AMD Linux Driver 2021.40 Release Notes

1. Overview

AMD's Linux® Driver's includes open source graphics driver for AMD's embedded platforms and other peripheral devices on selected development platforms.

New features supported in this release:

1. Main line kernel 5.15 stable support.
2. Bug fixes.

2. Linux® kernel Support

1. 5.15.0 stable

3. Linux Distribution Support

1. Ubuntu 20.04.3

4. Component Versions

The following table shows git commit details of the sources and binaries used in the package.

The patches present in patches folder of this release package has to be applied on top of the git commit mentioned in the below table to get the full sources corresponding to this driver release. The sources directory in this package contains patches pre-applied to these commit ids.

Component Name	Version	Commit ID	Source Link for git clone
Kernel	5.15.0-stable	8bb7eca972ad531c9b149c0a51ab43a417385813	https://github.com/torvalds/linux/tree/v5.15
Libdrm	2.4.107	9cef5dee3cd817728c83aeb3c2010c1954e4c402	https://github.com/freedesktop/mesa-drm.git
Mesa	21.3.0	bb9bdc4b7392dd46efe09be554e370f547b7080a	https://github.com/mesa3d/mesa.git
Ddx	19.1.0	6234a1b2652f469071c0c9b0d8b0f4a8079efe74	https://github.com/freedesktop/xorg-xf86-video-amdgpu.git
Gstomx	1.0.0.1	5c4bff4a433dff1c5d005edfceaf727b6214bb74	git://people.freedesktop.org/~leoliu/gstomx
Wayland	1.15.0	ea09c2fde7fcfc7e24a19ae5c5977981e9befeb7	https://github.com/wayland-project/wayland
libva	2.8	3cc2212c38630ffcdc6b38e0bd867845adee5ed9	https://github.com/intel/libva.git
libvdpau	1.1.1	af517f56d64118520aa0c8456318dd9ec3307e94	https://github.com/freedesktop/libvdpau.git
LLVM	13.0	9c49fee5e7ac0ca8bc4ec1c3738ca0d83df65852	https://github.com/llvm/llvm-project
Firmware	Master	b8389516eedcc62f30294f99bf3adc23080f4810	https://git.kernel.org/pub/scm/linux/kernel/git/firmware/linux-firmware.git
Vulkan	refs/tags/v-2021.Q3.7	e4a5c9f48ff98fe6f37f54c6c850e8dfad7dfac4	https://github.com/GPUOpen-Drivers/AMDVLK/tree/v-2021.Q3.7
Supported Applications			
LunarG Vulkan SDK	1.2.182	NA	https://vulkan.lunarg.com/sdk/home#linux
Vulkan CTS	1.2.6		https://github.com/KhronosGroup/Vulkan-CTS.git
RGP	1.6	NA	https://github.com/GPUOpen-Tools/Radeon-GPUProfiler/tree/v1.6

5. Features Supported on APU

Supported features are shown in the following table.

