



Smode Tech

9 Ter rue Auguste Barbier
75011 Paris
+33 (0)1 43 38 99 87

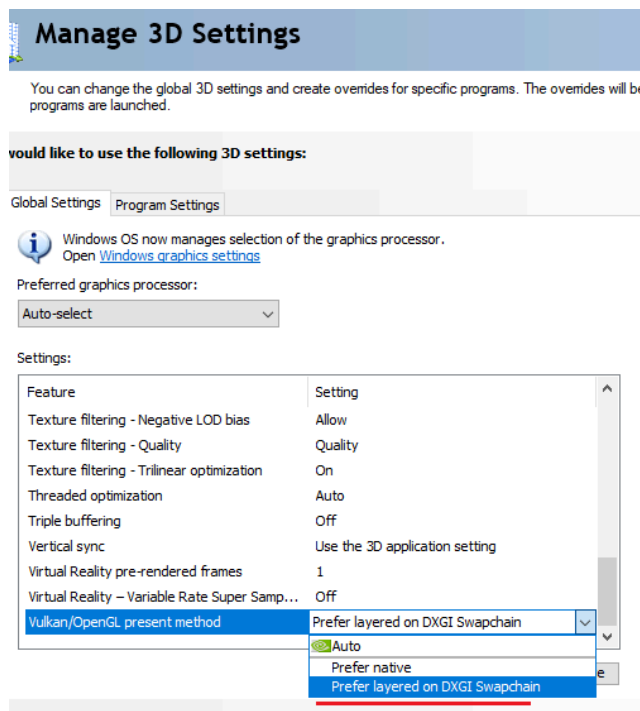
New SMODE synchronization setup

September 12, fix documentation URL

September 10, 2024 new setup

January 15 2024, initial draft

Nvidia Quadro setting that may NOT helps Smode rendering



In the last 15/01/2024 related technical bulletin, we talked about the new **Vulkan/OpenGL present method** setting that was introduced with recent Quadro driver versions.

This is available in the **Manage 3D Settings** section of the **NVIDIA Control Panel**.

NVIDIA driver seems to choose the **Prefer native** mode when this value is set to **auto**.

#1 Ghost frame drops symptoms

Using the same and strictly equal EDID pixel clock on different displays connected on different GPUs are subject to small clock drift between GPUs.

This can introduce the sporadic ghost frame drop issue.

Note that use custom EDIDs with small differences helps to reproduce this issue in a more deterministic way:

Mix 50.00hz and 50.01hz EDIDs will allow this issue to be reproduced each 10 seconds.

More the EDIDs frequencies are equal, the more delay to reproduce the issue and its duration will grow.

On Bi-GPU setup, after several minutes of running, sporadic frame drops was visible on screen but not on Smode GPU Frame Rate (ghost Frame drops)

After a big periode instability, everything became normal again.

Empty or lowly loaded projects are not impacted. QuadroSync2 was not required to reproduce this issue.

