync II card in each Delta Media Server. This can be linked to a central house sync/reference generator.

Genlocking your system ensures that all output/displays play at precisely the same rate to prevent media tearing. 7thSense recommend using House Sync genlocking via the BNC reference port, rather than the framelocking method using the RJ45 ports. This procedure will synchronise your server(s) to a house sync source when using NVIDIA GPUs.

Open up the NVIDIA Control Panel, and select Synchronise Displays along the left hand side:

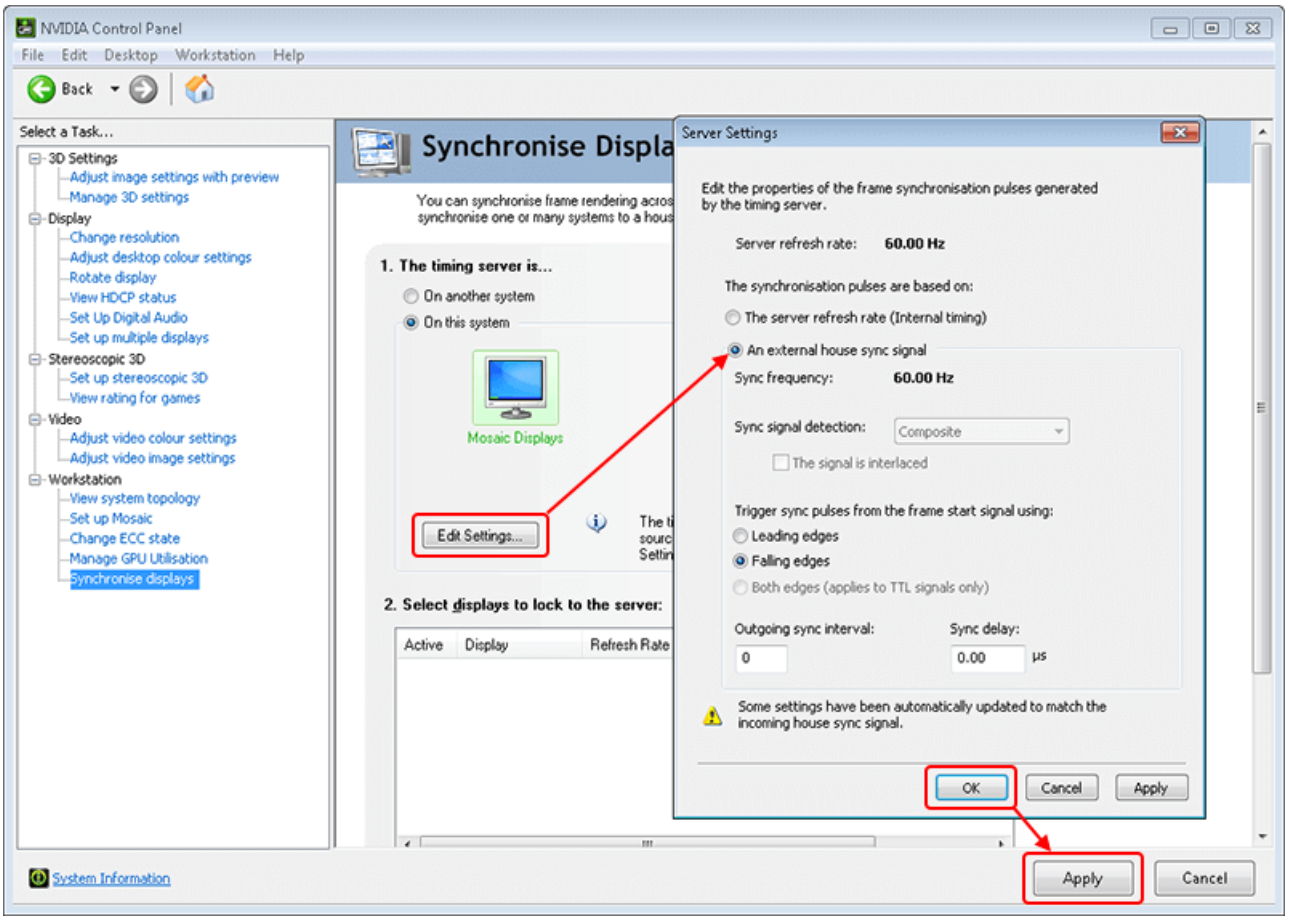


Timing Server

This is the reference that enables the NVIDIA framelock. The GPU on one server *can* takes its reference from another NVIDIA GPU on another server as a timing master, so this timing should never be used on a single server system. This can be done via RJ45, or by utilising 'The server refresh rate' with 'BNC output enabled' as signal from the master system.

Normally we are using an external house sync, so select 'On this system' and then click *Edit Settings*.

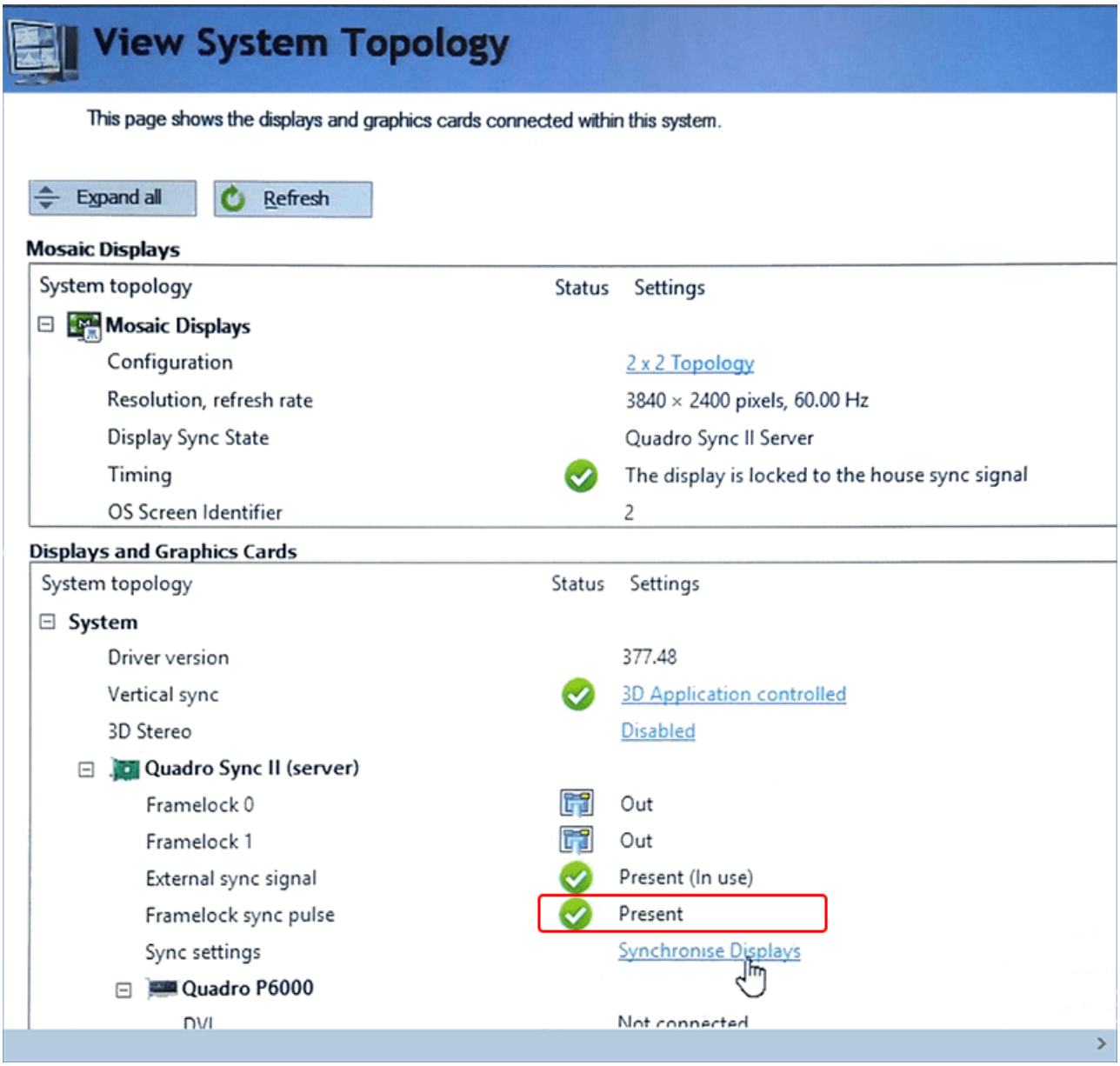
Select ‘An external house sync signal’, ensuring that your house sync matches the frequency of the EDID that has been applied to each output, otherwise it will not synchronise.



Then click OK and Apply:

All outputs will then flash repeatedly for up to a minute while the synchronisation is completed.

Note: any Nvidia system locked to an external sync must state that the **framelock sync pulse** is ‘present’ and show a green tick before system testing, otherwise it will drop frames:



This same ‘framelock sync pulse’ confirmaton should have a green tick when using ‘on this system’ > ‘the server refresh rate (internal timing)’ too. If no external sync is available, this is how the system should be configured.

Finally restart the server to ensure all changes apply, and hold completely. The green tick(s) may not appear until after rebooting the system.

Reconfiguring NIVIDIA displays

Sometimes there is a need to reconfigure your NVIDIA displays, so here is a straightforward guide to the procedure, covering multiple servers. At various points if you need assistance contact 7thSense support.

Using UltraVNC from a control PC, access each server remotely and open the NVIDIA Control Panel (as here [73]).

- Terminate **DeltaServer.exe** and **DeltaMonitor.exe** processes.
  Ensure that they remain closed during any changes to NVIDIA control panel (keep an eye on them after reboots, because they will try to start again on Windows boot).
- Physically disconnect house sync from all servers.
- Disable any enabled Mosaic, on each server, using 'Setup Mosaic' and then Disable.

In the System Topology menu of NVIDIA Control Panel, on each server:

- Click 'EDID' text available in the information of any given display, go to **Unload**, check all checkable outputs, and 'Unload EDID'.
- Now physically disconnect all display and adapter connections from all servers.
- If you are using adapters, at this time pick *one* adapter and connect it to its cable (leave all adapter+cable assemblies physically disconnected from the graphics card).
- Pick one server, which we shall treat here as the master setup box, and physically connect one adapter+cable assembly to the top DisplayPort output of the graphics card closest to the system power supply. We will call this 'Card 1 Output 1'.
- Reboot all servers at this point (you should only have 1 display connected to each of them at this point).
- After reboot, how many displays are now indicated as 'Connected (Name of Display)' on the 'master setup box'? This should be 1. If not, something is wrong, please seek further technical help. It is a good idea to also note the *Name of Display* indicated here.

Now in the 'Change Resolution' page of NVIDIA Control Panel on this 'master setup' box:

- Observe what resolution/refresh/color sampling options are being revealed by the received EDID. Pick any one of the available displays near the top of the Change Resolution menu (only 1 option will be available if you only have a single output connected to that server). If multiple options are available, take note of the 'X of X' indication of that display so that you can reference it later as necessary.
- Select the correct settings that you want to use for your system permanently and apply.
  Most commonly, you want to select the native resolution of your display, and the refresh applied should generally match the framerate of the media you will play in Delta. (*Example:* if your media is produced to play at 30 fps, then your desktop graphics refresh rate could be 30 Hz). If for any reason, the settings you need are not present, then this needs to be addressed now. Don't bother going any further until this is addressed. Please describe the issue and the 7thSense support team will try to help.
- After applying the resolution/refresh/color sampling settings you believe to be correct. You might choose to take a screenshot that shows the menu fields:
  - 'Connector' type (in example: 'HDMI - HDTV')

  - ‘Resolution’ selected in the list (in example: 4K × 2K, 3840 × 2160).
    Does this item fall in the resolution list under the heading ‘Ultra HD, HD, SD’, or ‘PC’, ‘Custom’, or ‘Mosaic’? If this can’t be seen in the screenshot due to length of their resolution list, just note what is is (as in example: UltraHD, HD, SD).
- Refresh rate (in example: 30 Hz)
- Output Colour Depth, format, dynamic range method (in example: 8 bpc, RGB, Limited).
- You will be able to tell if those settings have been applied because an ‘Apply’ button will appear if they have not yet.
- **Reboot now** (after you have successfully applied the settings you like, and confirmed that the image to your display looks correct).
- Check that settings have stuck, and that display still looks good, following reboot.

In the ‘System Topology’ menu:

- Click ‘EDID’ text available in the information of any given display, go to EXPORT, click on the connected head, and ‘Export EDID’. Save the EDID (a .txt file) to C:\7thSense Data (because it can be easily accessed from here over the network from the other server.) Name it something logical that you will recognize later, such as ‘EDID_Display Name_Date.txt’.
- Go to *Load* > *EDID File* > *Browse* and navigate to C:\7thSense Data and choose the EDID file you just exported.
- Now check the display box indicating ‘Monitor’ as Status (as opposed to ‘Not Connected’) and ‘Load EDID’. After accepting the success popup, you should now see ‘File’ indicated as that display’s status, instead of ‘Monitor’.
- Close EDID Manager.
- Next, one output at a time (very important), physically move that adapter+cable assembly down to the next physical DisplayPort connector *on that graphics card*, and follow the same load steps, loading that same master EDID .txt file.
- Follow the same physical move-then-load procedure for all outputs of all GPUs that you will utilise on each server (copy the EDID .txt via the network at \\IP address\7thSense Data when you move on to other servers.

It is recommended to load all GPUs evenly.

In other words, if you need 5 heads and you want to spread it over 2 GPUs, emulate 3 outputs to each GPU even though you only need (3+2). If your channel/mapping licence in DeltaServer supports the feasibility, consider just emulating all outputs of all GPUs on all boxes for organisational ease, even if you are not utilising all outputs.

Reboot now.

Double-check that you have all connections you desire indicated ‘File’ type EDID, whether physically connected or not. You can now physically connect as many heads to those prepared outputs as you

like. If you see any additional QTY of outputs appear upon doing this, then something is wrong. Please take a screenshot of what you see and refer to 7thSense support.

Now in the 'Setup Mosaic' on each server:

- 'Create new Configuration'
- Choose the correct 'Number of Displays'. This will be the total QTY of outputs that you have prepared on that system (all GPUs sum).
- Choose a Topology layout that you prefer (all-in-a-row is most common. For example, 1 × 2 is 1 row of 2 displays.
- Click Next.
- Choose the correct 'Resolution per display' and 'Refresh'. If the options you need don't exist, then something is wrong from earlier in the EDID prep process. Describe the issue and 7thSense support will help resolve the issue.
- Click Next.
- Starting with ID '0,0' and going through '0,1','0,2','0,3' (all outputs on the first GPU) and then on to '1,0','1,1','1,2','1,3' (all outputs on the next GPU) and so on, drag and drop displays from 'Available Display Sources' onto the Topology layout in reading order (left-to-right, then top-to-bottom) and click 'APPLY'.
- Your desktop should go through some changes at this point. Keep a close eye, because at the end you may be presented with an 'Accept changes?' dialog, and if you miss it then your settings may revert, and you'll have to do the process again.

  If you are working via VNC, sometimes the access will become unavailable when the desktop layout changes, in which case you may want very quickly to disconnect and reconnect VNC to regain access (before the revert timer is up!). You can always just connect a keyboard and mouse if VNC is being too difficult.
- 'Finish'.

Reboot now.

In 'Change Resolution' menu on each server:

- You should now only see 'Mosaic' type resolutions in the resolution list. Make sure the *total grouped resolution* you expect is applied.
- Check Refresh and Color sampling settings as well. If anything is not correct, set it.
- If you had to change anything, reboot now.

Now physically connect house sync to the BNC house sync input in each server.

In 'View System Topology':

- Look for any 'Quadro Sync II' indication. Observe the status of 'External Sync Signal'. If it says not present, then your house sync has not been detected and you should investigate. Ensure that the

house sync format that you connect matches the refresh rate of your display outputs (for example, 720p60 or 1080i60 tri-level house sync would be good if your displays are 60 Hz refresh). Do not bother going any further, if an appropriate sync format is not connected and detected on all servers at this point. Address the issue first, then *Sync Settings* > *Synchronise Displays*.

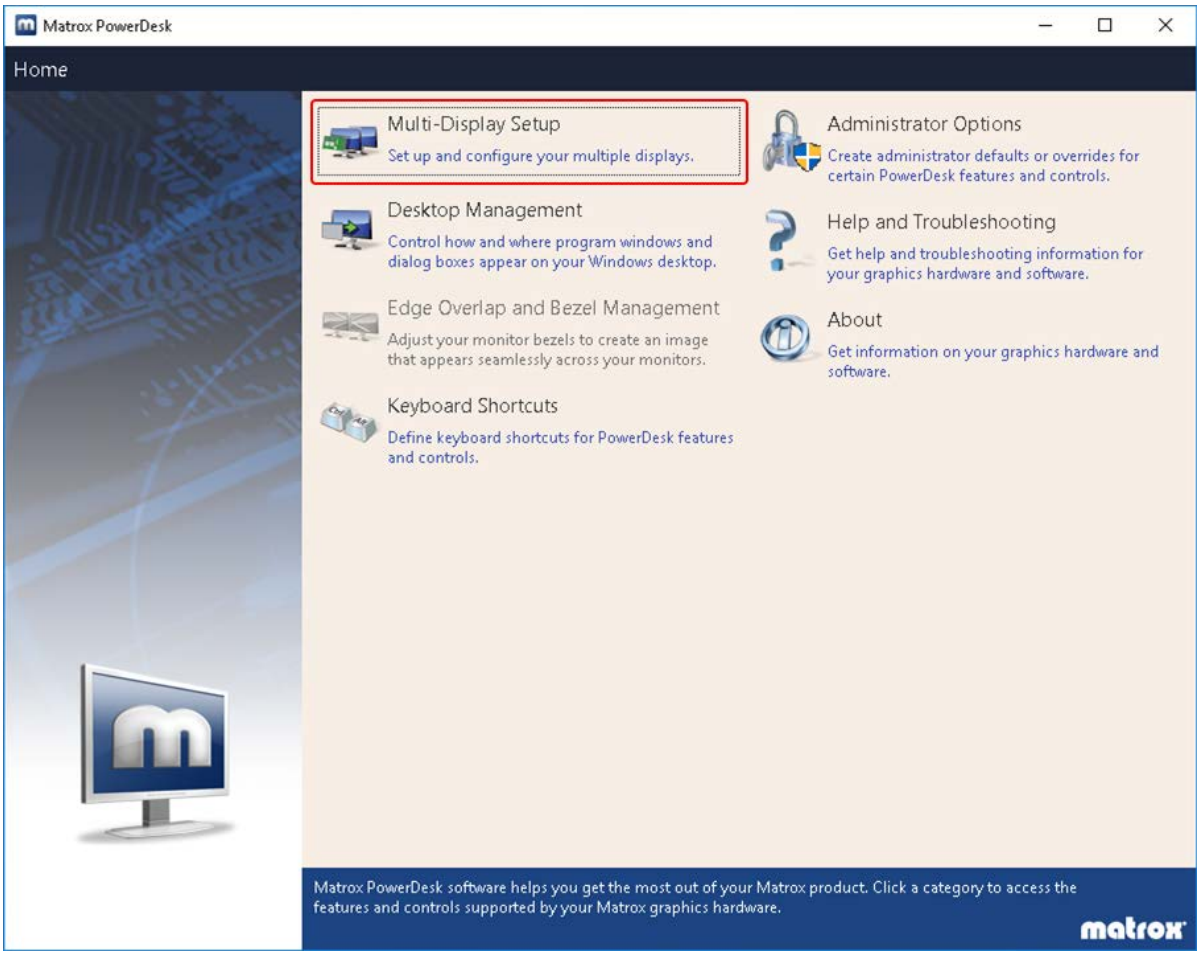
- At **The Timing Server Is...** 'On this system' > 'Edit Settings' > select 'An external house sync signal'. You should see that the 'Sync Frequency' exactly matches your display output refresh here. If it does, click 'APPLY' leaving other settings as default. If it does not, then do not apply, Cancel, and address the issue before going any further.
- In 'View System topology', you should now see External Sync Signal 'Present (In Use)' and Framelock sync pulse 'Present', on the Quadro Sync II status of each server. On each active output, you should also see Timing: 'This display is locked to the house sync signal'. All of those statuses will show a green check mark.
- Reboot all servers. Make sure the system comes back up indicating exact same status once again. If it does not, please describe the issue to 7thSense support for assistance.
- Confirm that your display output looks correct. If it does, you are ready for DeltaServer. If it does not, describe the issue to 7thSense support.