Feature Group	Feature supported	V1000	R1000/LP	R1600	V2000	R2000
2D	2D acceleration	Yes	Yes	NA	Yes	Yes
3D	EGL 1.4, 1.5, EGL extensions.	Yes	Yes	NA	Yes	Yes
3D	OGL 4.5, OGL 4.6	Yes	Yes	NA	Yes	Yes
3D	GLX 1.4	Yes	Yes	NA	Yes	Yes
3D	DRI3 support	Yes	Yes	NA	Yes	Yes
3D	DRI3 updates (VDPAU, VAAPI)	Yes	Yes	NA	Yes	Yes
3D	Vulkan Open Source	Yes	Yes	NA	Yes	Yes
2D	10 bit Display	Yes	Yes	NA	Yes	Yes
Audio	DP Audio supports for standard	Yes	Yes	NA	Yes	Yes
Audio	I2S Audio	Yes	Yes	NA	Yes	Yes
Display	EDID(Basic)	Yes	Yes	NA	Yes	Yes
Display support	X and Desktop support	Yes	Yes	NA	Yes	Yes
Display support	Tear Free Desktop	Yes	Yes	NA	Yes	Yes
Display support	Partial support RandR 1.4 capabilities	Yes	Yes	NA	Yes	Yes
Display support	Kernel Mode Setting	Yes	Yes	NA	Yes	Yes
Display support	4K60HZ display support	Yes	Yes	NA	Yes	Yes
Display support	Multi-GPU support (Refer table below for dGPU pairing)	Yes	No	NA	No	No
Display support	No of Displays supported (Refer display support table below)	-	-	NA	-	-
Display support	4K cinema	Yes	Yes	NA	Yes	No
Display support	DP MST	Yes	Yes	NA	Yes	Yes
Display Support	Single Large Surface (SLS)	Yes	Yes	NA	Yes	No
Play back	Play back support MPV player using VAAPI / VDPAU	Yes	Yes	NA	Yes	Yes
Play back	Play back support for Gstreamer using VAAPI, gstomx (not recommended)	Yes	Yes	NA	Yes	Yes
Play back	1080p 24fps, 30 fps and 60fps video play back	Yes	Yes	NA	Yes	Yes
Play back	4k 30fps video play back	Yes	Yes	NA	Yes	Yes
Play back	4k 60fps video play back	Yes	Yes	NA	Yes	Yes
Power Management	Power Play support to re-clock	Yes	Yes	NA	Yes	Yes
Power Management	initial GPU reset support	Yes	Yes	NA	Yes	Yes
Power Management	Power Play sysfs interface for manually selecting clock speeds	Yes	Yes	NA	Yes	Yes
VDPAU Post Processing	Deinterlace	Yes	Yes	NA	Yes	Yes

VDPAU Post Processing	Edge Enhancement	Yes	Yes	NA	Yes	Yes
VAAPI Postprocessing	Deinterlace	Yes	Yes	NA	Yes	Yes
Transcode	4k Encode	Yes	Yes No(LP)	NA	Yes	Yes
Video Quality	Scaling and color space conversion (CSC)	Yes	Yes No(LP)	NA	Yes	Yes
Video Quality	Pull down detection and Deinterlacing	Yes	Yes No(LP)	NA	Yes	Yes
Video Quality	Support for software scaling	Yes	Yes	NA	Yes	Yes
Video Quality	Support for hardware scaling	Yes	Yes	NA	Yes	Yes
Video Quality	10-bit Decode with 10 bit render	Yes	Yes	NA	Yes	Yes
Compute	OpenCL	No	No	NA	No	No
dGMA –OpenGL		NA	NA	NA	NA	NA
dGMA - OpenCL		NA	NA	NA	NA	NA
fTPM		Yes*	Yes	NA	Yes	Yes
RJ45	1G	Yes (V1000 NPU also)	Yes	Yes	No	No
	10G	Yes* (V1000 NPU also)	Yes	Yes	No	No
SFP+ (connector)	1G	Yes* (V1000 NPU also)	Yes	Yes	No	No
	10G	Yes* (V1000 NPU also)	Yes	Yes	No	No
eMMC	BC	Yes (V1000 NPU also)	Yes	Yes	No	No
	HS200	Yes (V1000 NPU also)	Yes	Yes	No	No
	HS400	Yes (V1000 NPU also)	Yes	Yes	No	No
SD Card	SD UHS I – SDR50	Yes (V1000 NPU also)	Yes	Yes	No	Yes
	SD UHS I – SDR104	Yes (V1000 NPU also)	Yes	Yes	Mo	Yes
	SD UHS I – SDR104	Yes (V1000 NPU also)	Yes	Yes	No	Yes
I2C		Yes (V1000 NPU also)	Yes	Yes	Yes	Yes
SPI Kernel Driver *		Yes	Yes	Yes	Yes	Yes

*Bilby platform only

*To make use of SPI kernel driver on Bilby Platforms, Required BIOS which has enabled SPI Entry in the ACPI table. Default BIOS doesn't have this. Please contact FAE for the required BIOS.

6. Features Supported on DGPU:

Supported features are shown in the following table.