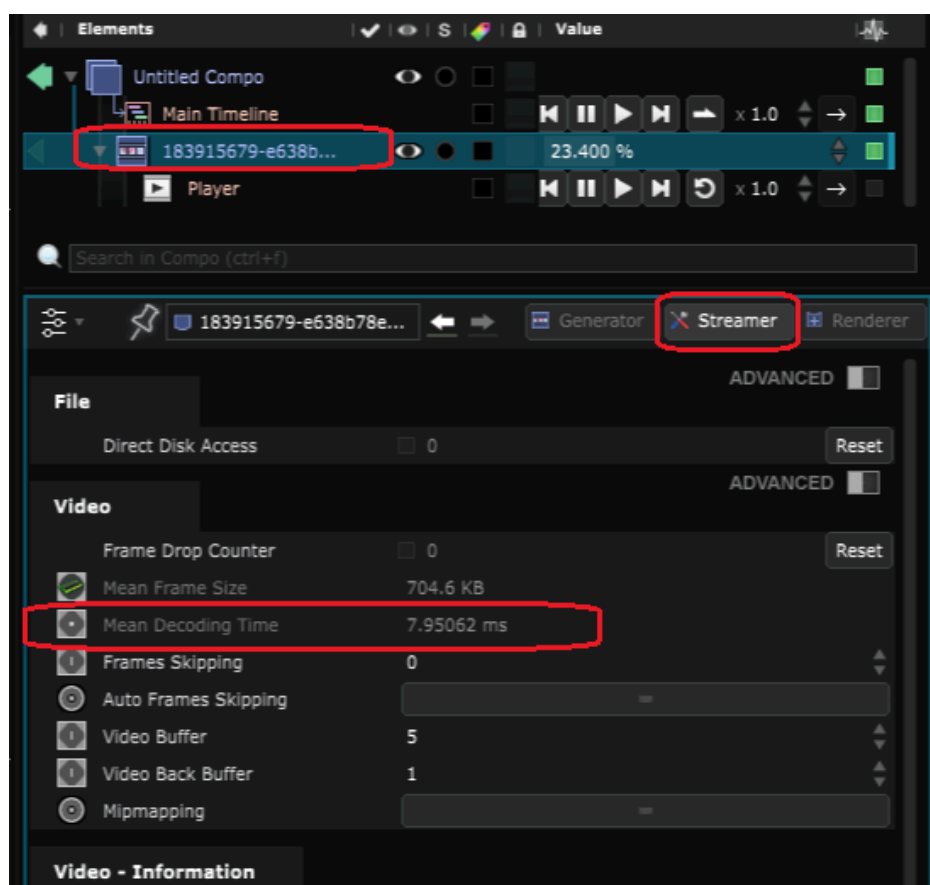
#2 New way to fix the ghost frame drops issue

Previously we encouraged users to set the **Vulkan/OpenGL present method** to Prefer layered on DXGI Swapchain mode, but this may introduce performance pitfalls with the new Nvidia drivers, or custom 10 bits pixel format Smode output and new Smode way to benefit from the Quadro Sync 2 synchronization methods.

So for this kind of usage, we promote setting back to the default **auto** value.

#3 Framedrop symptom with **Prefer layered on DXGI Swapchain** issue

Active **Vulkan/OpenGL present method** to Prefer layered on DXGI Swapchain mode may increase the **Mean Decoding Time** of video file playback close to the framerate limit (ie 20ms for 50hz) and increase Video Frame Drop Counter accordingly. Especially when Genlock is in use. This can be observed in the **Streamer** tab of running video players.

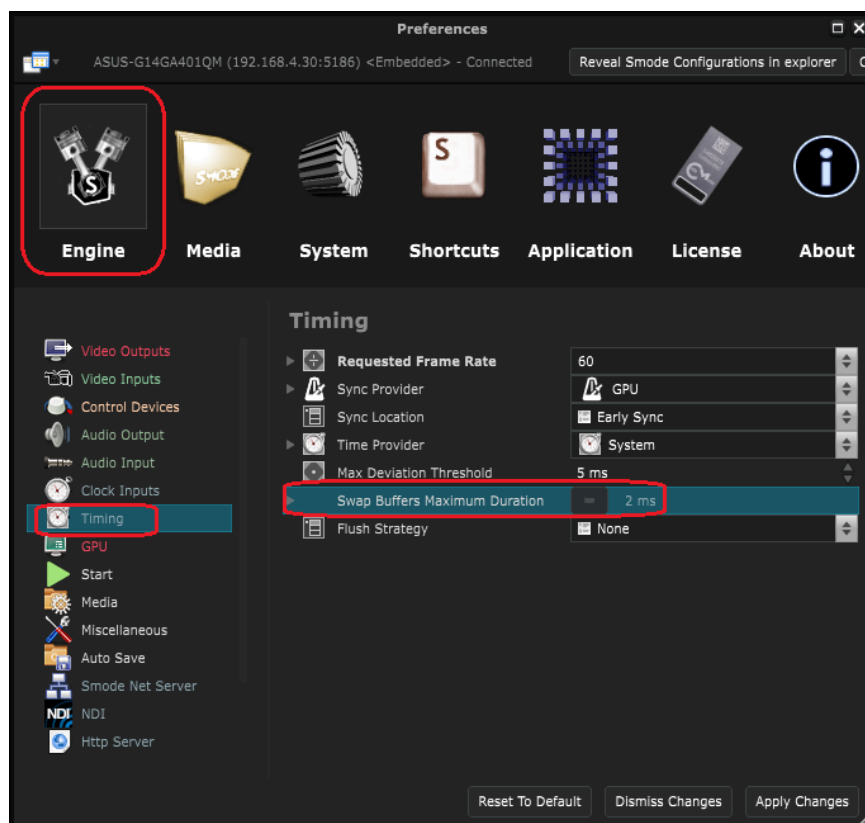


New SMODE v10 synchronization settings WITHOUT Genlock

The Smode project gpu load and the Smode output windows color pixel depth impact Nvidia driver synchronization!