Output status reports can be useful, and may be requested in case of further support:

- Open an administrative command prompt, run 'sync_config.exe status' and screenshot or copy-paste so a full output can be submitted.
- Open an administrative command prompt, run 'nvtimingdiag.exe' and screenshot or copy-paste so a full output can be submitted.

Emulating and Grouping Matrox C680 Displays

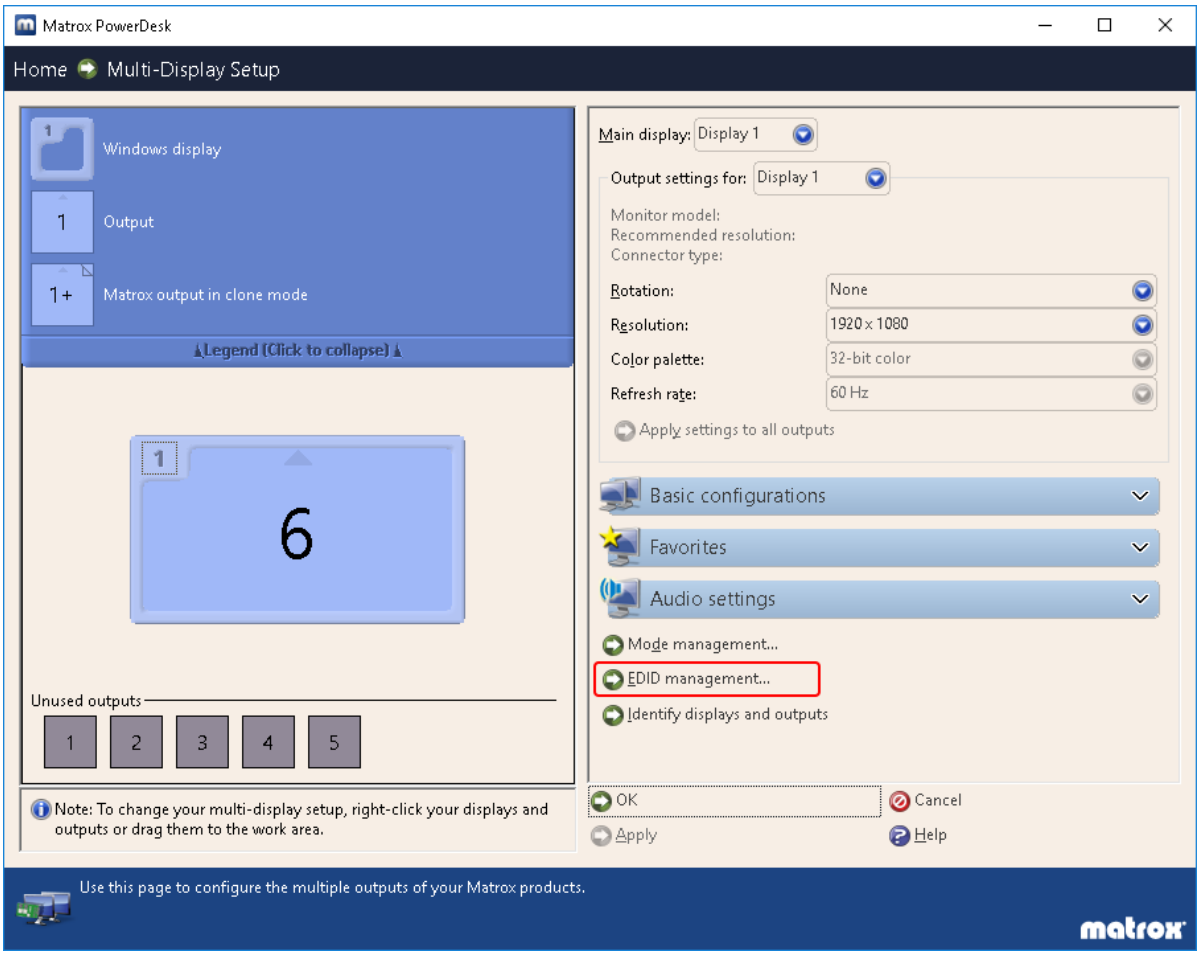
Right Click on the Matrox desktop icon and open the driver displays homepage. This is the front end of the driver – information about the driver can be found in 'About'.



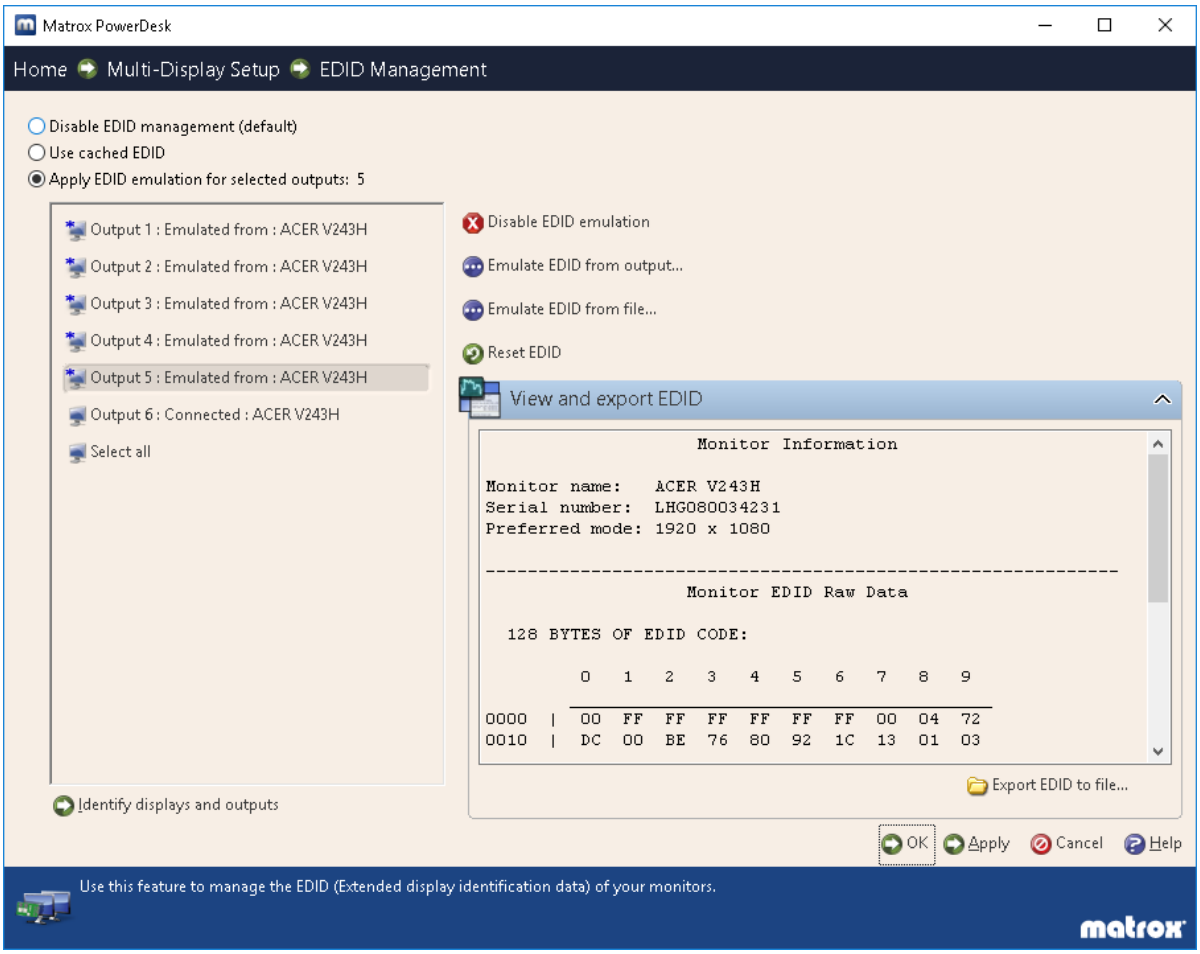
- Open Multi-Display Setup for EDID spoofing and grouping.
- After making any EDID or Group changes, a dialog will ask if you wish to keep these settings. A 60-90 second timer should appear in the active viewpoint.

Emulating

EDID Setup and Grouping can be found inside Multi-Display Setup. EDID Setup can be found in EDID Management and requires *all* the outputs to be connected.



C680 graphics cards require a .dat file for the EDID. These can be exported from the display and saved to file. This option is available inside *View and export EDID > Export EDID to file…*



- Once the EDID has been exported, ‘Emulate EDID from file...’. You can either individually emulate each connected output, Select all, or Ctrl+left-click the selection of outputs you want to emulate.
- Apply and OK to confirm the emulation.

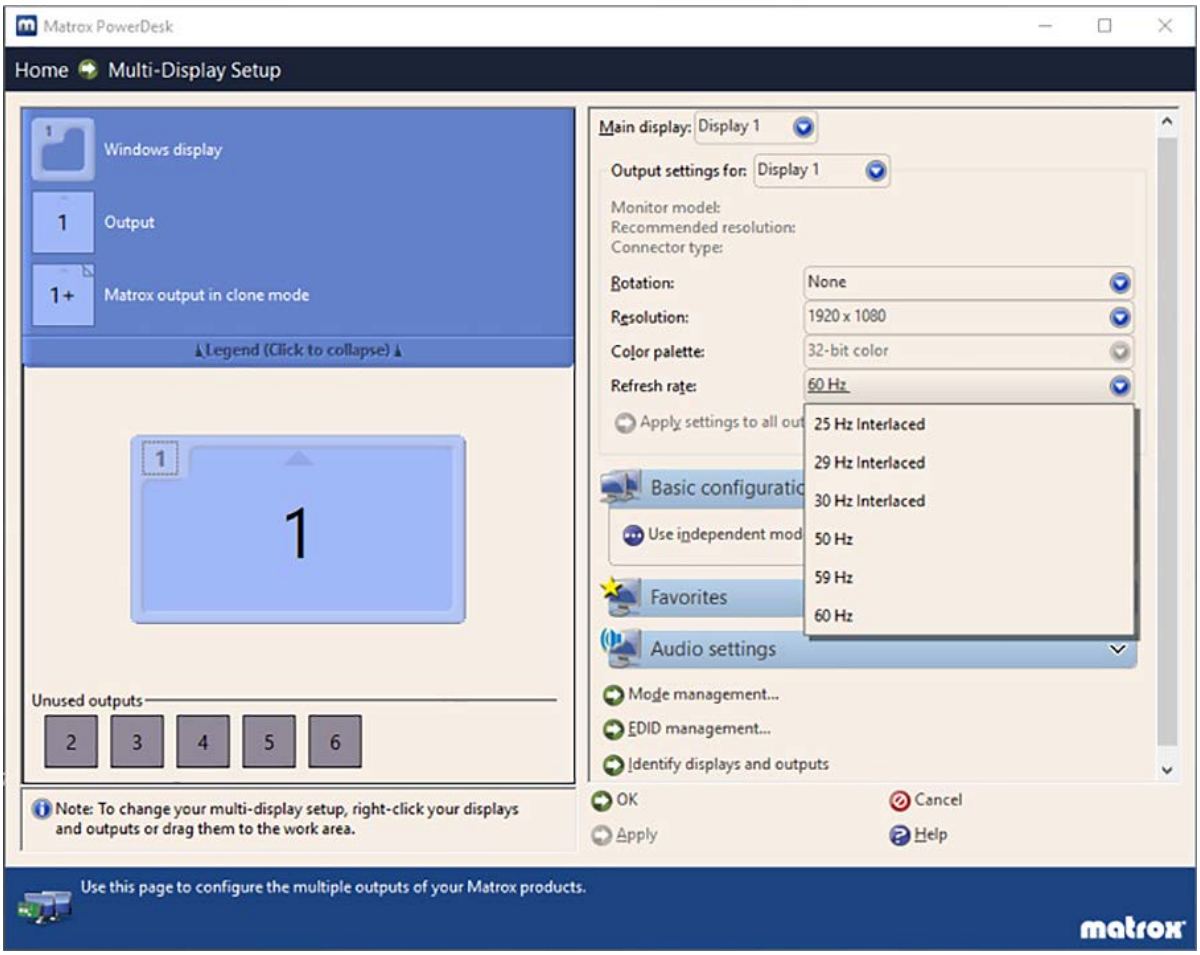
You can emulate outputs that are not physically connected to the card when using ‘Emulate EDID from file’.

Unspoof

Under the same *Multi Display Setup > EDID Management,* select all and click ‘Disable EDID emulation’, then Apply and OK.

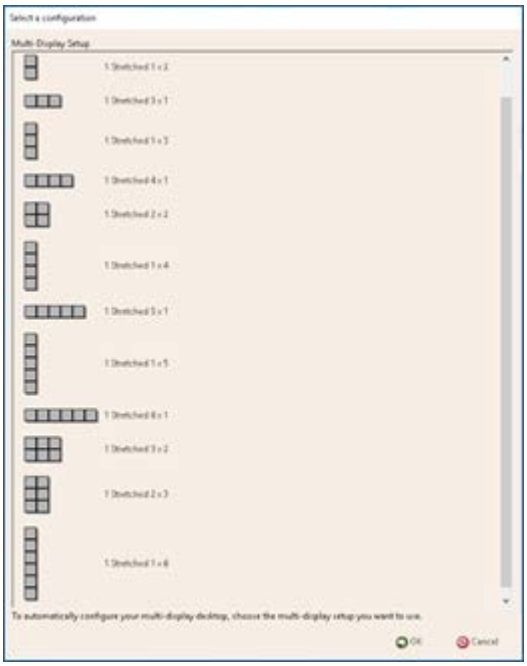
Multi Display Setup

In Multi Display Setup you can view and change the Display Resolution, Bit colour and Refresh Rate. Any changes made need you to click ‘Apply’ before entering EDID Management or Stretch Mode.



Grouping

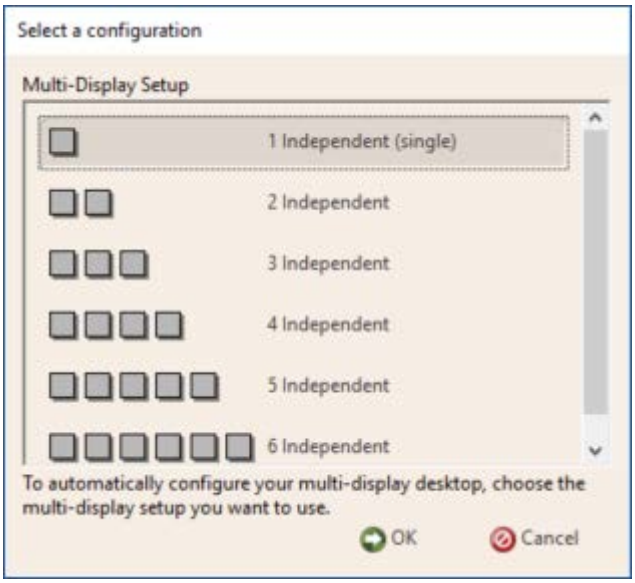
Once emulated you can group your displays. Click the ‘Basic Configurations’ tab and select ‘Use Stretch Mode’. This will offer the available configurations according to the number of outputs connected. If you have all 6 outputs emulated, you will be given all the available configurations between 1 output and 6:



- Select the group you need, Click ‘OK’ and then ‘Apply’ to create the Group. Click ‘OK’ again to return to the driver Home interface.
- Restart the system after making any graphics changes.

Ungrouping

To ungroup, go to *Multi Display Setup* > *Basic Configurations* and click ‘Use Independent Mode’. Select 1, or the number of connected outputs, from the options. Click ‘OK’ and ‘Apply’.



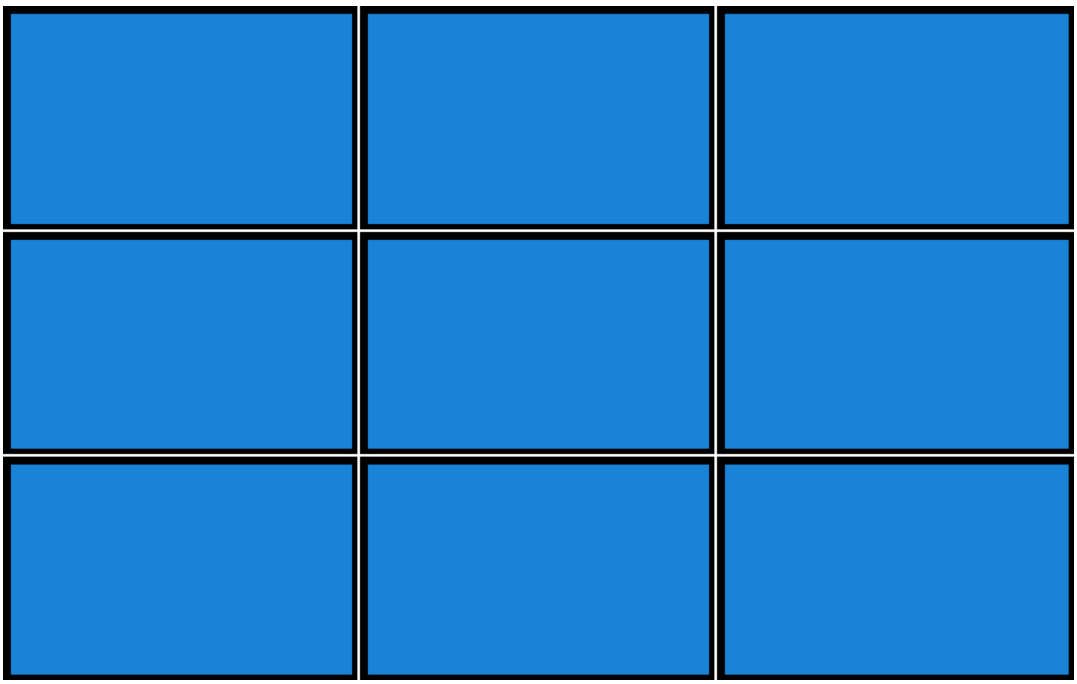
Video Walls

Video Walls

Whilst not presenting issues of warp and blend, video walls have their own complexities. Dimensions can be very precise, from display panel specifications and physical measurement. The arrangement logic, however, can sometimes feel confusing, especially with rotated and multi-channel walls, or where additional display controllers are used.

Video Walls: Bezel Compensation

Until seamless direct-LED video walls completely take over, even ultra-slim bezels remain part of the display calculation. Effectively we need to stretch the resolution of the total display so that the image includes the width of all, and only, the *adjoining* bezels.



The specification of a display panel will provide the pixel resolution and the bezel width.

Example: 1920 ×1080 HD display with very small bezels:

- 0.75 mm pixel pitch
- left/right bezel width 5 mm/3 mm
- top/bottom bezels 5 mm/3 mm (these may not be the same as left/right in all displays)

Width of adjoining bezels = 0.75 × (5 + 3) = 6 px

In the above group of 3 × 3 of these displays, the total display resolution (canvas) is:

Width: (3 × 1920) + (2 × 6) = 5772

Height: (3 × 1080) + (2 × 6) = 3252

It can also be worth physical measurement, since additional millimetres can accumulate depending on the physical mounting and become noticeable in alignment of diagonals.