Feature Group	Feature supported	Kernel 5.15-stable					
		E9390	E9560	E9260	E9550	E917X	E9565
2D	2D acceleration	Yes	Yes	Yes	Yes	Yes	Yes
3D	EGL 1.4, 1.5, EGL extensions.	Yes	Yes	Yes	Yes	Yes	Yes
3D	OGL 4.5	Yes	Yes	Yes	Yes	Yes	Yes
3D	OGL ES 3.2, 3.1, 3.0, 2.0, 1.1	Yes	Yes	Yes	Yes	Yes	Yes
3D	GLX 1.4	Yes	Yes	Yes	Yes	Yes	Yes
3D	DRI3 support	Yes	Yes	Yes	Yes	Yes	Yes
3D	OpenGL composited desktop(untested)	Yes	Yes	Yes	Yes	Yes	Yes
3D	DRI3 updates (VDPAU, VAAPI)	Yes	Yes	Yes	Yes	Yes	Yes
3D	Vulkan Open Source	Yes	Yes	Yes	Yes	Yes	Yes
2D	10-bit render	Yes	Yes	Yes	Yes	Yes	Yes
Audio	DP Audio supports for standard bitrates	Yes	Yes	Yes	Yes	Yes	Yes
Display	EDID	NA	NA	Yes	Yes	Yes	Yes
Display support	X and Desktop support	Yes	Yes	Yes	Yes	Yes	Yes
Display support	Tear Free Desktop	Yes	Yes	Yes	Yes	Yes	Yes
Display support	Kernel Mode Setting	Yes	Yes	Yes	Yes	Yes	Yes
Display support	4K60HZ display support	Yes	Yes	Yes	Yes	Yes	Yes

Feature Group	Feature supported	Kernel 5.15-stable					
		E9390	E9560	E9260	E9550	E917X	E9565
Display support	Multi-GPU support	Yes	Yes	Yes	Yes	Yes	Yes
Display support	No of Displays supported	Refer display support table below					Yes
Display support	4K cinema	Yes	Yes	Yes	Yes	Yes	Yes
Display support	DP MST	NA	NA	Yes	Yes	Yes	Yes
Display Support	Single Large Surface (SLS)	Yes	Yes	Yes	Yes	Yes	Yes
Play back	Play back support MPV player using VAAPI / VDPAU	Yes	Yes	Yes	Yes	Yes	Yes
Play back	Play back support for Gstreamer using VAAPI, gstomx (not recommender)	Yes	Yes	Yes	Yes	Yes	Yes
Play back	1080p 24fps, 30 fps and 60fps video play back	Yes	Yes	Yes	Yes	Yes	Yes
Play back	4k 30fps video play back	Yes	Yes	Yes	Yes	Yes	Yes
Play back	4k 60fps video play back	Yes	Yes	Yes	Yes	Yes	Yes
Power Management	Power Play support to re-clock	Yes	Yes	Yes	Yes	Yes	Yes
Power Management	initial GPU reset support	Yes	Yes	Yes	Yes	Yes	Tes
Power Management	Power Play sysfs interface for manually selecting clock speeds	Yes	Yes	Yes	Yes	Yes	Yes
VDPAU Postprocessing	Deinterlace, Edge Enhancement	Yes	Yes	Yes	Yes	Yes	Yes
VAAPI Postprocessing	Deinterlace	Yes	Yes	Yes	Yes	Yes	Yes
Transcode	4Kx2K Encode	NA	NA	Yes	Yes	Yes	Yes

Feature Group	Feature supported	Kernel 5.15-stable					
		E9390	E9560	E9260	E9550	E917X	E9565
Video Quality	Scaling and color space conversion (CSC)	Yes	Yes	Yes	Yes	Yes	Yes
Video Quality	Support for software scaling	Yes	Yes	Yes	Yes	Yes	Yes
Video Quality	Support for hardware scaling	Yes	Yes	Yes	Yes	Yes	Yes
Video Quality	10-bit Decode with 10-bit render	NA	NA	NA	NA	NA	NT
OpenCL	Compute	No	No	No	No	No	No

Display support:

Platform	No of display(s)
R2000	3
V2000	4
R1000 LP	R1102G(B2): 1x4k@60HZ or 2x1080@60HZ R1305G(B4): 2x4k@60HZ or 3x1080@60HZ
R1000	3
V1000	4
E9390	4
E9560	4
E9260	5
E9550	6
E9171	5
E9172	5
E9173	3
E9174	5
E9175	5
E9565	6