On Quadro setup without QuadroSync2 hardware or when QuadroSync2 is disabled or with GForce gamer grade Nvidia GPU. Lowly loaded Smode projects have counter-intuitive impact on frame time stability when vertical synchronization is active.

To fix this on setup without genlock, you must activate Smode 10 new **Swap Buffers Maximum Duration** setting located in **Engine** Preferences **Timing** tabs



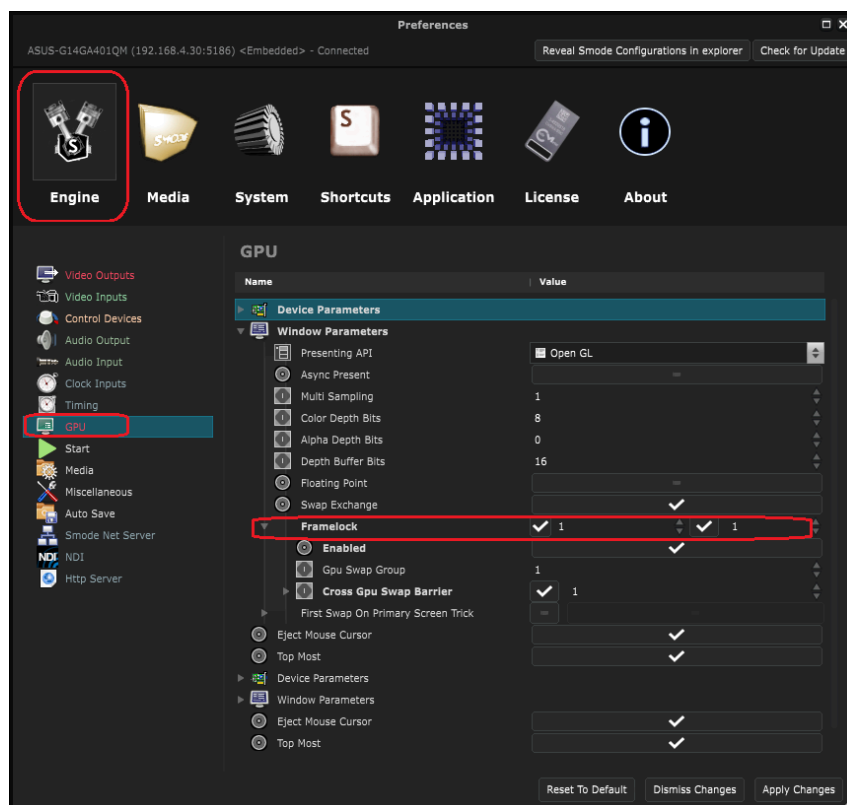
This introduces sleeping time between the end of the frame rendering and the sending of the output buffer to the driver ensuring this event will never be farther than two milliseconds of the vertical synchronization.

WARNING: This option is costly and should never be used on a setup using active QuadroSync2 synchronization.

New SMODE v9.4.6 & v10 synchronization settings with Genlock

With QuadroSync Genlock activated in Nvidia Control panel, **Vulkan/OpenGL present method must be set to auto** in Nvidia Control panel, and Smode v10 **Swap Buffers Maximum Duration** setting **must be disabled**.

Starting to Smode v9.4.6 of the 15 March 2024, Smode can join QuadroSync2 framelock settings located into Engine GPU settings:



Swap group concerns multi windows / multi process on the same computer

Cross gpu swap barrier concerns multi gpu but also multi computer setup.

So both need to be enabled and index values are let to the user but can be kept as default **1** value for common usage scenarios.