This is the available size for the media. If you carve it, do so proportionate to the whole display.

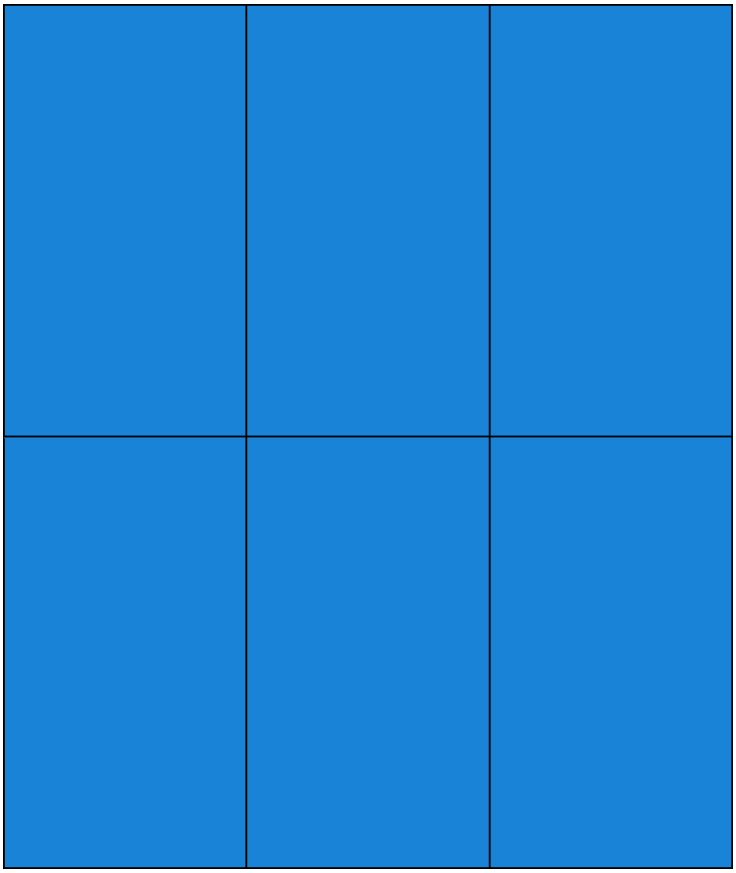
If the display is large enough to require multiple channels, make sure the channel matrix in Delta is underlapped to the bezel measurement, since the adjoining *outer* bezels of each channel now need to be taken into account.

Portrait-Grouped Video Walls

Whilst in theory panel display groups/desktops can be rotated in Windows, experience shows that it is more reliable to rotate the show in Delta. Here are two examples of wall displays employing portrait-oriented panels, requiring rotation.

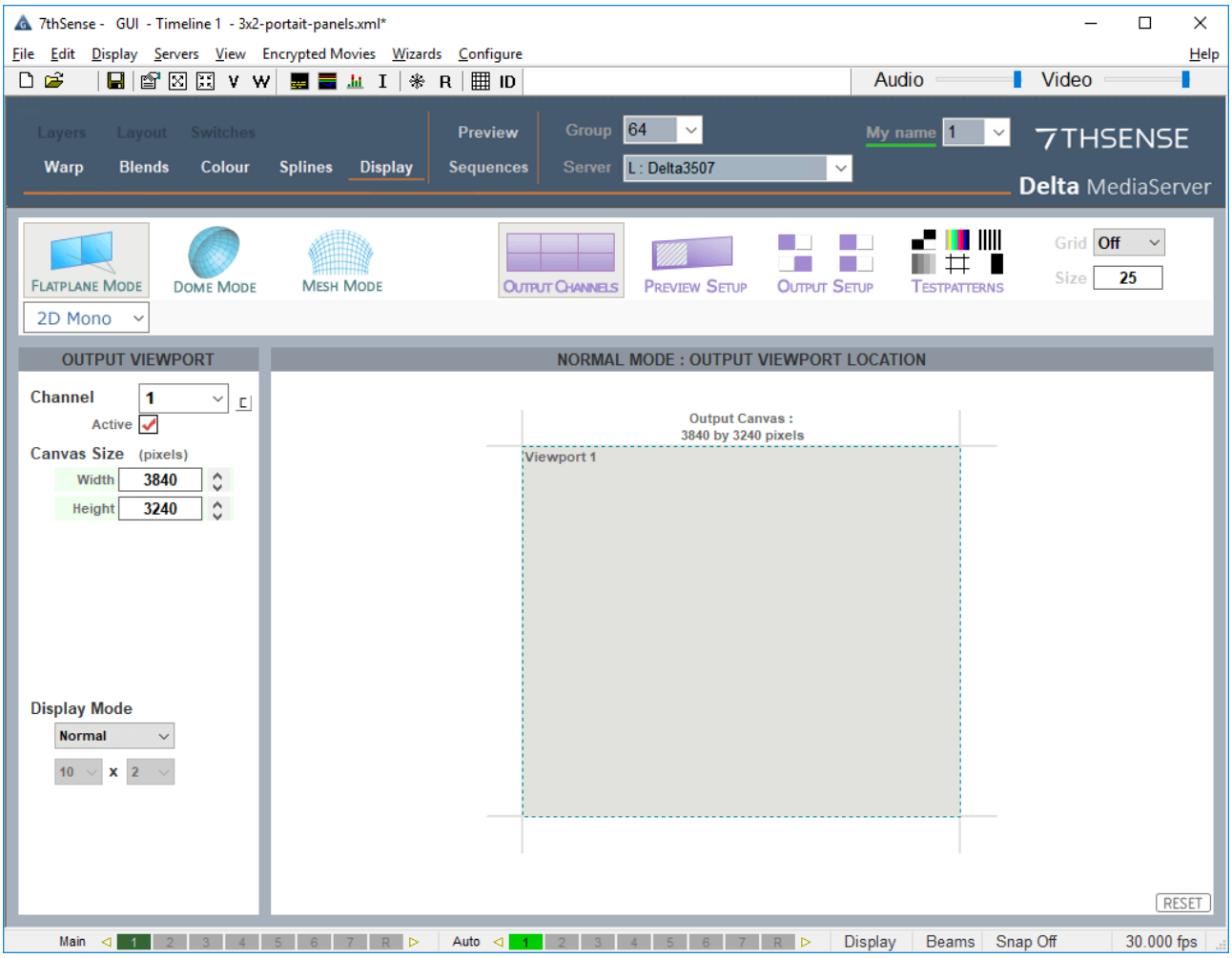
Example 1: 3 × 2 portrait panels, single channel

A group of six, 1920 × 1080 px display panels, is installed in portrait orientation, overall dimension 3240 × 3840:

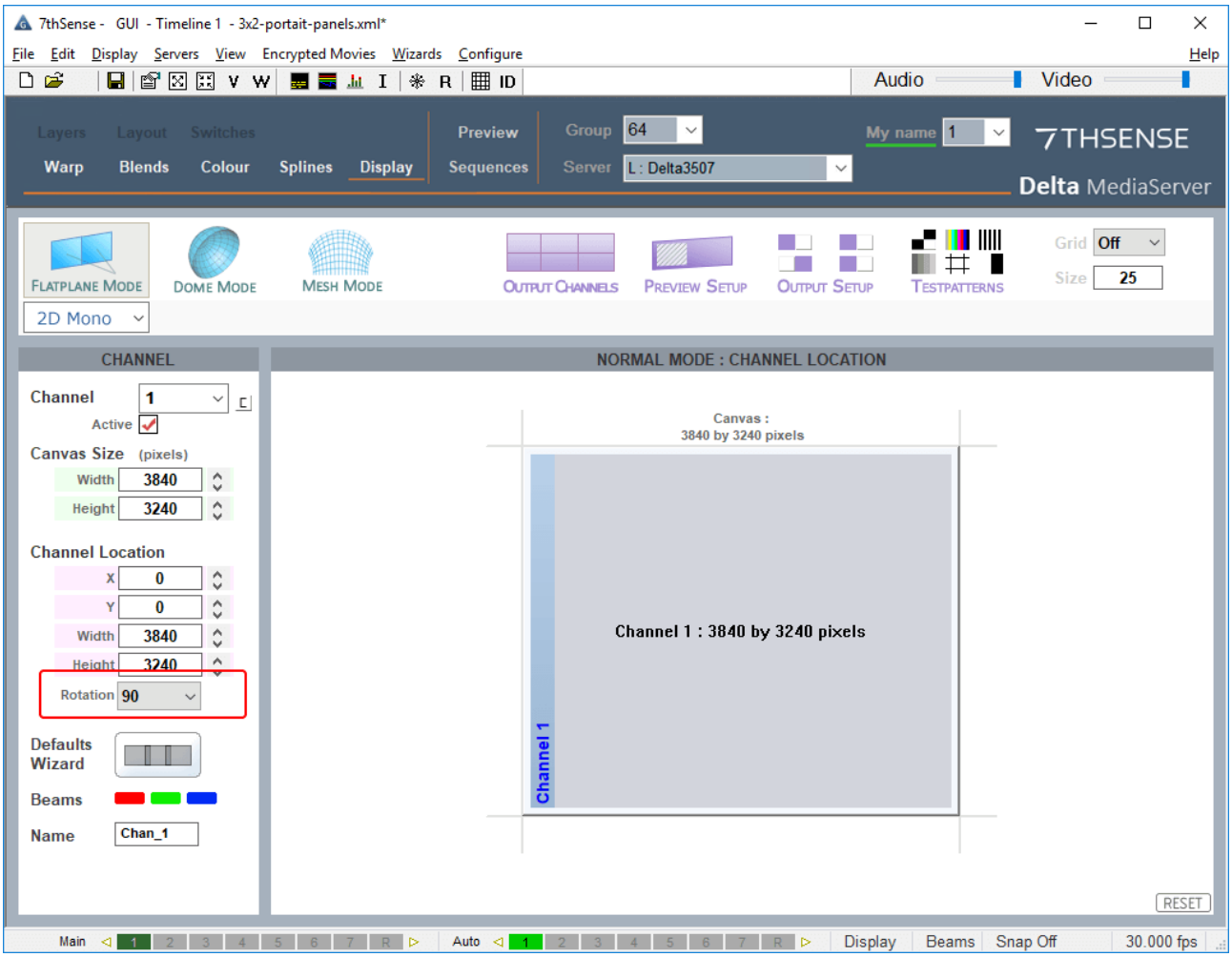


When grouped for the graphics output card, they will be grouped as if in normal landscape orientation. The simplest approach in Delta is to make canvas agree with the group, the channel agree with the rotation (physical reality), and to locate the media to agree with this.

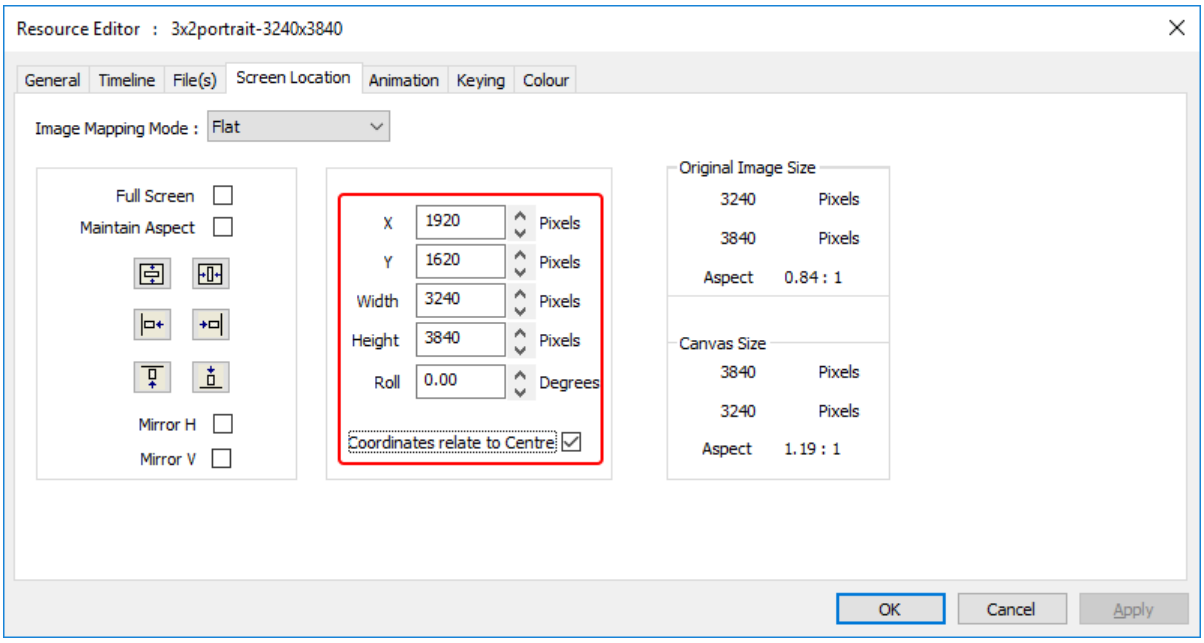
The **canvas** agrees with the graphics card display group:



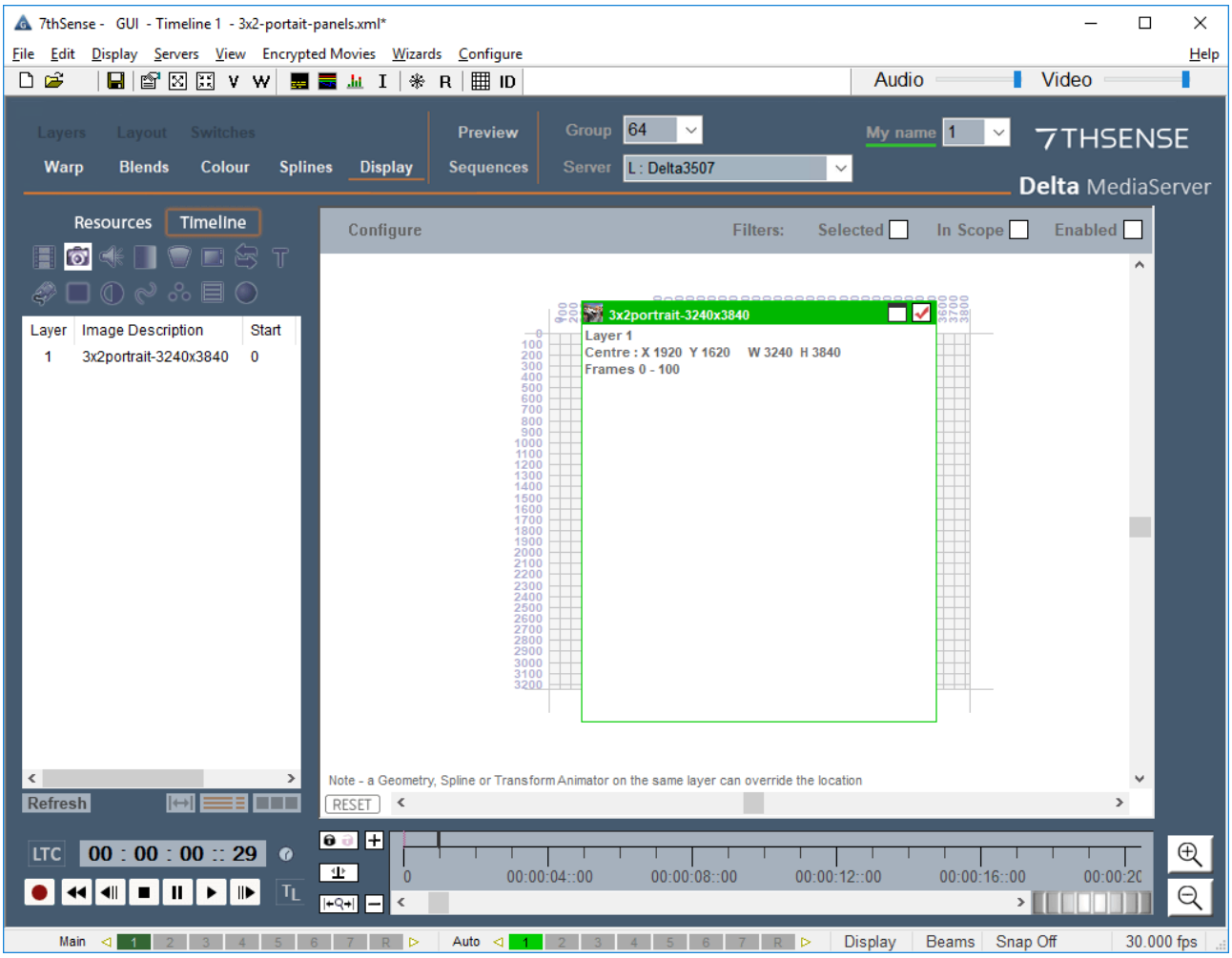
The **channel** agrees with the physical rotation:



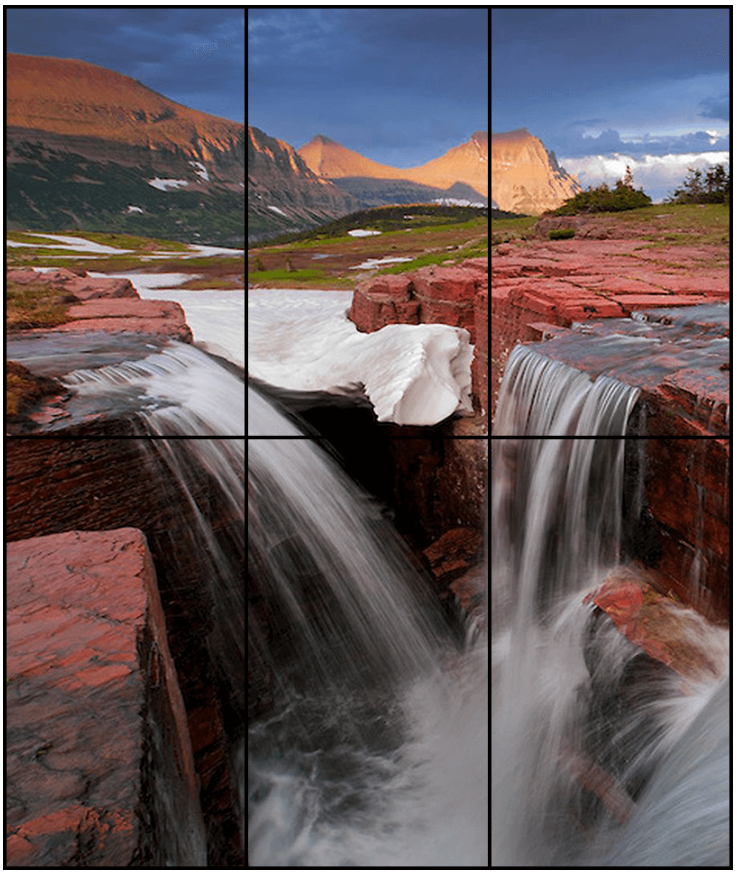
The **media** is in the correct physical orientation for the display and therefore agrees with the channel, not the canvas, so we give it a corrected location in the layout. This is easiest by positioning the centre of the media in the centre of the canvas:



This appears in the **layout** is if it were mismatched:



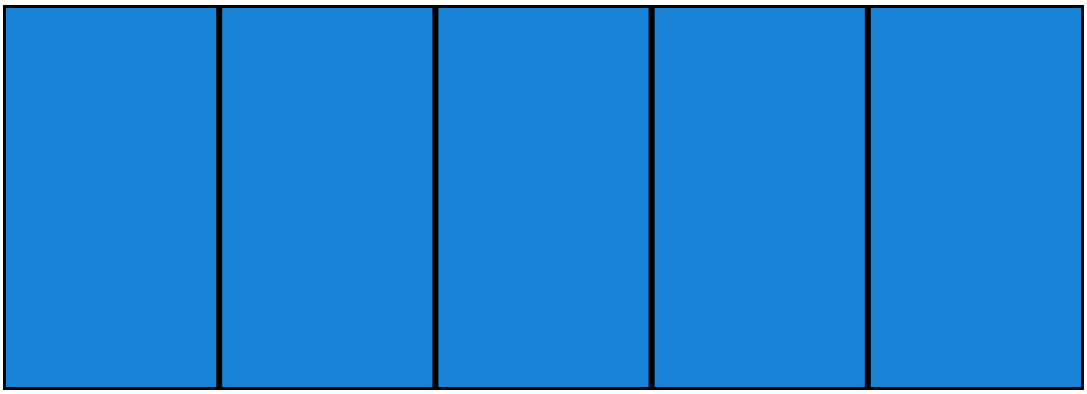
But the display (and preview) shows that this is correct:



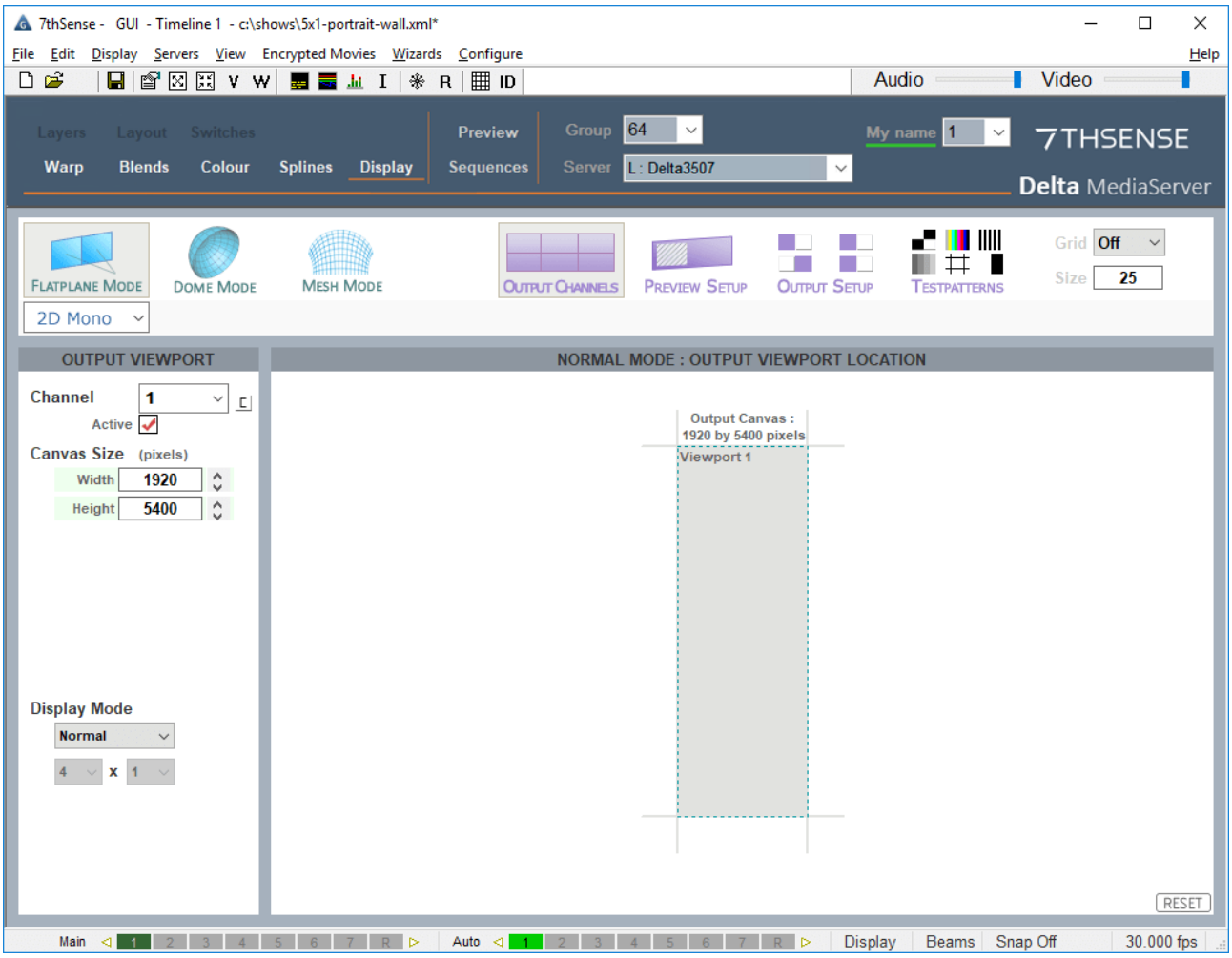
Note that the playback window represents the canvas, so will be rotated.

Example 2: 5 × 1 portrait panels, single channel

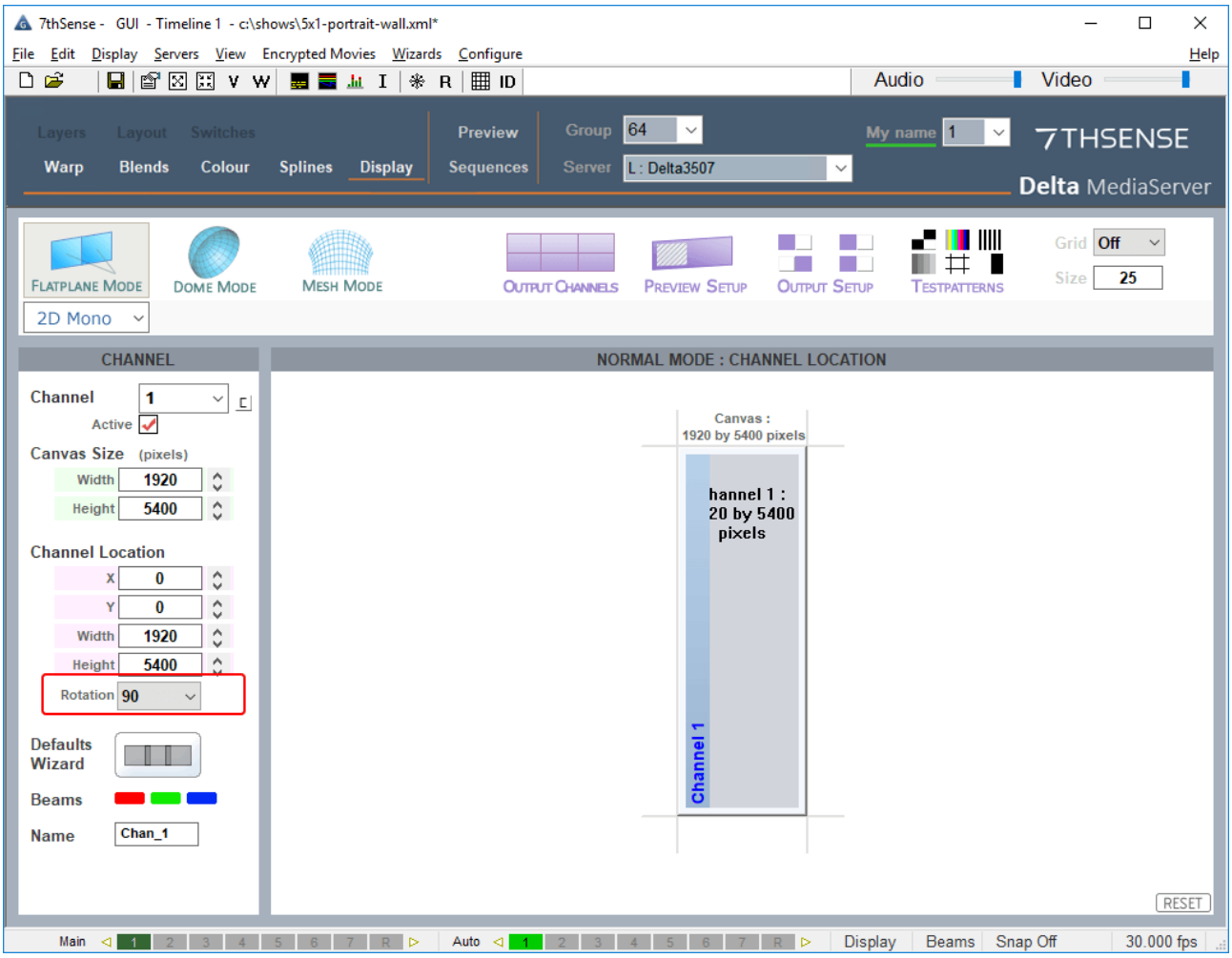
A group of five, 1920 × 1080 px display panels, is installed in portrait orientation, overall dimension 5400 × 1920:



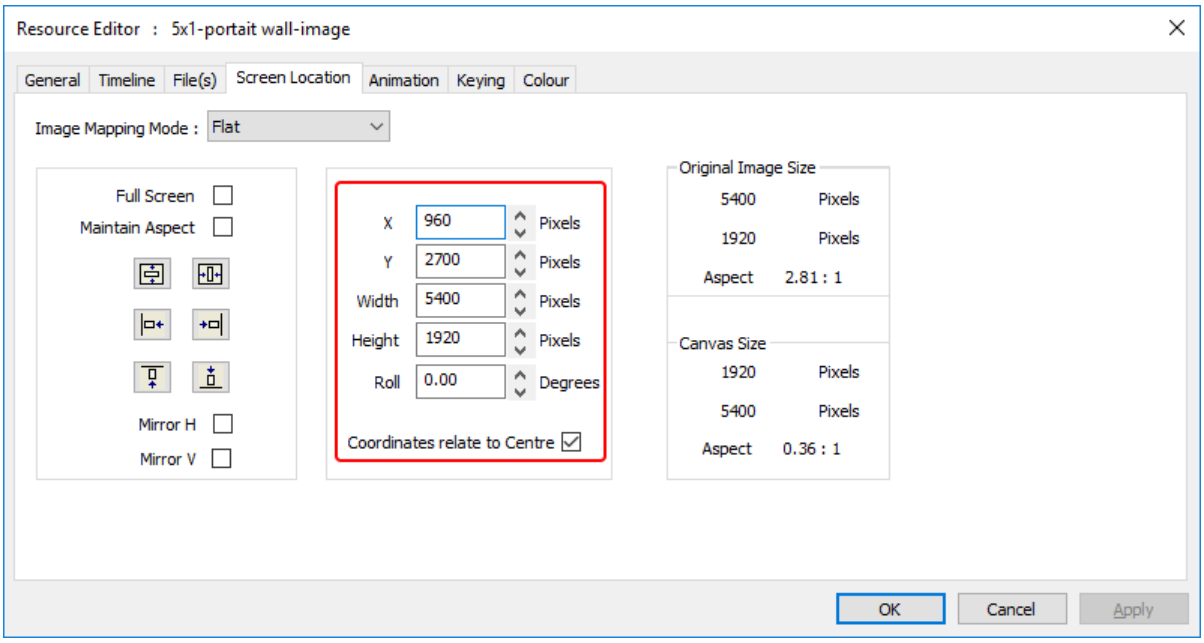
The graphics card grouping will stack these in landscape orientation, so we match the **canvas**:



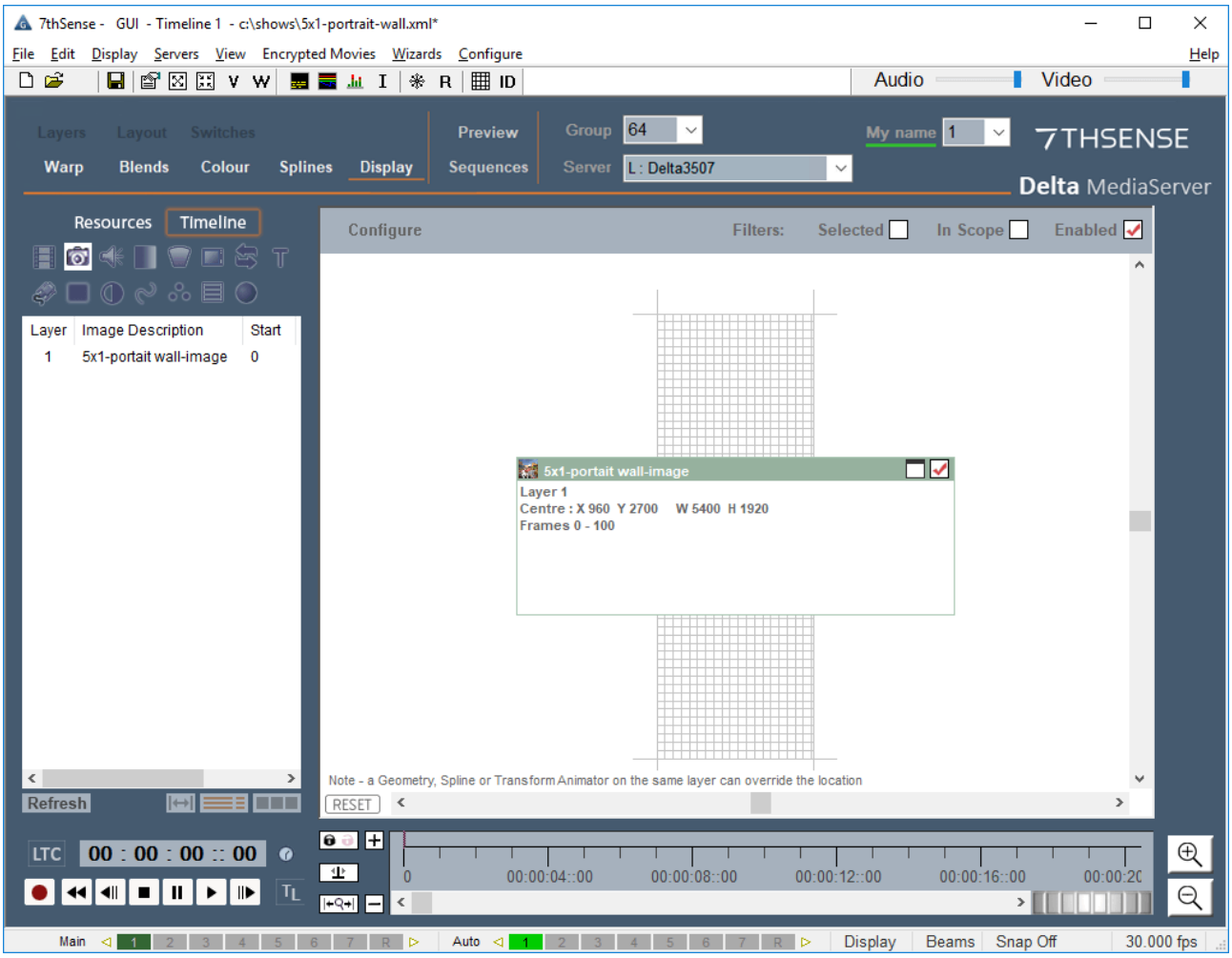
The **channel** agrees with the physical rotation:



The **media** is in the correct physical orientation for the display and therefore agrees with the channel, not the canvas, so we give it a corrected location in the layout. This is easiest by positioning the centre of the media in the centre of the canvas:



This appears in the **layout** is if it were mismatched:

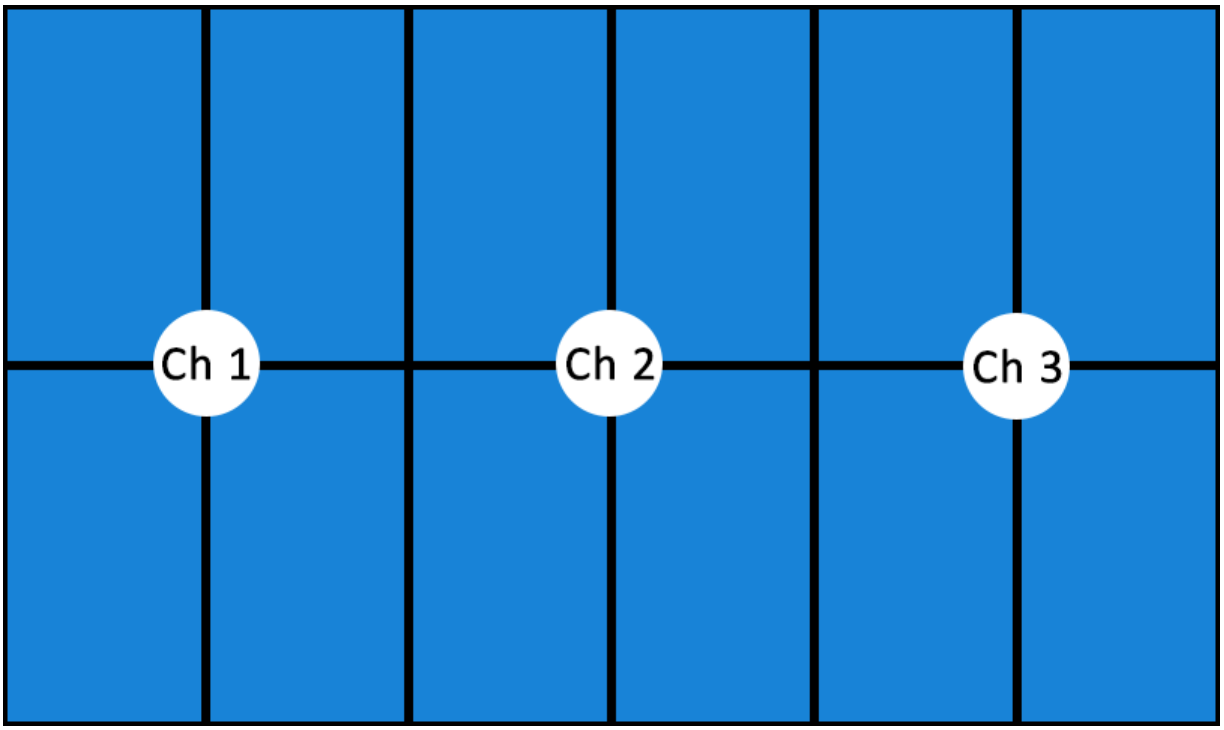


But the display (and Preview) shows that this is correct:

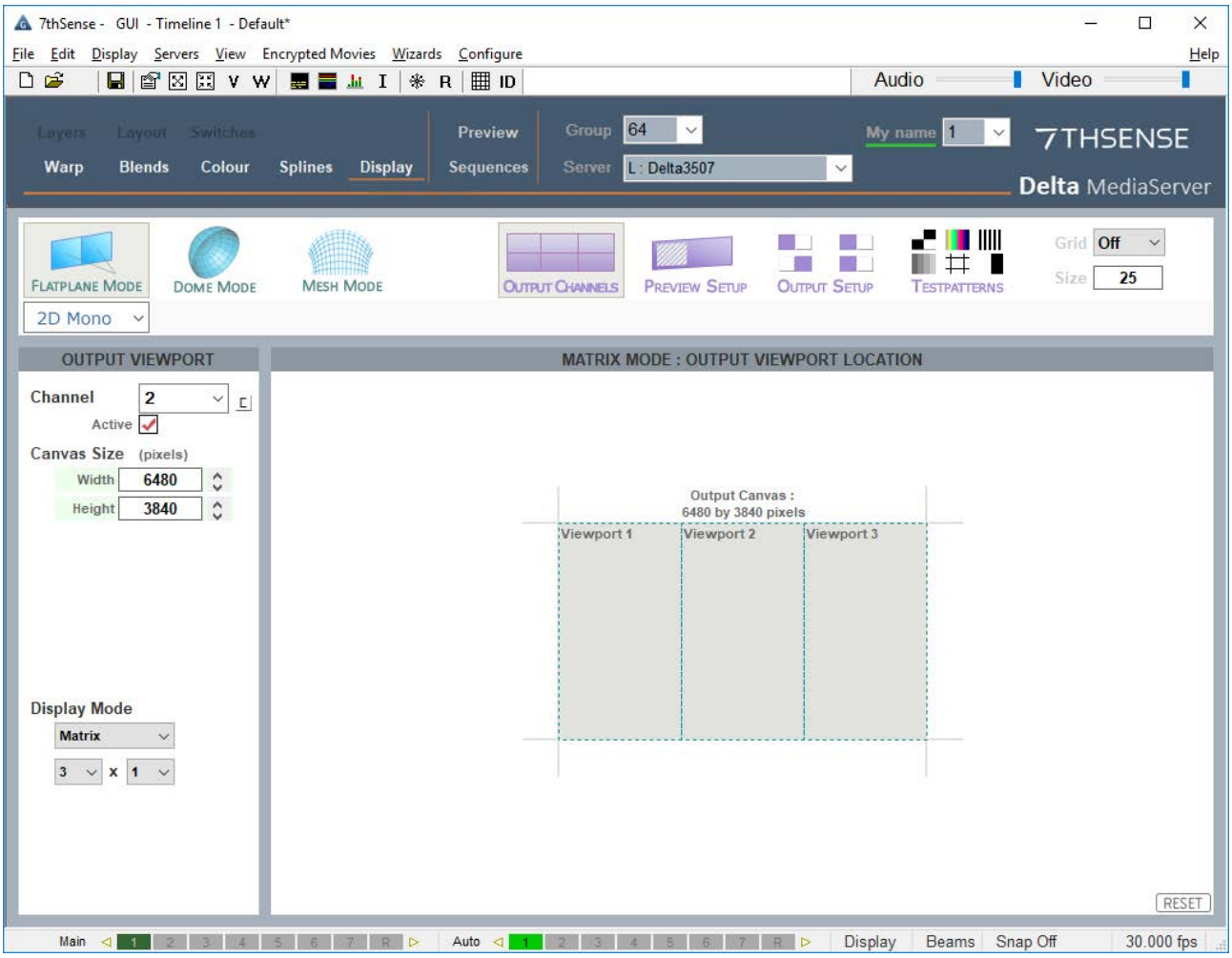
Note that the playback window represents the canvas, so will be rotated.