7. HW codec support

Codec	API	Middleware/framework
H.264 decode	VAAPI, VDPAU, OMX	ffmpeg-VAAPI, ffmpeg-VDPAU, gst-VAAPI, gst-OMX
H.265 decode	VAAPI, VDPAU, OMX	ffmpeg-VAAPI, ffmpeg- VDPAU, gst-VAAPI, gst- OMX
H.265 10bit->8bit decode (PF & V1000 only)	VAAPI	ffmpeg-VAAPI
MPEG2 decode	VAAPI, VDPAU, OMX	ffmpeg- VAAPI, ffmpeg- VDPAU, gst-VAAPI, gst- OMX
MPEG4 Part2 decode	VDPAU	ffmpeg- VDPAU
VC1 decode	VAAPI, VDPAU	ffmpeg- VAAPI, ffmpeg- VDPAU, gst- VAAPI
H.264 encode	VAAPI, OMX	gst-VAAPI, gst- OMX,
VP9 decode	VAAPI	Ffmpeg-VAAPI

8. Platforms Supported

1. R2000
2. V2000
3. R1600 CPU
4. R1000LP
5. R1000
6. V1000
7. V1000 NPU
8. E9390 dGPU
9. E9560 dGPU
10. E9260 dGPU
11. E9550 dGPU
12. E9171 dGPU
13. E9172 dGPU
14. E9173 dGPU
15. E9174 dGPU
16. E9175 dGPU
17. E9565 dGPU

9. Tested platform configurations

The following tables show the system configuration that was used for testing the driver package.

R2000	
APU	R2000
OPN's	R2312, R2314
APU TDP	12-25W, 12-35W
BIOS version	RBP0080A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	SSD, M.2

V2000	
APU	V2000
APU TDP	10-25W, 35-54W
BIOS version	RC01006A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	SSD, M.2

R1000 LP	
APU	R1000 LP
APU Frequency	B2 6W, B4 8W/10W
BIOS version	RBB1208A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	HDD, SSD, M.2

R1000	
APU	R1000
APU Frequency	B2 15W, B4 15W/25W
BIOS version	RBB1208A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	HDD, SSD, M.2

V1000/NPU	
APU	V1000
APU Frequency	B10 45W (3350 MHz), B8 45W(3250 MHz), B8 15W(2000 MHz), B3 15W(2000 MHz)
BIOS version	RBB1208A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, DP to VGA, DP to DVI, mDP
Storage disk	HDD, SSD, M.2

9. Multi GPU Pairing

APU	dGPU
R1000	E9260, E9171, E9173, E9550, E9390, E9560, E8565
V1000	E9260, E9550, E9171, E9172, E9173, E9174, E9175, E9390, E9560, E9565
V1000 NPU	E9550, E9173, E9260, E9390, E9560

10. Issues fixed

1. System Hard hang observed S3 at 288th cycles with 4x4k display config on V2000.
2. Stutter and framedrops observed after resume from sleep with vdpau playback on V2000.
3. CGPG enable/disable in driver causes blank screen on V2000.
4. System softhang observed with OGL CTS 4.6 on V2000.
5. S3 fails and causes Platform reboot after 940 cycles on V2000.
6. VAAPI Encode video has corruption and artifacts while doing frame rate up scaling.
7. S3 causes system hang with SLS 1x2, 2x1 config on R1000LP.
8. Blank screen observed upon hot plug after changing the resolution on R1000.
9. 10% Performance drop in SPEC2017 Rate scores on V1605.

   Workaround: SPEC performance degradation caused due to changes below.

   https://github.com/torvalds/linux/commit/9301982c424a003c0095bf157154a85bf5322bd0 and
   https://github.com/torvalds/linux/commit/f9dfb5e390fab2df9f7944bb91e7705aba14cd26
   Reverting the above patches on top of 5.13 stable kernel will resolve the performance degradation issue.
10. TX timeout observed when operate data transfer stress test on V1000.
11. Random S3 failure on R1000.
12. System hang observed on resumption from S3 with vaapi/vdpau video playback.
13. Minor stutter is observed when Performing gstreamer vaapi decode on V1000.
14. SME is not enabled.
    Note: SME is not functional with amdgpu driver. Please use nomodeset for SME functionality.
15. Less throughput observed with UDP compared to TCP.
    Note: Able to achieve comparable bandwidth with UDP with IXChariot tool.