Framelock only work if the output is full screen, if you have multiple screen they need to be merged into a mosaic

Avoiding frame drop with SMODE

To avoid frame drop with Smode you need to follow those several points.

#1 Smode Tech BIOS & OS requirements

Apply points that are explained in the online documentation:

<https://www.smode.io/documentation/ref/other/windows-cleanup-and-recommended-settings.htm>

#2 Configure multiple output scenario properly

- If your Smode output windows overlap several display devices, use NVIDIA Mosaic.
- Ensure your Smode output window does not go outside your desktop coordinates or miss part of the full display size to benefit from all Nvidia full screen optimisations.

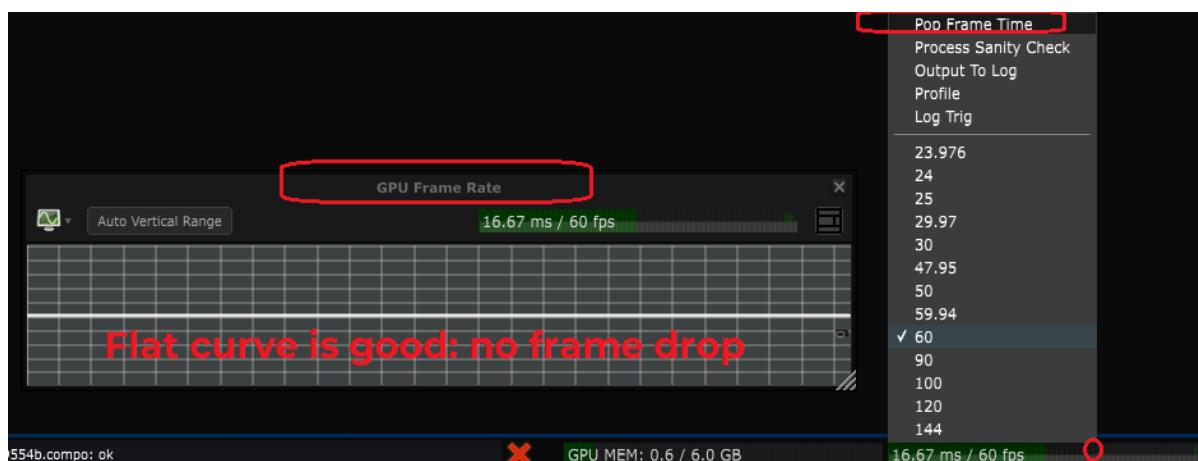
#3 Enforce EDID on all displays on all GPUs

- Enforce proper EDID to all display devices connected on all GPUs including the one used to see the desktop (UI).
- Let EDIDs have only one resolution/frequency available to avoid bad os/driver selection.
- Ensure all EDIDs have the same pixel clock at 10 kilohertz precision on all display devices connected on all GPUs including the one used to see the desktop (UI).
- Ensure your external video matrix devices use the same Edids too.

Ensuring there is no frame drop with Smode

GPU Frame Rate curve allow to know if frame drops occurred:

(double click on frame rate allow to display this curve in a bigger way)



If peaks on this curve appears it can be due from two kind of issues:

#1 Incorrect system settings

In this case see previous chapter to fix that.

#2 Smode project is too heavy for your hardware

In this case , some project optimizations are required:

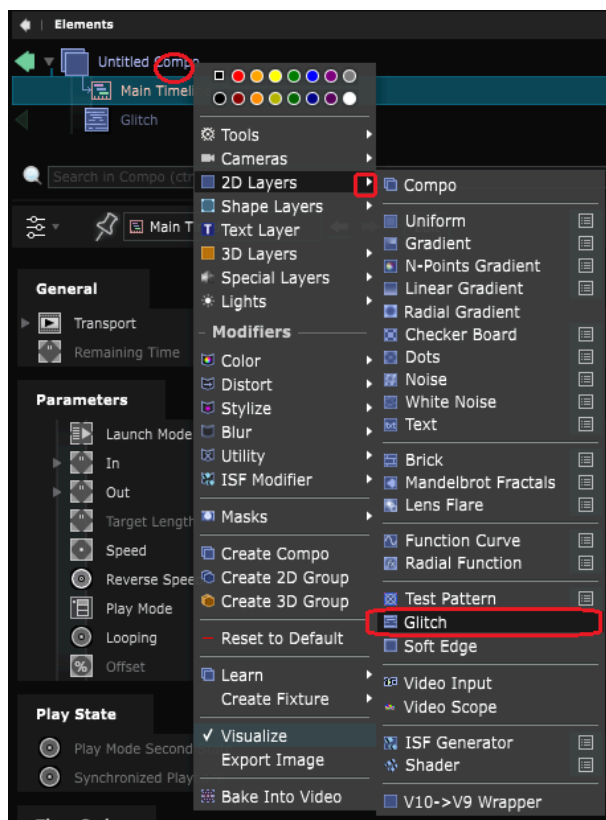
Reduce resolution or particle count, video quality or layer numbers...