Multi-channel Video Walls

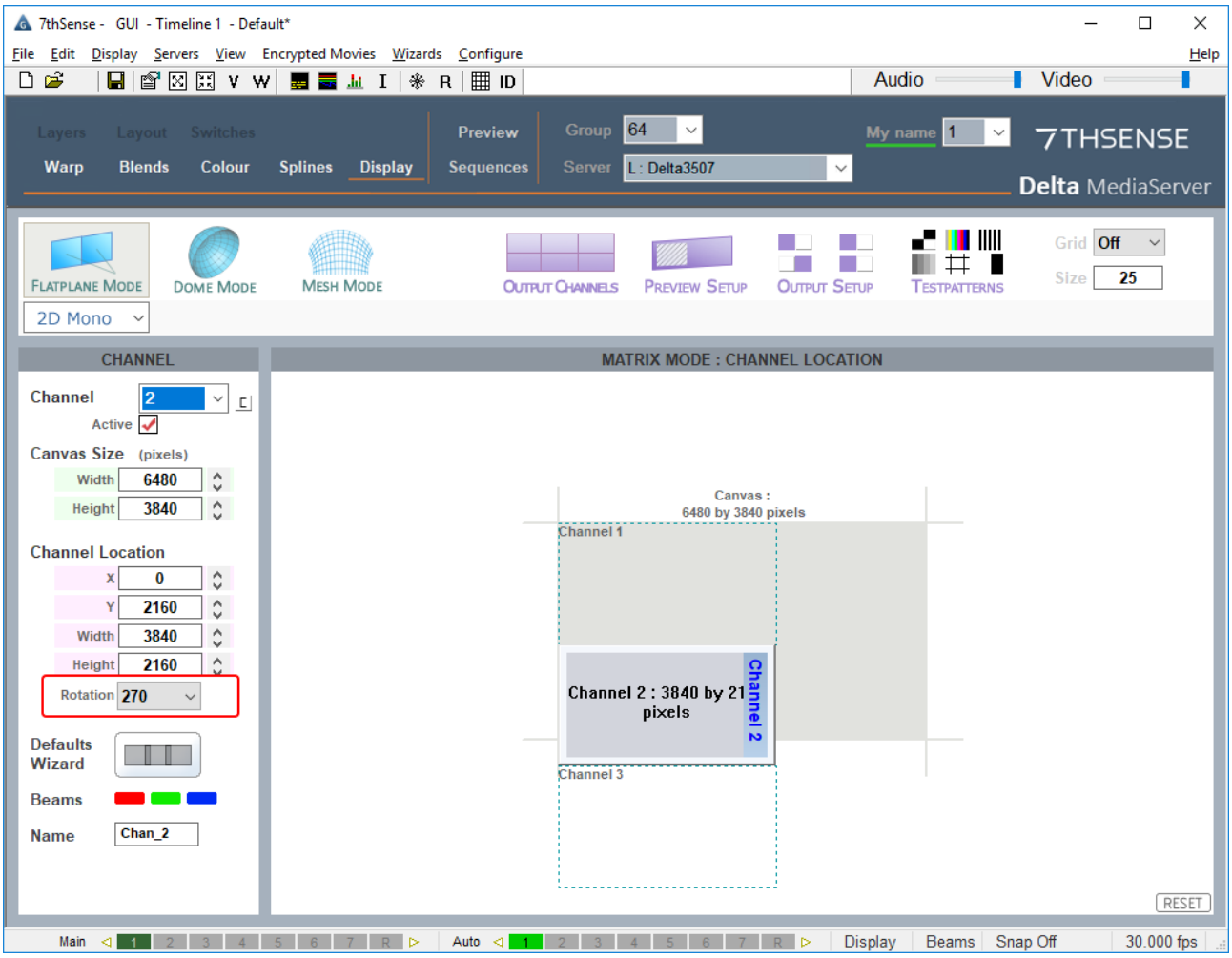
Larger video walls may require multiple channels, and even splitting channels with a display controller, such as the Datapath Fx4, to feed more display units. Managing rotation and placement of displays grouped by each graphics card can take a little thought. Here is a worked example of a 6 × 2 display installed in portrait orientation, fed by three channels from Delta.



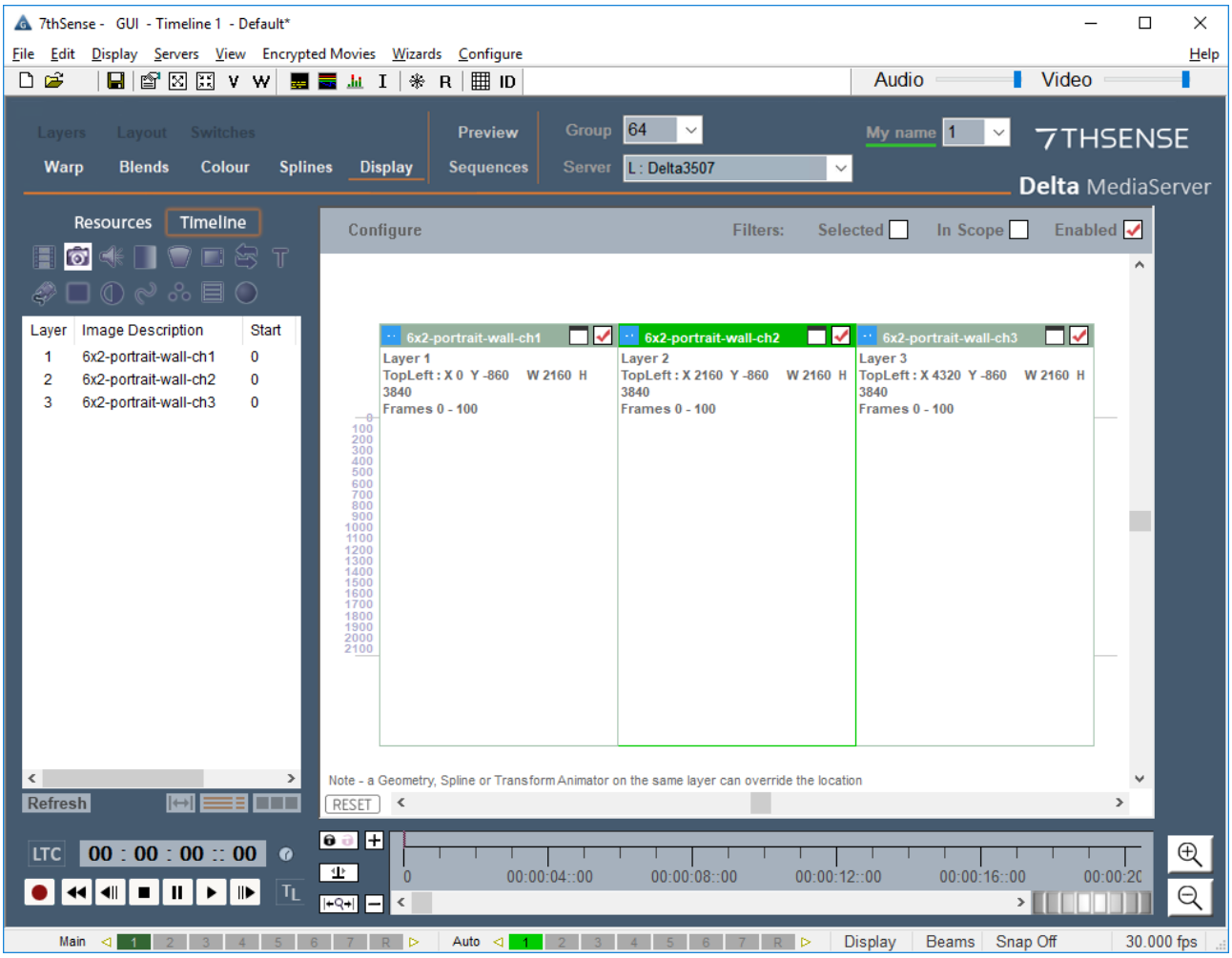
In DeltaGUI, the **canvas** matches the overall display, in an underlapped (for bezel compensation) 3 × 1 matrix array:



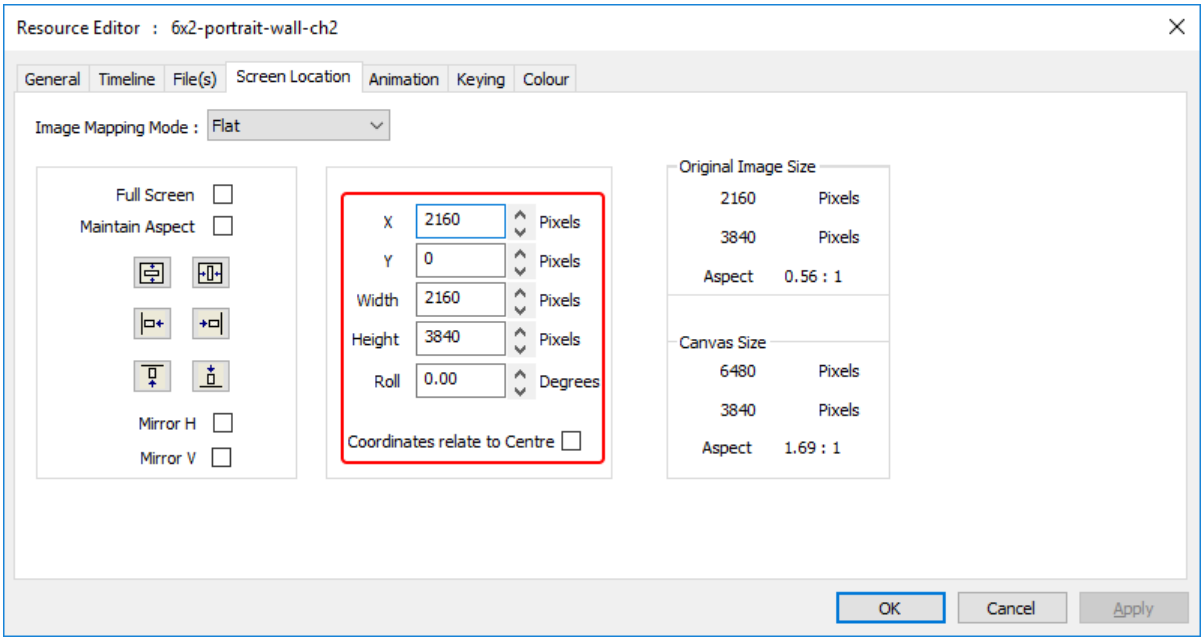
The three **channels** are rotated to match the graphics card grouping for portrait-oriented displays, so that they run left to right:



Here media carved into the three channels is given individual locations for these rotated channels:



Here the **location** of the media for channel 2 has been set:



The display is now correct:

This example is small enough for a single piece of uncarved media, but this principle of arrangement holds for any array using many more displays. Note also that this is the correct approach for very long walls exceeding the 16384 px width limit.

Non-rectangular video walls

For effect, video walls can be any shape or arrangement, to be more eye-catching and interesting, and carrying a single disaggregated image, or multiple but co-ordinated images. Graphics card drivers are good at grouping rectangular arrays, and rectangular media is efficient. For everything else, there are options.

Let's take an irregular array of 8 panels that needs to be able to show a contiguous image. Except for the extreme-right panel, we would not be wasting much of a rectangular media frame:

Delta software offers composition mode, whereby elements of the source media are placed individually into display areas. This allows for very efficient media delivery by compacting just the visible areas during the graphic design, into a rectangular frame that minimises unused pixels.

In this case, the solution could be to take the displayed areas only, and compact them into a rectangular frame, a saving of 60 per cent:

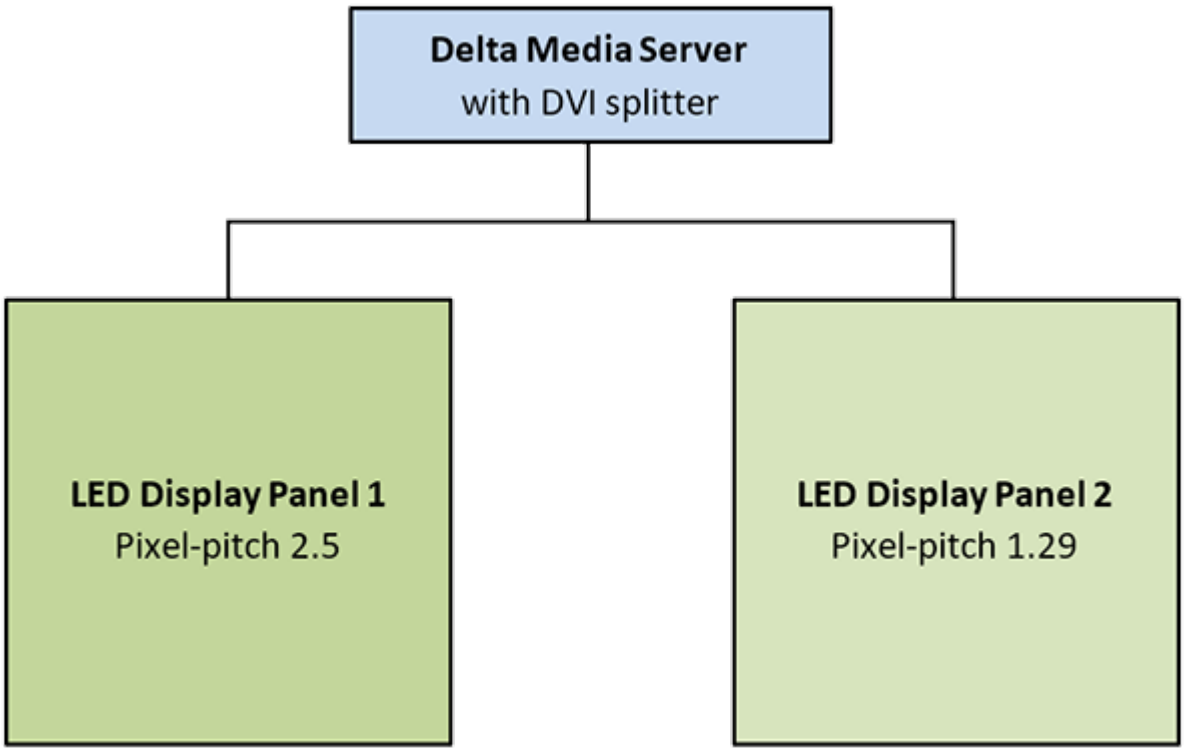
Delta will take each element, rotate where required, and place them in the total canvas area:

There are many solutions, and a simple alternative in this case may be simply to extract the outlying area as a separate media resource and cut the right-hand quarter off the original.

Display controllers (see below, the Datapath Fx4 [119], for example) can also produce a similar result, placing parts of a rectangular image into the distributed video space. The visual result is exactly the same.

Mixed-Pitch LED Displays

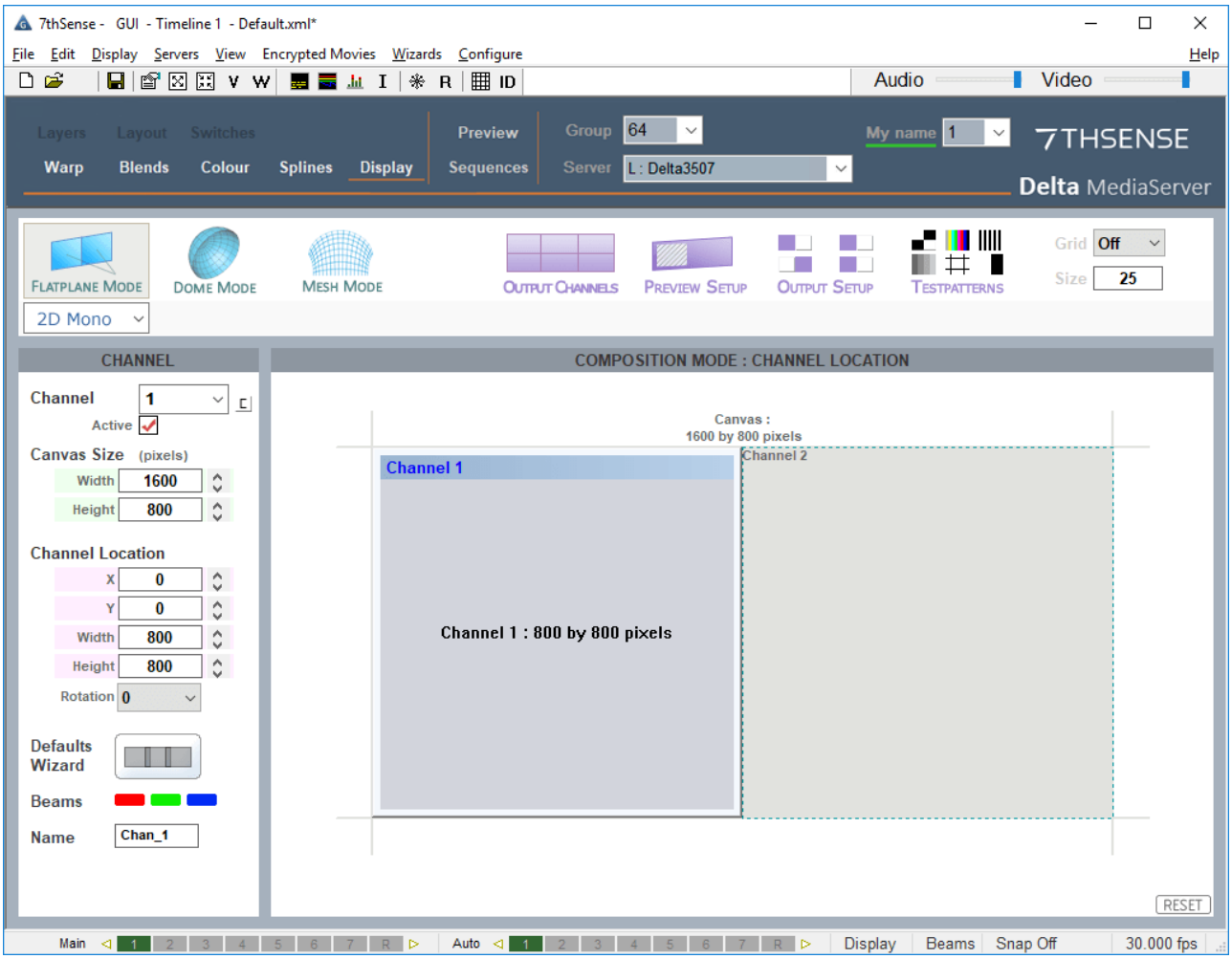
Sometimes it may be necessary to span media across LED display panels with different pixel pitch. The panels may have the same physical dimensions, but be required to play the same media, perhaps adjacent to each other. Consider this two-display example, where the processors for each display can receive the same resolution, the displays are the same physical dimension, but one has almost double the pixel-pitch of the other:



By using DeltaServer in composition mode (a Delta licence option), the output channels can be manually placed on the output raster. Each LED processor receives only the relevant part of the media, on a desktop resolution in DeltaGUI that matches that of the processors.

