Nanolumens

1080p or 4K Signals

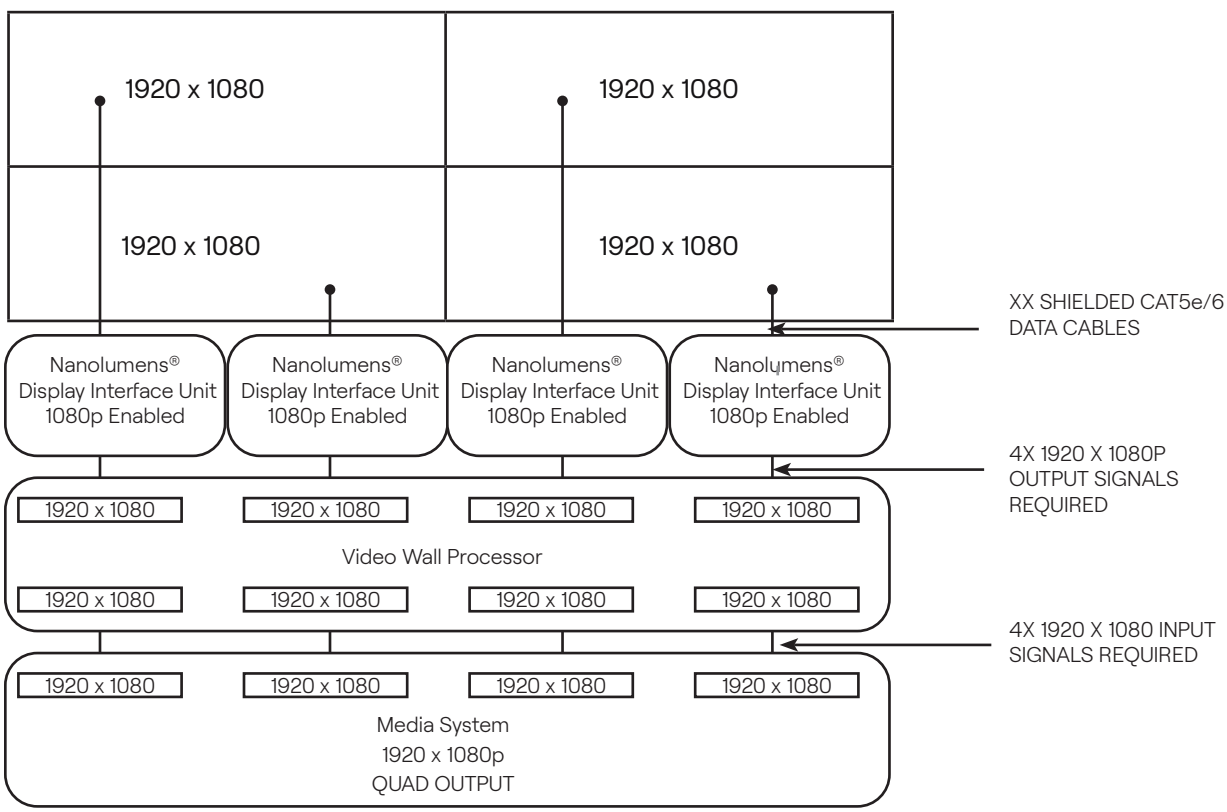
Which should you choose for your system?

There are many factors to consider when planning the introduction of new technologies. LED displays are no different. As pixel pitches have become tighter through the years, LED display resolutions have increased based on pitch and size. As a result, it is important to pre-plan the flow of information upstream to ensure the desired functionality and performance of the LED system complements client expectations.

Planning for content is an extremely important step in the process of LED system procurement and integration; a step that should begin early in the process between customer and client to map out and visualize content desires and functionalities. Answers determined in this phase will determine the overall system functionality, and the relationship between the LED display and the hardware upstream.

Using an example of a 4K display, we will look at a simple signal flow using 1080p signals and what issues may be faced upstream of the LED system.

3840 x 2160 LED DISPLAY



In the signal flow above, every portion of the system requires 1080p (HD) signals to be utilized to deliver the content to the 4 quadrants of the LED display, to fill the 3840 x 2160 canvas. There is a reliance on the video wall processor to be able to "stitch" the 4 individual signals together to enable a full screen canvas.