See related documentation topics:

<https://www.smode.io/documentation/ref/compo/how-to/use-optimisation-tools-to-accelerate-a-composition.htm>

<https://www.smode.io/documentation/ref/ui/profiling.htm>

Ensuring your display hardware will not drop



If your Smode GPU frame rate does not drop, your display device may drop by the way if it does not support its EDIDs pixel clock correctly.

To detect this, use Glitch layer and reduce its default 100% opacity to avoid hardware damage (or eyes).

If glitch frequency is visually stable, your display screen accepts your pixel clock.

If glitch is not visually stable: it was “ghost frame drop” (aka frame drop not detected by Smode), introduced by your display device's output chain.

This behavior may be due to a bad attempt of your display device to reclock the frequency or interpolate it to its native one.

It may also come from signal converters or bad EDIDs set in video matrix.

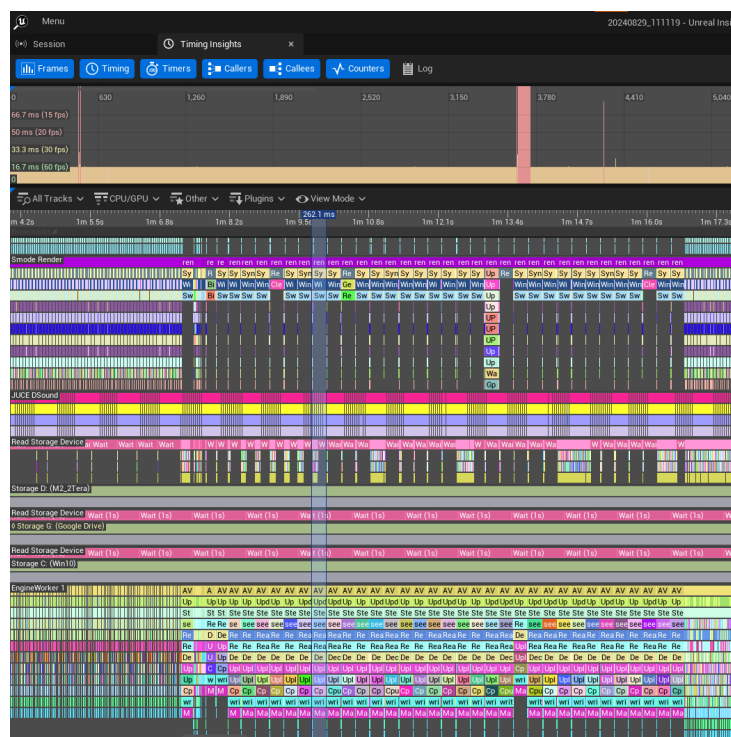
Else try other EDIDs, else change your hardware.

New SMODE v10 way to investigate performances

More than Smode Video file profiler and Frame rate meter, Smode 10 introduced integrated new Phase Wizard: the radar view of synchronized events per frame.

<https://www.smode.io/documentation/ref/animation/device/videoInput/phase-wizard.htm>

Smode Also introduce integrated output traces for Unreal Insight



Here the configuration link to use this feature

<https://www.smode.io/documentation/ref/compo/how-to/advanced-profiling-with-unreal-insight.htm>

Unreal Insight can be downloaded from Epic game Unreal official web site or a lighter version from this link

<https://shop.smode.io/download/utilities/Unreal%20Insight.zip>

Enjoy ! Good SMODE!

Alexandre Buge & Basile Rouault 10/09/2024