Display Canvas

In DeltaGUI, *Display* > *Canvas*, set the canvas size to the overall resolution of both display processors. For this example, let's suppose each is 800 × 800, so the overall canvas size is 1600 × 800:

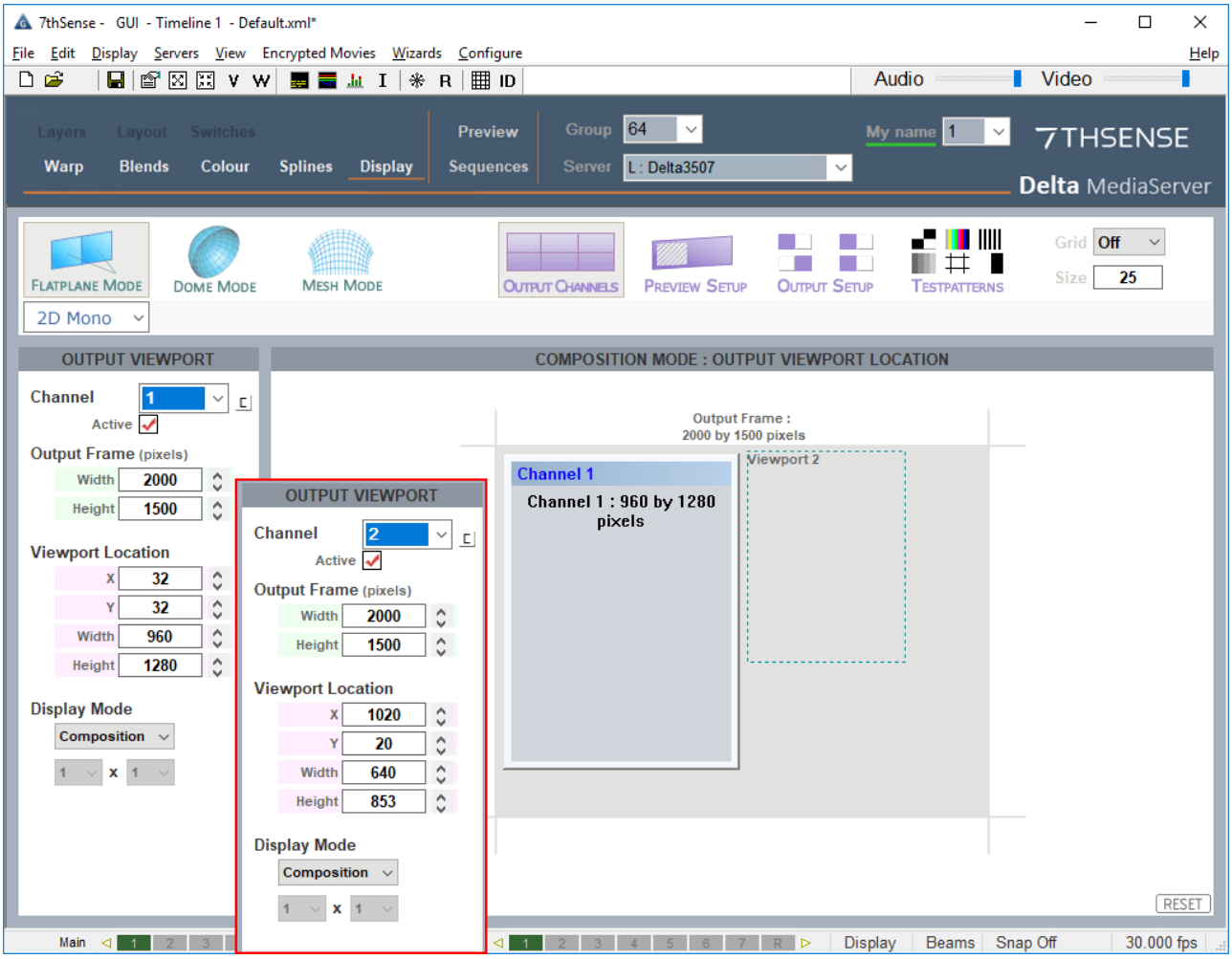


Timeline Media

Then suppose we place media on the Timeline with a dimension of 1920 × 1280. The left half of this media on channel 1 (with the higher pixel-pitch, unscaled) will therefore be 960 wide, full height.

Output Channel Viewport Settings

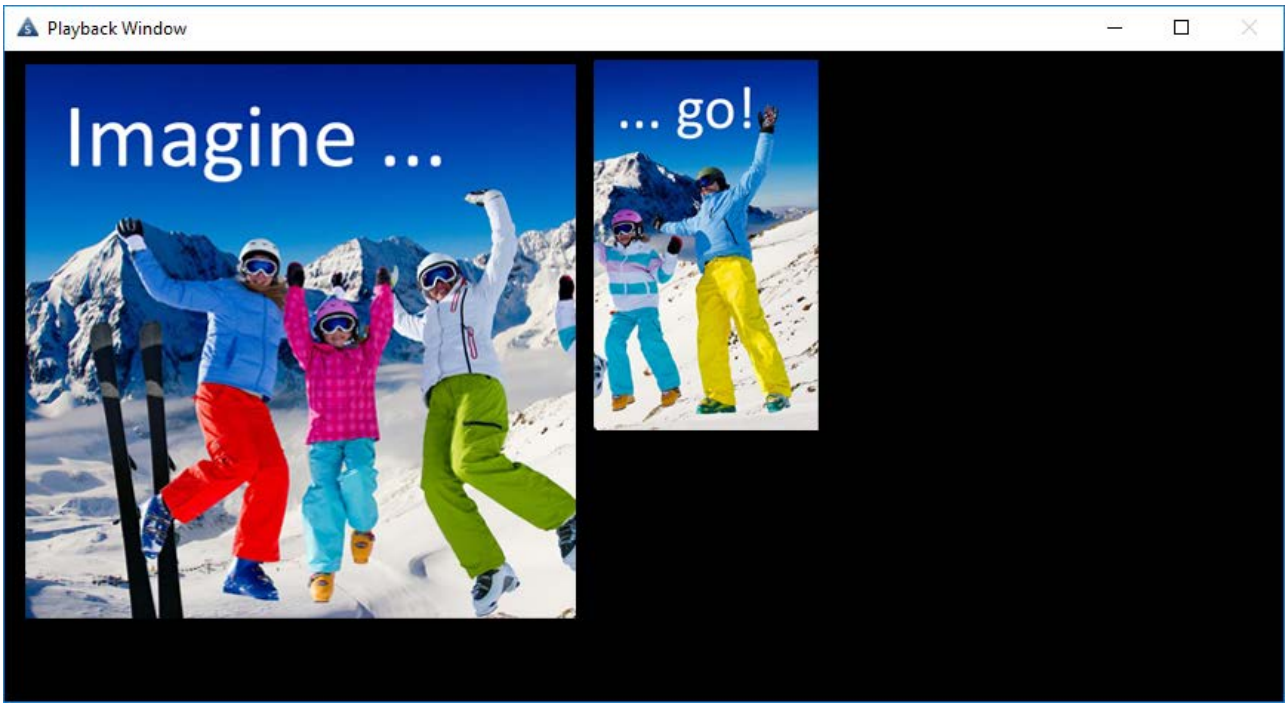
Since we are in composition mode, when we go to Output Channels, we can set the overall output frame, and the viewport for each channel. First, create a frame bigger than the output resolution to create working space, and position each channel's viewport. This will also allow us to offset the viewport if the displays prefer not to run from X,Y of 0,0. Compare the viewport settings of each channel (Channel 2 inset illustration):



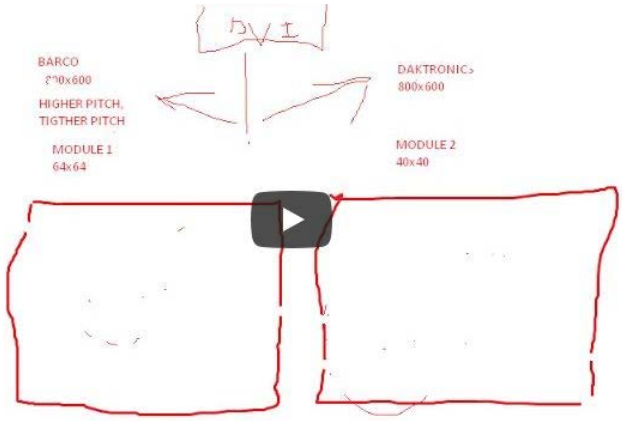
Channel 1 viewport location has been offset in X and Y by 32 px (let's say this is a requirement of this LED display panel). Its width is the first (horizontal) half of the media (960), and it is full height (1280).

Channel 2 is positioned (viewport location X at 1020 px) clear of channel 1, and is vertically offset by 20 px (again let's suppose this is a different requirement for this panel). It displays the right side of the media (960 × 1280) but scaled down by the pitch ratio of 1.5 between the two displays (to 640 × 853).

In the playback window, this will appear ‘wrong’ but on the LED displays, their different pixel-pitch will look correct.



A worked example in Delta version 2.4 can be seen here. (In Delta 2.5, viewports are shown using the *Output Channels* icon in *Display*.)



Mixed-pitch LED displays using composition mode

View online at http://portal.7thsense.one/user-guides/MC264-display-configuration/index.html?gdc_mixed-pitch_led_displays.html

Datapath Fx4 Display Controller

The Datapath Fx4 will take one GPU output and split it to control a group of up to 4 displays. Units can be daisy-chained (looped) and synced. In this basic setup guide we look at how configuration works, but the creative possibilities are much wider.

Each output monitor can take its input from any region of the input image as all of the required cropping, scaling, rotation and frame-rate conversion is handled by the Datapath Fx4 hardware. These regions can overlap to allow any output to replicate another or can be configured to support any creative splice of the source material. This allows the support of many non-rectangular screen arrangements with uneven gaps, and any mix of monitor orientations.

The fundamental limit for the FX4 is 616 MP/s (Mega pixels per second). 3840 × 2400@60 Hz does, for example, fall under that limit and would work using the DP input. However, there is also a limit on the maximum output geometry size from any one the outputs, and this is 2048 × 2048.

The FX4 only supports 8-bit operation, with the exception of the SDI version which supports 12-bit outputting when using the DP inputs.

Features

- Creative configurations
- Up to UHD input, 4 × HD 1080p outputs
- Rotates, crops, scales, mirrors and bezel corrects
- Dual HDMI 1.4 and single DisplayPort 1.2 inputs for 4K 60 fps source capture
- HDCP support on all inputs and outputs
- Stand-alone operation: non-volatile configuration can adapt to changes in inputs by automatically adjusting all scale factors
- Power down configuration save facility, power up instantly with no re-setup required

For more details, there is a Datapath Fx4 Quick Start, and a full Guide available. This contains additional information on looping multiple units, recommended maximum cable lengths, and troubleshooting.

Conceptual Overview

The Datapath Fx4 is configured and the final display laid out, using the Wall Designer application. This can be used over IP, or with the software on a PC connected by USB to the Fx4. Principally, the Wall Designer software is providing configuration and visualisation. The result is stored in the Fx4, and can be saved in a config file (extension .wdl). It is very simple to use.

Do not use the Wall Designer app on the server, because you can easily lose the controls you need by sending them out of view.

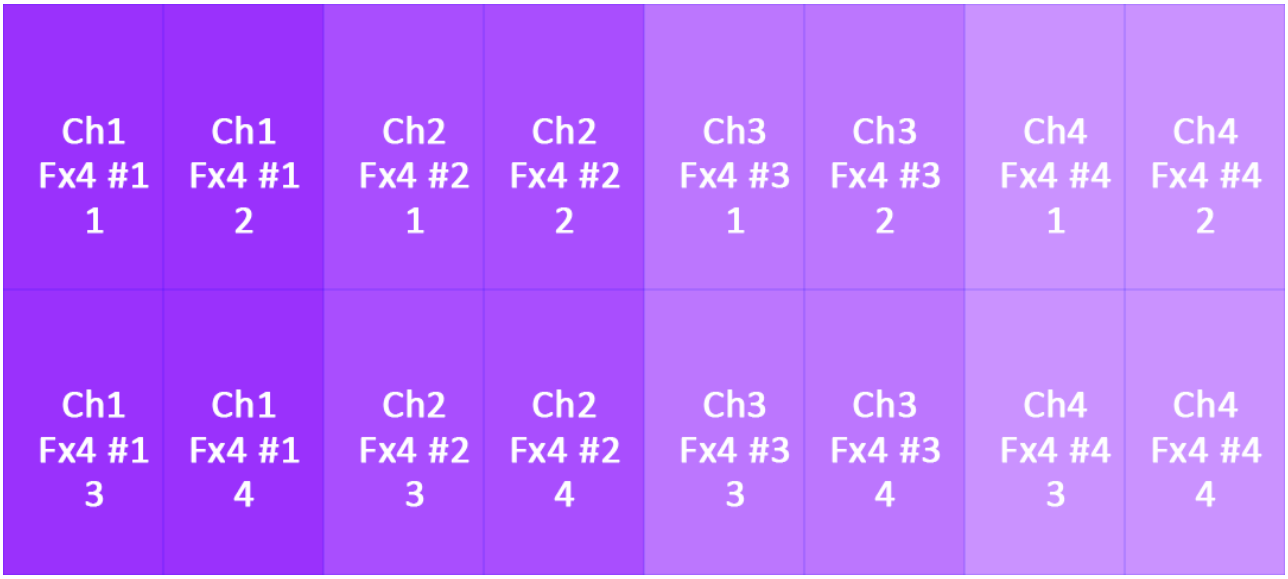
How Wall Designer and Fx4s views the world

You can take a single piece of media through a single channel in Delta and split it across multiple display panels with one or several Fx4 units daisy-chained together. Rather like Delta composition mode viewports, the resolution of the whole canvas is split across all connected displays (Datapath promotes Wall Designer as a designer tool for constructing panel arrays that are not in a classic matrix). The software shows each panel as a window onto the whole media. These 'capture regions' are virtual panels and can be dragged around, flipped and rotated and positioned by measure as you wish, to match a physical wall construction. Where the virtual panel lies on the media background, that area of the media is what the panel will display (illustration below). Daisy-chained (looped) Fx4 units are viewed as connected units in Wall Designer to handle more than four panels at once.

Matrix Video Walls

Large high-resolution displays will need to pass through multiple Delta channels. Each GPU head can then address one or more Fx4 units, but only daisy-chained *per head*. Fx4 units from multiple heads can be genlocked, but each channel's Fx4 must be configured separately. However, if the Fx4s are addressing identical layouts (as in a regular matrix), the same configuration for the first can be replicated on the other units. In this way very large video walls can be fed easily to at least four times as many panels as channels available to Delta.

Example: a matrix of 16 1920 × 1080 panels, giving 8640 × 3840 overall



Each of four GPU heads is connected individually to four separate Fx4 units, each Fx4 feeding four displays mounted in portrait.

The Wall Designer is used to configure the first group of four on the first Fx4, and handles the panel orientation and bezel correction. The configuration can be saved and then applied to each of the other units. To handle the bezel correction *between* channels, use DeltaGUI.

If required, each Fx4 can be assigned a static IP and thereafter be addressed remotely, or its server addressed by VNC.

Alternative possibilities for driving this display:

- two GPU heads each from two servers (using carved media)
- one GPU head with four daisy-chained (looped) Fx4 units (loses resolution)

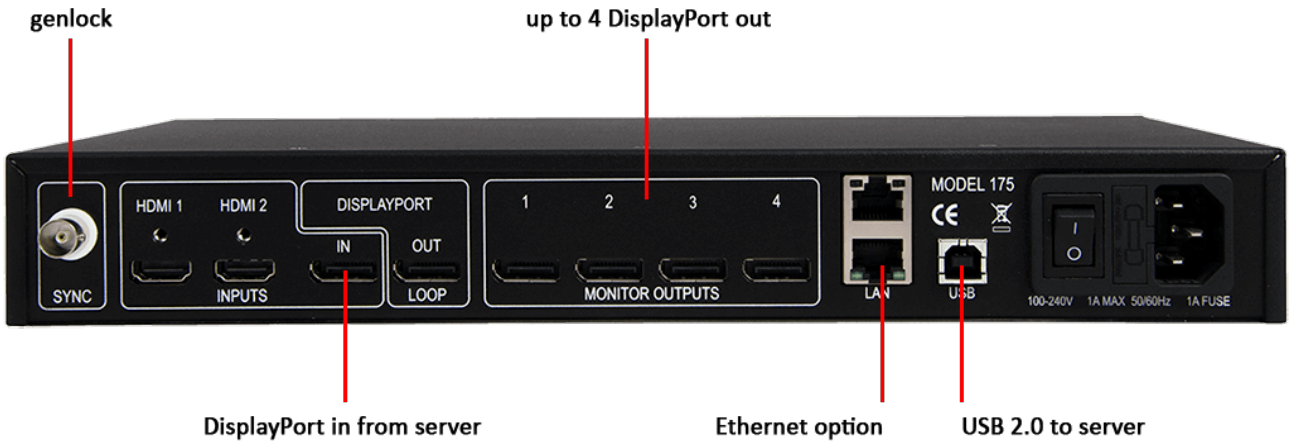
Wall Designer and DeltaGUI

The Wall Designer app will handle the internal bezels of a group of display panels, so that each Fx4 receives input from one Delta channel. Where multiple Fx4 units are fed from separate Delta channels, the bezel around the outside of each Fx4 group must be accounted for. This is done in the channel setup in Delta by underlapping the media channel by the width of the adjacent outer bezels.

An alternative, though perhaps more involved method, is to set the panels up as if they had no bezels, and use Delta in composition mode to place viewports precisely in the panels and account for the bezels there.

Connections

There are three models distinguished by their output connectors: DP, HDMI and SDI. This is the DisplayPort model:



For UHD bandwidth, you must use DisplayPort 1.2 cables.

Take the required GPU output from the Delta server to the DisplayPort **in**.

The adjacent **loop** out port enables a second unit to receive the same server output and split to up to a further four displays. Example: a 4K output from one server GPU can be split across up to four displays, or more, but this is still an overall 4K group display.