11. Known Issues/Limitations

R2000 issues:

1. Stutter observed for video playback through chromium browser.
2. Glitches observed with zoom calls on 3x4k/1080p display configuration.
3. Lag observed with teams video conference, PPT, browser on 3x4k display configuration.
4. One of the display goes blank after boot with 3xTrue 2K MST configuration.
5. Stutter observed at times on secondary displays with 3x4k config.
6. Sporadically Type C to Type C Hot plug fails.

V2000 issues:

1. Sporadically Type C to Type C Hot plug fails.
2. Randomly blank-out observed during S3 cycles with 4X4K_HDMI@60hz configuration on LG27UK650.
3. 4k@120 Hz refresh rate is not working with HDMI.
4. Keyboard and Mouse is not responsive with ACCELL make TYPC to HDMI Active dongle on USB-C-P0 port.
5. Minor stutter observed at times with vaapi playback with MST-4K@30hz.
6. One of the Monitor goes blank after Hotplug of display cable which is connected to SUT in MST Daisy chain.
7. One Monitor(1 of 3) goes blank after booting to OS in MST Daisy chain configuration of 3xTrue 2k.
8. All monitors goes blank after executing S3 in MST Hub configuration & Daisy chain configuration.

R1000 LP Issues:

1. Heavy stutter in slideshow presentation and Multimedia playback in dual monitor usecase. Note: Issue is happening due to hitting the power limit with the above use case.
2. Minor Tearing is observed while doing skype video calling in fullscreen.
3. Tearing and stutter observed in Multimedia playback of H265 1080p@60fps in dual monitor scenario along with PPT presentation in one monitor.

R1000 Issues:

1. Not showing GPU Load in amdgpu_pm_info sysfs entry on V1000 and R1000/LP.
2. User experience is very poor after hotplug on mGPU config with more than 6 monitors.

Common Issues:

1. Few of the display blank out with MST hub in 5.4 kernel.
2. Few of the VulkanCTS 1.2 test cases fails with error of VK_ERROR_OUT_OF_HOST_MEMORY.
   [Workaround]: Vulkan CTS 1.1.3 works fine.
3. IO Page fault logs observed while loading the I2S module.
4. HP Z27s monitor resolution change does not take effect sometimes.
   Recommendation: Not to use the monitor since the monitor issues HPD pulse during Changing resolution causing to revert to previous/native resolution sometimes.
5. Hotplug root node of DP MST monitors in daisy chain or via Hub fails.
   Workaround: To always connect or disconnect monitors in MST configuration one by one and not at root node level.
6. sporadically soft hang observed while doing "capture profile" in Remote profiling of Hologram (RGP) on V1000/R1000.
7. Artifacts observed during video playback with multiple 4K monitors on E9173 dGPU.
8. Display artifacts while doing S3 with max 4k monitors on APU's.
9. Corruption on all four 4k monitors when resize the Video play back window to full screen and vice versa.
   Workaround: issue root caused to display underflow and GPU usage high indicating usage beyond hardware capability. A workaround is to disable window effects using command "gsettings set org.gnome.desktop.interface enable-animations false"
10. All MST displays goes blank while booting with MST Hub and MST off on the monitors.
11. Tearing/Stutter observed during 4k@60fps playback on 2x4k monitors.
    Workaround: Use zaphord Head configuration to play 4k@60fps video on multi monitor setup.
12. Hard hang observed for Piglit tests.
    Workaround: Piglit test passed without arb_tessellation_shader-tes-gs-max-output test cases.
13. Stuttering observed with glmark2 on mGPU config.
    Workaround: Use multi screen configuration to resolve the stutter.
14. [BE]: Observed Issues with HotPlug on Bald Eagle.
15. [BE]: S3 Fails randomly on BaldEagle with IOMMU enabled.
16. Issues with refresh rate change/rotate using xrandr command.
17. Export MESA_GLES_VERSION_OVERRIDE=3.2 to run OGL ES 3.2 CTS.
18. Hot plug results in blank display of one of the monitors when using startx mode.
19. B-frame support is not available in vaapi encode.
20. MF has limitation of displaying 2 – 4K monitors, 3rd 4 K monitor will not get displayed.
21. Following OGL CTS test cases do not work
    a. GL45-CTS.stencil_texturing.functional
    b. GL45-CTS.multi_bind.dispatch_bind_textures
    c. GL45-CTS.multi_bind.dispatch_bind_image_textures
    d. GL45-CTS.arrays_of_arrays_gl.SubroutineFunctionCalls2
    e. GL45-CTS.sparse_buffer_tests.BufferStorageTest
    f. GL45-CTS.shader_atomic_counters.basic-usage-fs
    g. GL45-CTS.shader_atomic_counters.basic-usage-vs
    h. GL45-CTS.shader_atomic_counters.basic-usage-gs
    i. GL45-CTS.shader_atomic_counters.basic-usage-tes