While this is a popular use method, it does come with some factors that must be considered during the initial stages of the sales process which are of extreme importance to enable successful delivery of application desires.

*Note - Data lines from Nanolumens® Display Interface Unit to LED Display not shown.

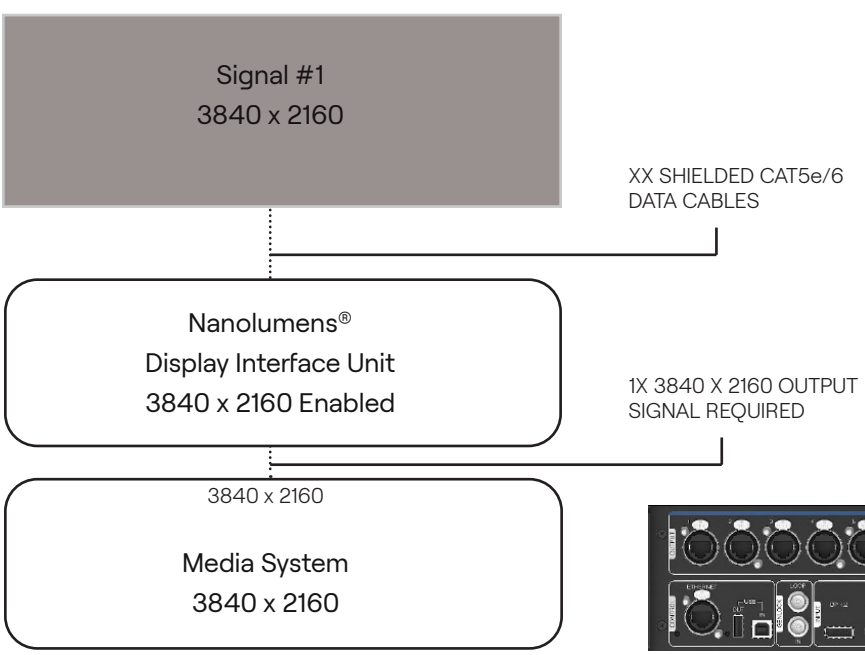
Consideration Factors

1. Is the client expectation to provide HD content to each quadrant?
2. Is the client's future intentions to create unedited 4K content with a singular output?
3. Is the video wall processor able to create a singular canvas?
4. Is the video wall processor able to sync the 4 signals together with no visual tearing?
5. What is the future use case of the LED display?
6. Can the content be successfully split up without causing visual issues?
7. Does adding potential additional failure points upstream cause concern?

In the below signal flow, the utilization of a 4K system has removed the requirement for a video wall processor to merge the 4X 1080p individual signals into a singular canvas, thus eliminating additional upstream hardware, additional potential failure points, and additional cost.

A singular input from the media system via HDMI 2.0/Display Port 1.2 @ 60hz or DUAL DVI-D @ 30hz can be used as the signal path from the media system to the Nanolumens® Display Inteface Unit creating a direct connection between the CMS and the mapping unit of the LED display.

This eliminates potential upstream failure points, and allows for smoother content creation as there is no need to divide a 4K single by a factor of 4, as needed when using 1080p signals on a 4K resolution.