Connect up to four **monitors** (typically a matrix is sequenced in rows 1 and 2 above 3 and 4).

Connect the **USB** B port to a PC with Wall Designer installed.

The **LAN** option allows the IP of the Fx4 to be addressed over a network, using the password-protected browser version of the Wall Designer. (The out-of-the-box dynamic IP can be seen via Wall

Designer on a USB-connected PC, in the Status menu.) A static IP can be assigned to each Fx4 once it has been configured. Multiple Fx4 units only require one LAN input, as the second Ethernet port is for looping.

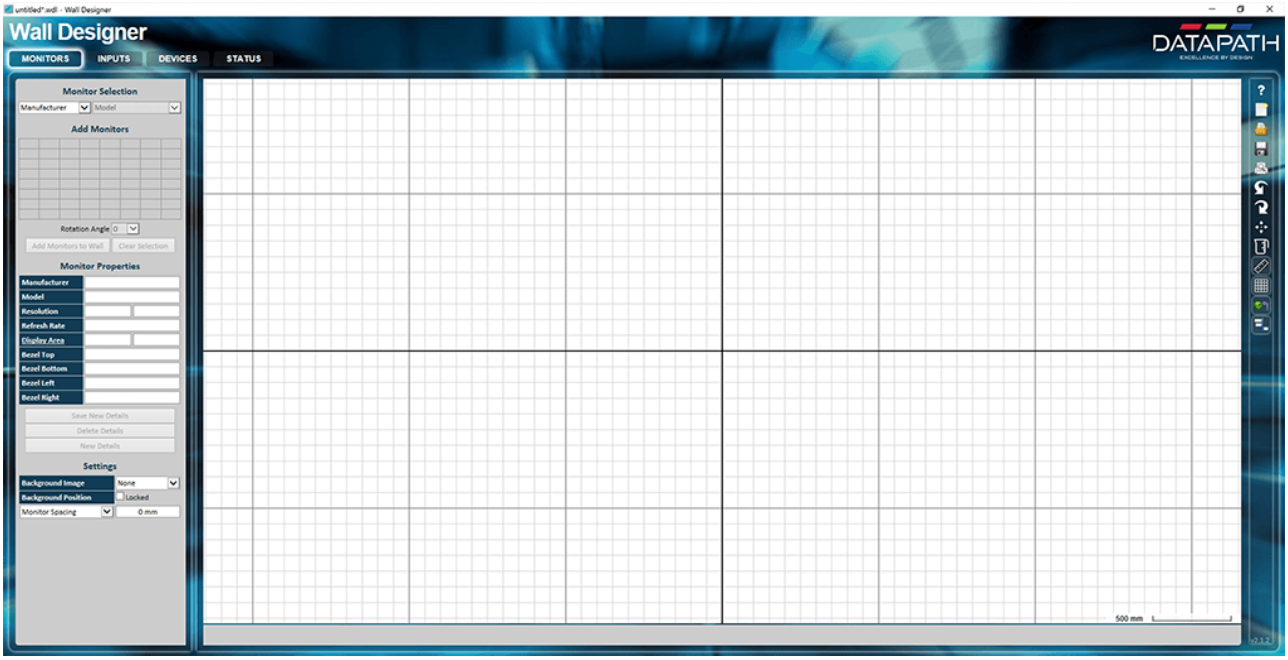
The **Sync** accepts Tri-level or Black burst syncs for genlocking the Fx4 to external devices. It is not required for basic display setup.

Wall Designer: Monitors

Make sure the Delta server graphics display is properly set up in Windows and the GPU driver and with the right EDID.

The Wall Designer app enables you to quickly configure your displays, saving the configuration to the Fx4 unit. The app can be downloaded from https://www.datapath.co.uk/datapath-current-downloads/display-controller-downloads/software-display-controller. Select 'Wall Designer'.

Install the app on the PC connected to the Fx4. Open Wall Designer:



Toolbar (right)

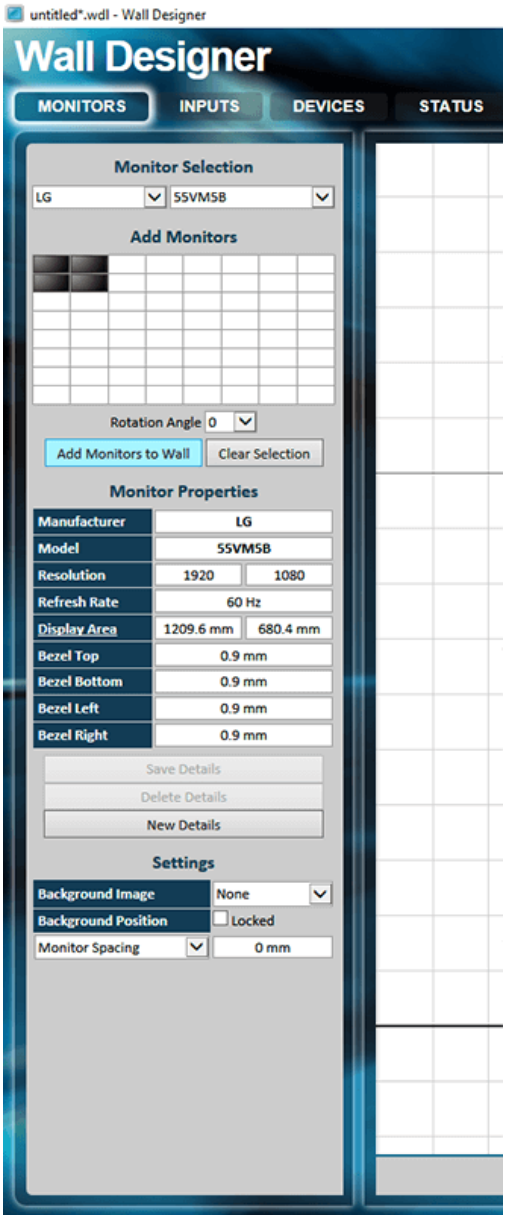
Note the **?** icon on the right for additional help. Production-level installation may only be for making sure the unit works, so fewer settings need be made than for a final wall installation.

File icons: New, Open an existing config file, and Save a config file.

Print gives a drawing of the panel layout with measurements and a table of panel models and placements.

Drawing: note the tools for showing measurements and units, and for snap-alignments, when dragging panels into position on the grid.

Menu: Monitors



Selection

- Select the brand of monitor and the model, from the drop-down menus. These selections will turn blue in the lists to indicate they are the current selection. All monitors must be of the same model, resolution, dimensions etc.
- Click on the grid and drag out the required arrangement (or click required grid squares). This example shows 2 × 2.
- For portrait-mounted panels, set the rotation angle before adding them to the wall.
- Click ‘Add Monitors to Wall’.
- Clear Selection clears ‘monitors to add’. To remove a monitor from the wall, right click the panel on the wall and select ‘Remove Monitor’.

Note that to add another monitor, first ‘Clear Selection’ otherwise all previously added monitors will be added again.

Properties

Details from the Datapath database should be correct by default, but check and change if necessary. Errors may reflect a wrong EDID on the server.

Resolution and **Bezels**: these are derived from the database of monitor models, but can be adjusted here.

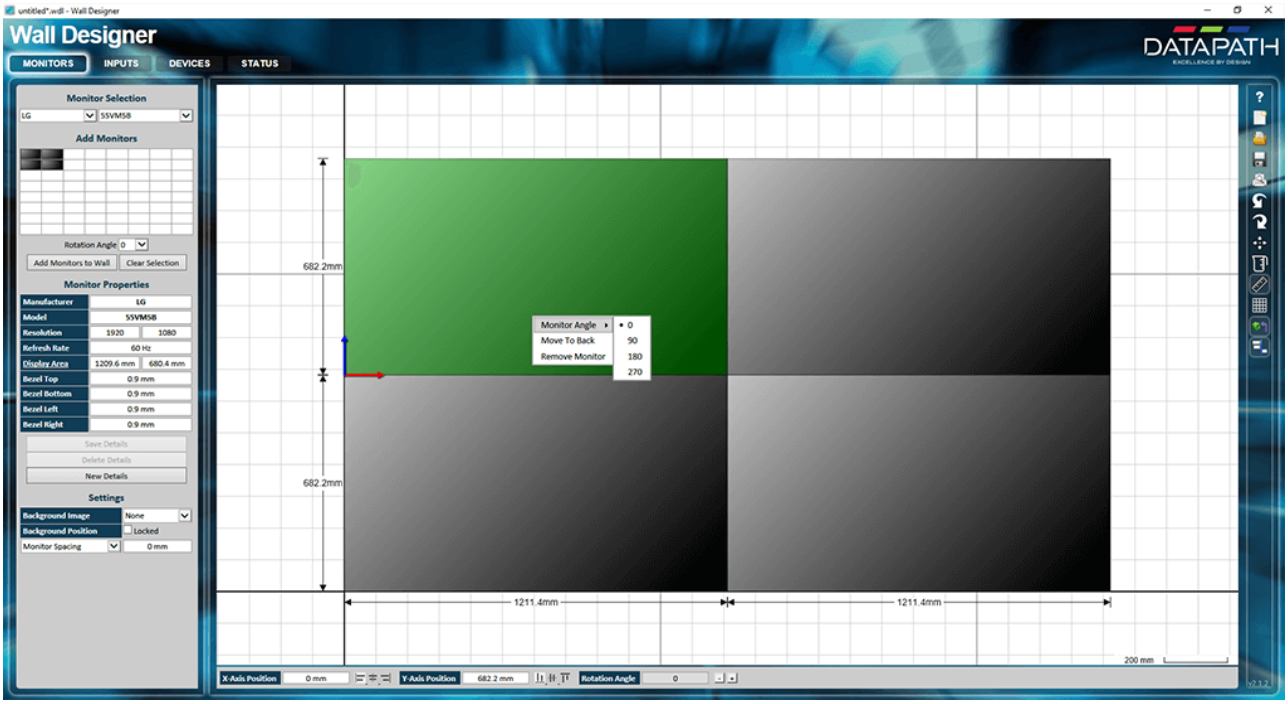
Save details: accept any changes made to Properties.

Undo Changes: resets to previous values. Reads **Restore Defaults** (database values) after saving.

Background settings are cosmetic and not necessary for setup. Their principal function is so that you can imagine a display wall in situ (e.g. an airport lounge, reception area, photo or design image of your own ...). There is an example of this in Conceptual Overview 120.

Monitor spacing/projector overlap: if known and required, apply these settings before adding monitors to the wall.

The added monitors will look something like this:

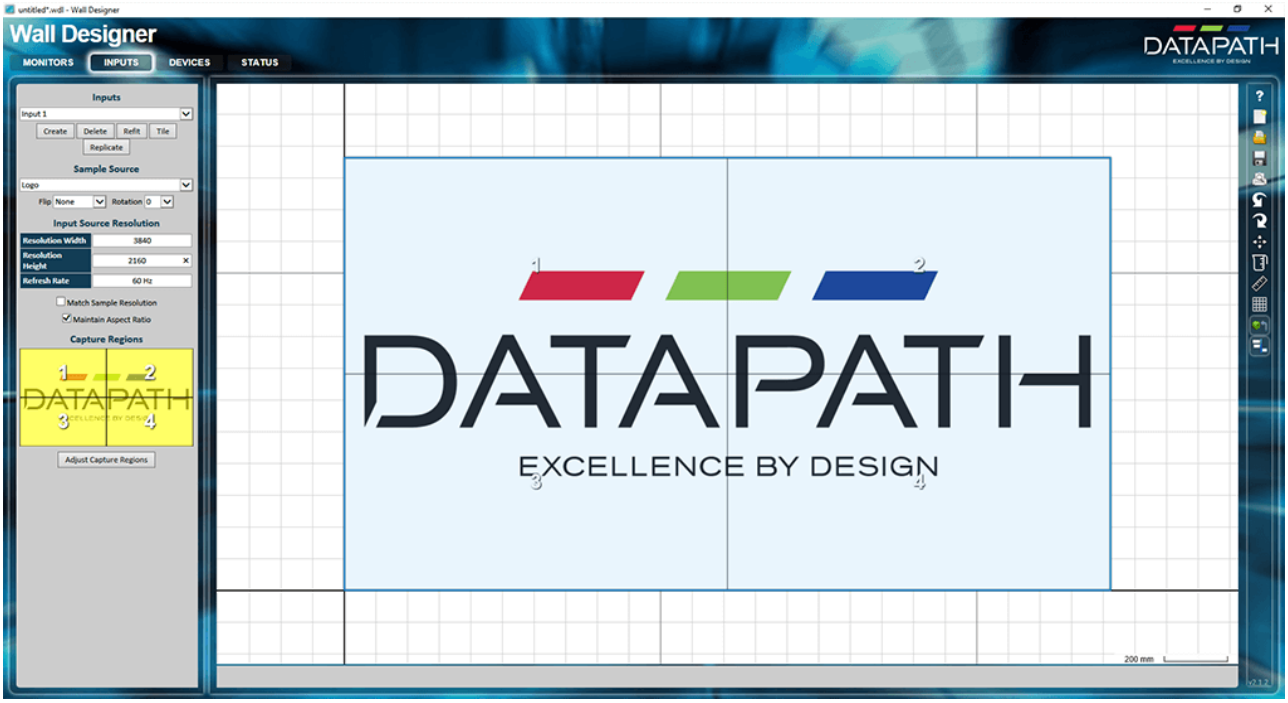


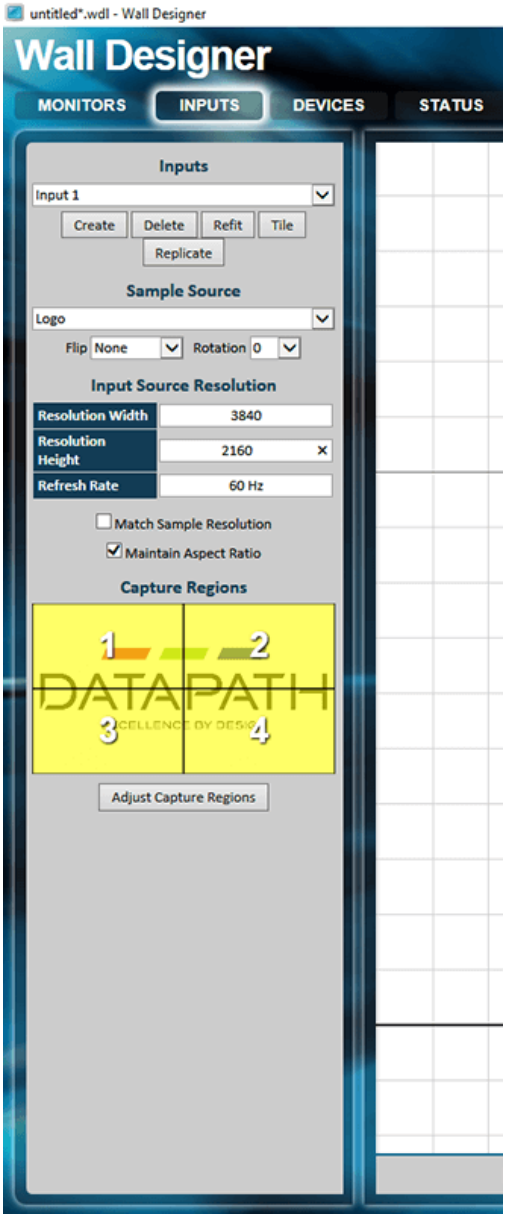
Here one monitor has been selected (just click and it will go green, showing the origin point), and the right-click menu shows rotation and layer, and allows removal from the wall. The measurement tool has been applied: click this tool once for overall dimensions, again for panel dimensions. Units can be mm or in, using the 'toggle units' tool.

Once selected, a panel can be dragged within the input area (not beyond), or given an X /Y origin by measure. The mouse wheel zooms the wall, and any selected background image can be selected and scaled behind the group by dragging.

Wall Designer: Inputs

Select the Inputs menu to address the entire input canvas area that is being being taken and split from the Delta server GPU head.





Inputs

- Create and name a new input, e.g. reference the server and GPU head (channel). Click ‘Create’.

You will only need one input to the Fx4. If you make any size adjustments to any panels, you can use ‘Refit’ to fit the panels into the media, or ‘Tile’ to fit all the media into the panels.

‘Replicate’ will place the source image into each channel.

Sample Source

- This is just an image to use in Wall Designer for setup. The Datapath Logo default may be good enough for setting up. Other defaults are listed, or use your own source with exactly the resolution and dimensions you need.

Note the Flip and Rotation options are for the whole panel group.

Input Source Resolution

This is the resolution of the input from the Delta server GPU head (channel).

Capture Regions

This section addresses which part of the source media is displayed on each panel and the group as a whole. To manipulate any panel, click ‘Adjust Capture Regions’ and select the required panel.

It should not be necessary to use this for an initial configuration, but does apply to actual installations. Here you set the origin for the placement of the input canvas on the arrangement of monitors, the overall dimensions, and can flip or rotate individual panels (see illustration below):

Close the capture regions when you have finished.

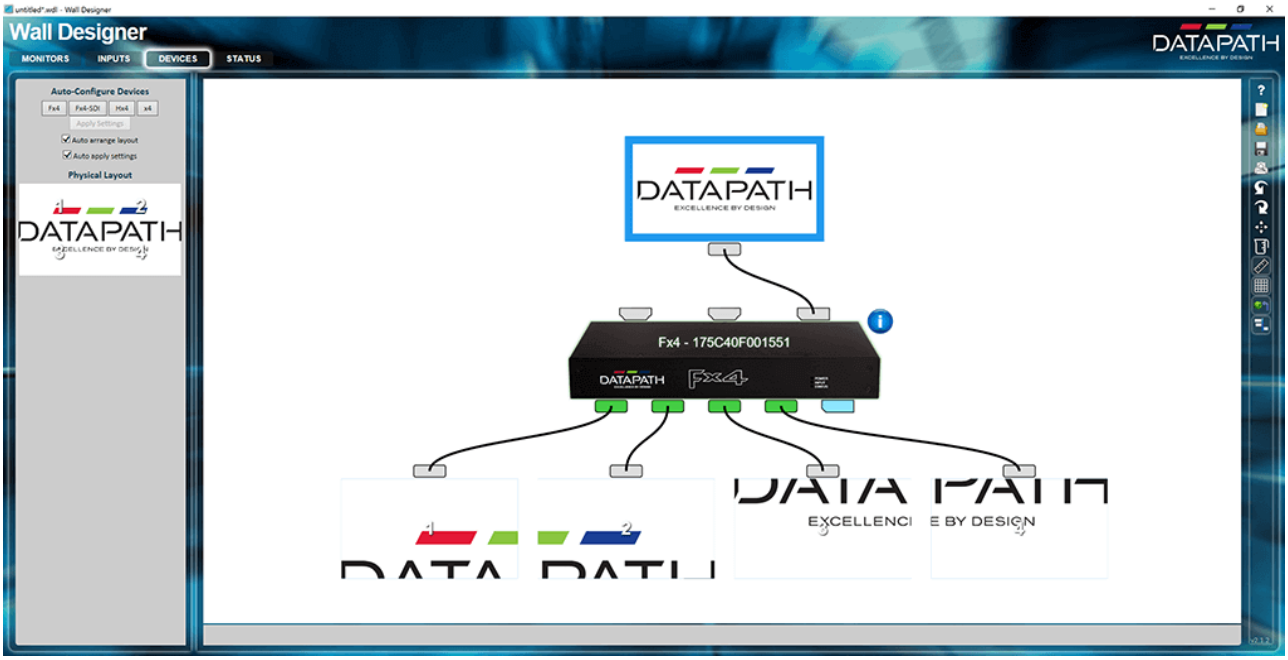
Your media should now be exactly where it should be, with channel edge alignment set in Delta, and bezel compensation managed within the channel by Wall Designer. We now need to connect these virtual panels to a real Datapath device.