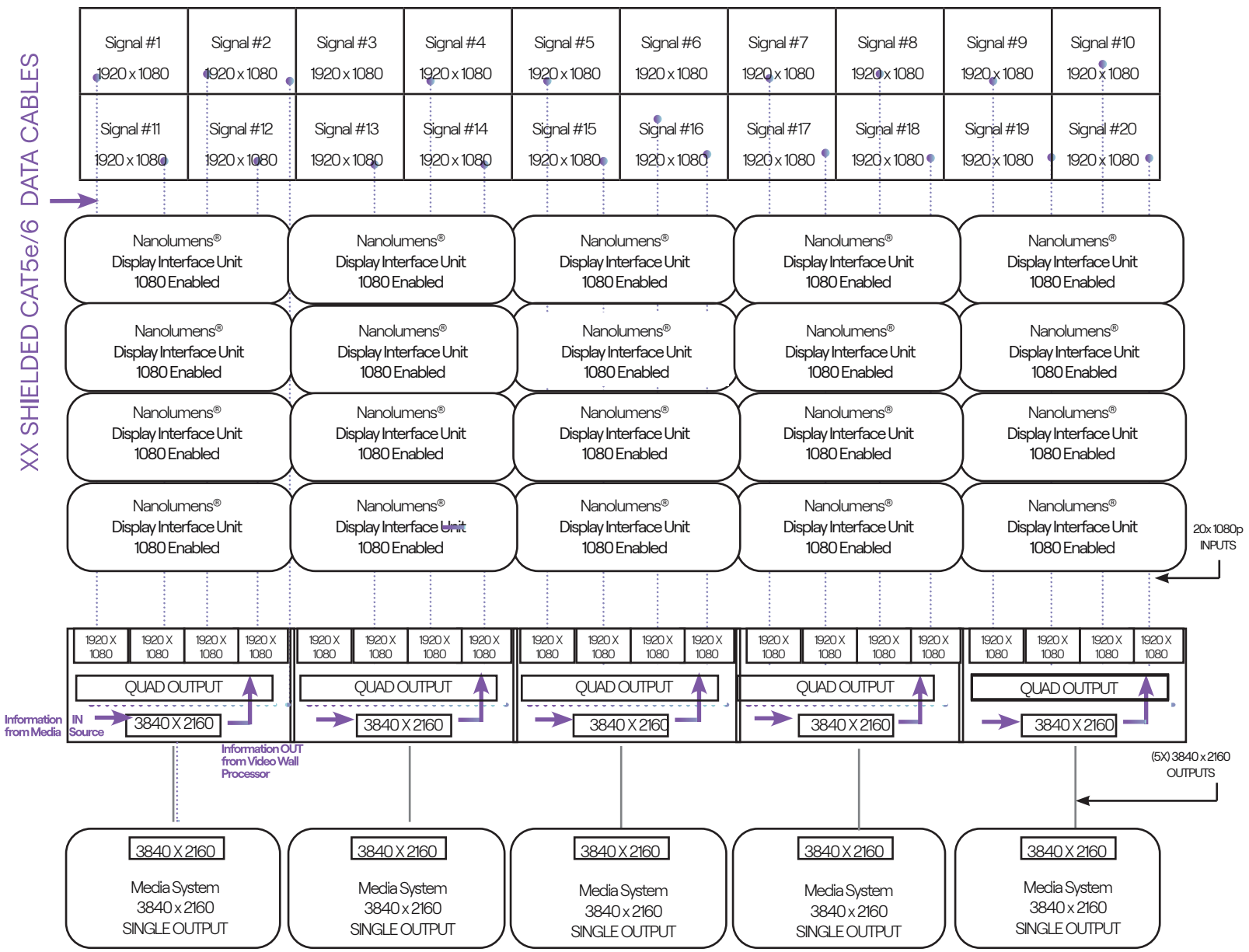


Rear view of the 4K Display Interface Unit

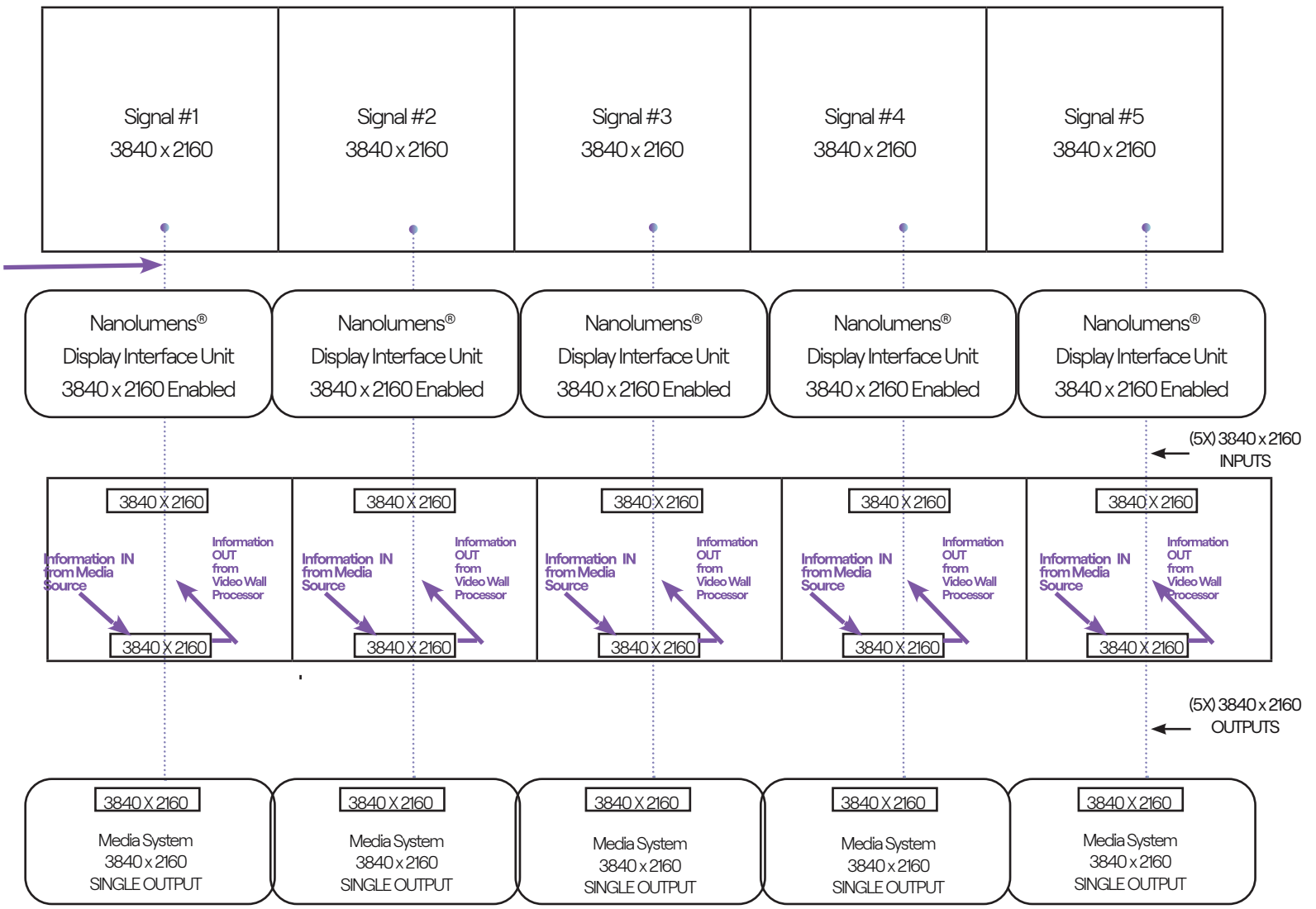
19200 x 2160 LED DISPLAY

If we apply the same scenarios using a larger LED display, then the differences in upstream hardware requirements become even more noticeable. A resolution of 19200 x 2160 (QTY [5] 4K SIGNALS) would require [20] 1080p outputs. Even if the media system is 4K enabled, the 1080p enabled Nanolumens® DIU only accepts maximum resolutions of 1920 x 1200 pixels, so the video wall processor would need to split each individual 4K signal by a factor of 4.

**The 1080p Display Interface Unit does NOT have genlock capabilities, so any latency synchronization between units must be done upstream.