Wall Designer: Devices

When you select the Devices menu, you will see the input device and the numbered panels:

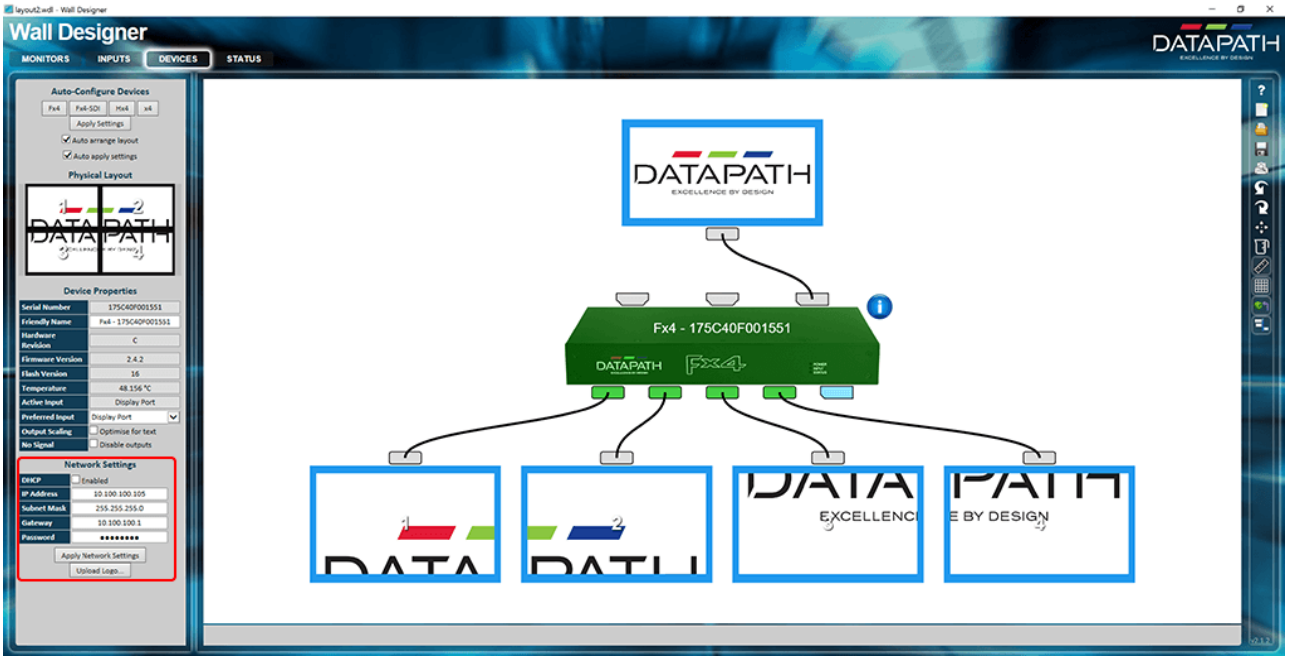
- Make sure ‘Auto arrange’ and ‘Auto apply’ are both checked.
- Click on the Fx4 button.

The panels will go black and return configured, and Wall Designer will show the schematic:



Any element can be clicked to show its properties, and/or dragged: selected items go green. You can reassign outputs to panels by dragging the wires. This avoids the need to swap plugs and ports to correct physical arrangements.

Click on the Fx4 unit itself to see or change its Network Settings:

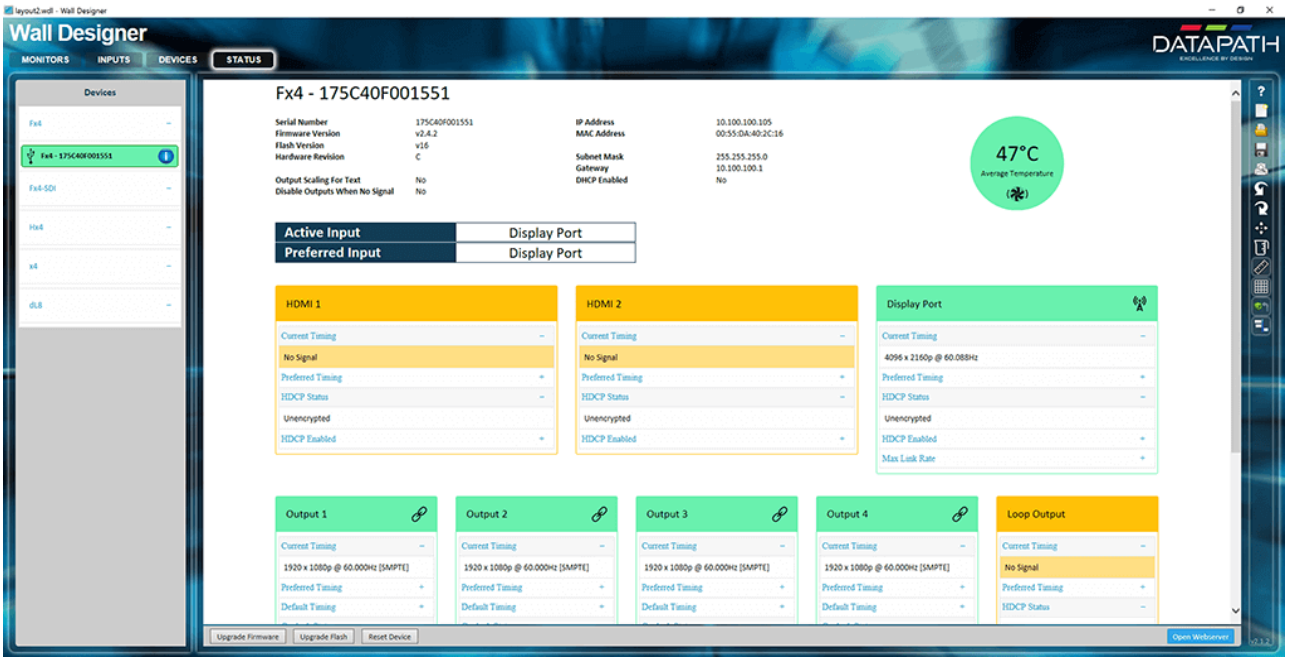


You can now set a static IP address for using the remote browser Wall Designer app to log into the Fx4 unit. Apply (and note) a password. This will be required at the Fx4 IP Control Panel when you try to connect to the IP of the Fx4.

Input-looped devices will show in this schematic with their connected displays.

Wall Designer: Status

The Wall Designer Status menu can be used to examine any USB-connected Fx4, as listed on the left.



The Status Panel provides a detailed summary of the device including details of Flash and Firmware versions, IP Address (if connected via a network), serial number and average temperature of the device etc. The Status Panel also displays the input and output properties. A detailed view of each property can be viewed by clicking on each drop-down menu.

Projection Alignment

Projection Alignment

Alignment for any kind of projection surface can either be done manually or by using auto-align tools. The process of alignment produces geometric data that warps the regular media to project correctly. Geometrically simple setups with smaller numbers of projectors do not require auto-alignment systems to achieve this warp data, but with large numbers of projectors, dome theatres and projection mapping, this becomes a very time-consuming task, that will only require repeating with any theatre adjustment, including lamp changes.

In both cases, geometrically accurate patterns are projected onto the display surface and observed, either by eye or camera. The warp data for each channel (projector) is held in Delta Geometry resources and applied to the background / display layer (i.e. to apply to the whole canvas and all visual media resources. Adjustments are made until the projected geometric patterns are correctly aligned. In the case of auto-alignment tools, the process may also include auto-blending and colour correcting overlapped media regions.

The geometry file can be saved separately as an .xdl file and then merged with any show on this display.

General notes for manual alignment of flat or curved screens

- The media design must match the aspect ratio of the display surface, not the additive dimensions of all channels, which overlap by around 20 per cent.
- Using a laser line will help provide a true horizontal and true vertical visual reference .
- The grid pattern projected consists of true squares. Physical measurement of diagonals will confirm aspect ratio.
- Work progressively with two adjacent channels, left to right.
- Adjust channels towards each other, not all one towards the next.
- Get everything almost right first, then go back and improve.
- With each channel, start with simple geometry (the four corners) before adding grid points to finesse your warp.

Guides

- Flat-screen manual alignment setup and process
- Dome Mode auto-alignment using Scalable Display Technologies Display Manager™
- Projection mapping (Mesh Mode) using .obj geometry definition files and Delta 3D calibration

Working in 10-bit Colour Depth

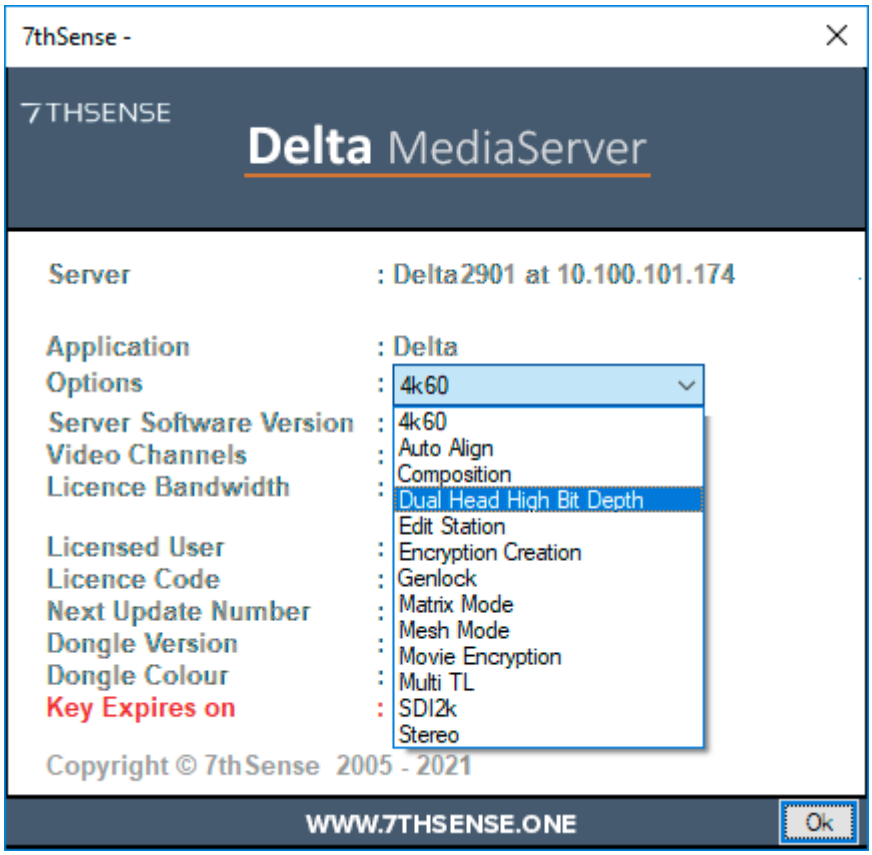
Working in 10-bit Colour Depth

10-bit operation is switched on from a Registry Key and also the graphics driver needs to be in 10-bit mode, with the EDID connected allowing a 10-bit signal.

Note: 10-bit operation is not enabled in *DeltaGUI* > *Display* > *Output Setup*.

Make sure the server is licensed for 10-bit (Without this the server won't render 10-bit)

- VNC to the server.
- Take the server out of Fullscreen mode and from the DeltaServer control window, click *About* > *About Server*. Make sure 'Dual Head High Bit Depth' is in the drop-down list, and select it:

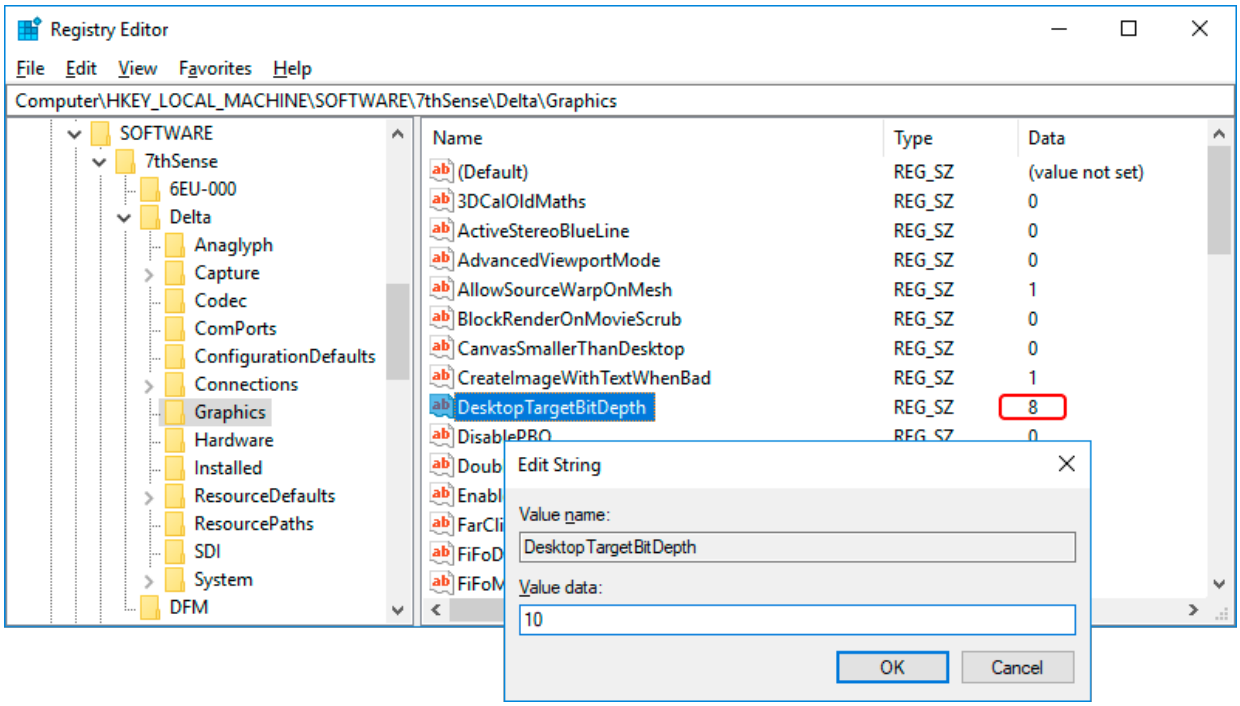


Change the Registry key if required

- Close the DeltaServer application (be sure to save anything that is open in DeltaGUI before you do this).
- Click Windows Start, type 'regedit' to open the Registry and find the following key:

  HKEY_LOCAL_MACHINE\SOFTWARE\7thSense\Delta\Graphics 'DesktopTargetBitDepth'.

  If this reads 8, double click the name and change the value to 10:



Check that 10-bit graphics support is enabled: AMD

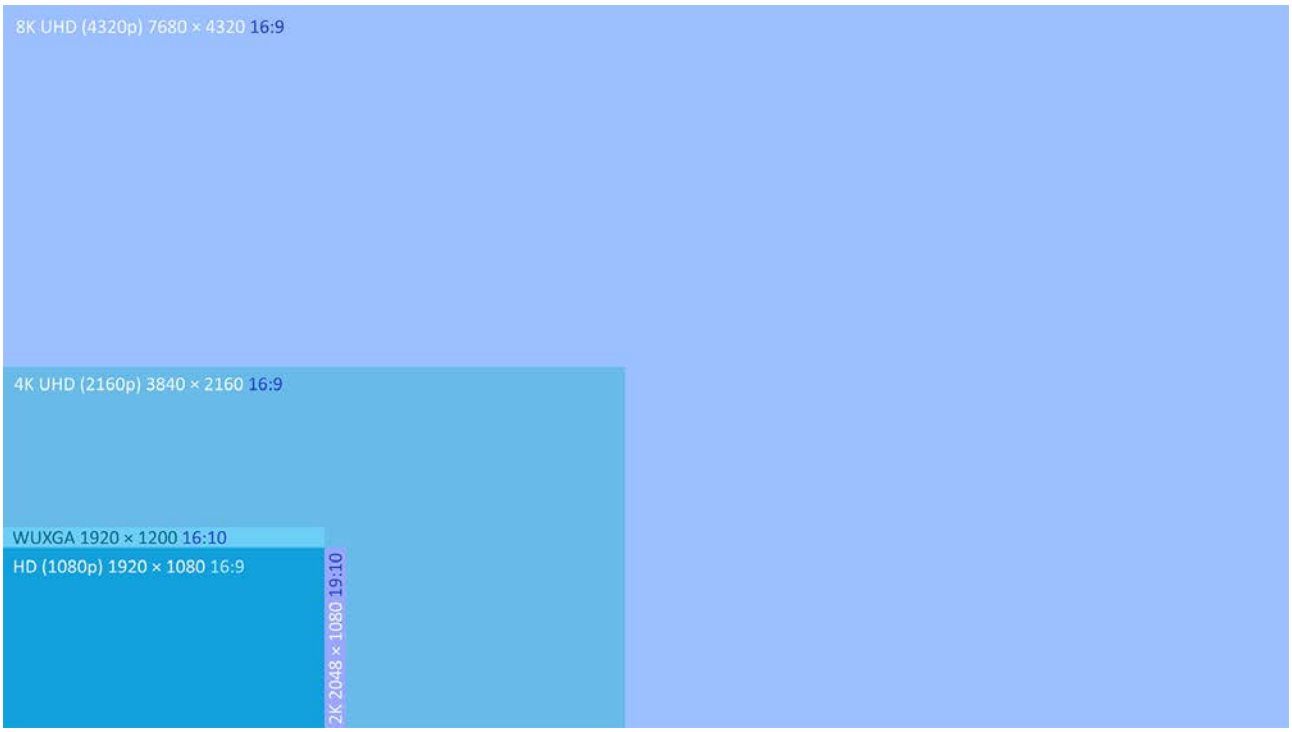
- Right click anywhere on the desktop of the Server and open AMD Advanced control panel. On the left hand side select AMD FirePro Settings. At the bottom is a checkbox called ‘Enable 10-bit pixel formal support’. Make sure this is checked:

- Now select ‘Properties (Digital Flat-Panel)’ on the left menu to check that the graphics EDID is also set to 10-bit. This will give you the EDID information and show at what bit depth the graphics card is drawing.

Standard Display Resolutions

Standard Display Resolutions

These are the most common display formats for reference, with pixel dimensions and ratios:



Format	referred to as	pixel dimensions	ratio
HD	1080p	1920 × 1080	16:9
WUXGA		1920 × 1200	16:10
2K		2048 × 1080	19:10
4K UHD	2160p	3840 × 2160	16:9
8K UHD	4320p	7680 × 4320	16:9

Document Information

Document Information

Date	Document edition	Software version	Revision Details	Author/Editor
December 2017	1	N/A	New release	Andie Davidson
July 2018	2	N/A	Updated with AMD Radeon Pro, Windows 10, Dual AMD setup	Andie Davidson
August 2018	3	N/A	Video wall worked examples and graphic output splitting	Andie Davidson
February 2019	4	N/A	Rearrangement, addition of Projection Alignment	Andie Davidson
October 2019	5	N/A	Pico AMD Radeon added	Andie Davidson
February 2020	6	N/A	Matrox C680 added	Andie Davidson
July 2020	7	N/A	Revised server terminology	Andie Davidson
December 2021	8	N/A	Later version of AMD Radeon Pro settings	Andie Davidson

Windows Registry Settings

This document is supplied for informational purposes only. Any modification to Windows Registry values that are not exposed via the DeltaServer or DeltaGUI application interfaces – or otherwise advised by 7thSense personnel – may result in performance degradation and/or complete instability of the products. Any attempt to engage 7thSense for support in troubleshooting may result in the reversal of all Registry settings to the factory default or last known good 7thSense-approved configuration. **The customer assumes all risk when manually editing any Windows Registry values on any 7thSense product.**

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