19200 x 2160 LED DISPLAY



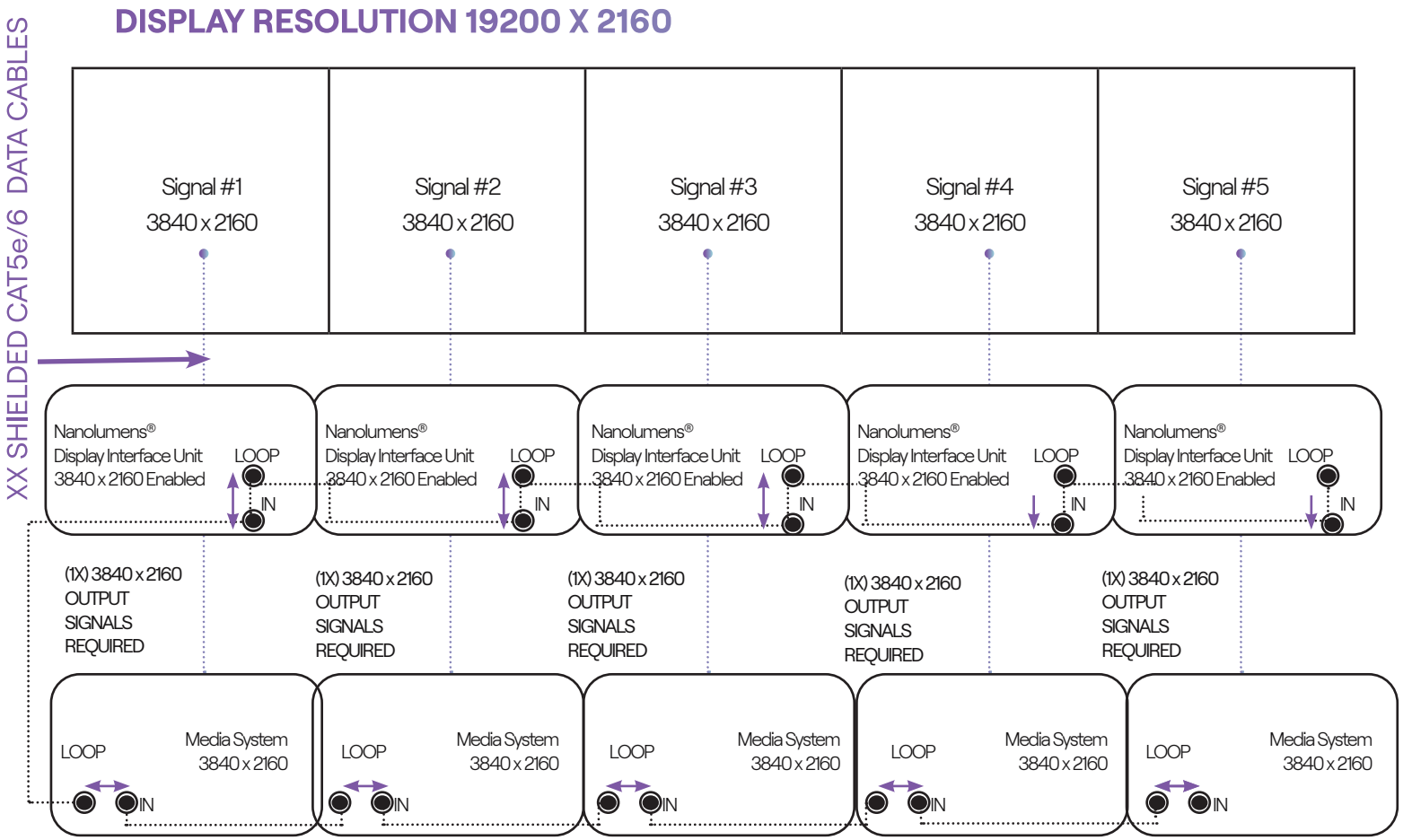
By switching to a 4K enabled Display Interface Unit, the same display (19200 x 2160), the number of signals reduces down to quantity [5] 4K signals @ 60hz. We have reduced the required inputs by 15, and can allow the content to be created to cover more pixel bandwidth without needing to break the content up within the windowing processor. This will simplify processor to processor relationships and content creation will be easier with less quadrants to operate.

Each 4K DIU can operate a pixel bandwidth of 8,847,360 pixels per system. The 1080p version can only handle a maximum of 2,304,000 pixels per system.

Synchronizing multiple large signals into the same canvas

There is often concern when introducing multiple signals into a system with a canvas that matches the display resolution, and how the signals can be synched together correctly so that latency between any of the signals is rectified prior to displaying the image. This is relevant in use cases such as broadcast, where cameras will be utilized, or live sporting streams where there are multiple windows of content that required the display to be split.

The Nanolumens® 4K enabled Display Interface Unit allows for genlocking between the cascading units via the IN/LOOP ports as shown in the diagram below.



- Genlock connector type is Blackburst
- Maximum of [10] 4K Display Interface Units can be cascaded together
- NOTE - Data lines from Nanolumens® display Display Interface Unit to LED display not shown