j. GL45-CTS.shader_atomic_counters.basic-usage-cs
k. GL45-CTS.parallel_shader_compile.CompilationCompletionNonParallelTest
l. GL45-CTS.parallel_shader_compile.CompilationCompletionParallelTest
m. GL45-CTS.enhanced_layouts.ssb_member_offset_and_align
n. GL45-CTS.enhanced_layouts.vertex_attrib_locations
o. GL45-CTS.parallel_shader_compile.MaxShaderCompileThreadsTest

XGBE:

1. 10G SFP Hot plug(FC) is not working.
2. [XGBE]: Force mode(Auto negotiation disabled) is not supported in RJ45.
3. Sporadically 2.5G Network is established after a delay of more than 20 sec for SFP 2.5 on Port 0/1.
4. 10G SFP Hot plug(FC) is not working with NetGear switch(XS724EM model)
5. Can't concurrently enable SFP+ and RJ45 interfaces.
6. No IEEE 1588 Timestamp support.
7. No receive Split header support.
8. Following features should be functional but have not been fully validated: Priority and VLAN (VLAN Priority Control), RMON Counter, VLAN support and Receive-Side scaling, 2.5G TCP/IP offload (duplex) and 2.5G jumbo frames (duplex).

Below is the type of SFP/RJ45 modules used in the XGBE validation of this release.

Type	Model	Part Number
1G SFP - RJ45	BEL	SFP-1GBT-06
1G SFP - RJ45	Finisar	FCLF8521P2BTL
10G SFP+ passive direct cable	Finisar	F17CC004893
10G SFP optical	Finisar	FTLX8574D3BCL
10G SFP optical	Finisar	FTLX851D3BCL
10G SFP optical	Intel	E10G42BTDABLK
10G SFP optical	Intel	AFBR-709DMZ-IN2

FreeSync:

1. Only one monitor should be attached to system.
2. The game should be running in fullscreen mode.
3. In case of mGPU, Xorg should be configured for multiscreen mode with only one monitor attached to the GPU where freesync is to be enabled. Please note that window managers should also have good support for multiscreen mode.
4. Supported only on DP.

MultiGPU:

1. Maximum framebuffer / viewport size supported by the GFX engine is 16K. When more than 8 2K monitors are arranged horizontally, we hit this limitation and corruption is observed on a few monitors. To overcome this limitation, the monitors must be re-arranged in a way that 16K limit is not exceeded. Xrandr can be used for this.
2. Beyond 8 monitors, the display doesn't come up. Xrandr via ssh needs to be used to achieve the goal of not exceeding 16k limit.

Third Party Issues/Limitations:

1. Terminal switching results in hard hang randomly. Issue root caused gnome which is third party component.
   https://bugs.launchpad.net/ubuntu/+source/gdm3/+bug/1758512 .
2. Switching to console mode upon hotplug results in soft hang. Issue root caused gnome which is third party component.
   https://bugs.launchpad.net/ubuntu/+source/gdm3/+bug/1758512 .
3. Stutter can be observed when stream framerate and monitor refresh rate are different. This is expected phenomenon. Stutter cab be minimized with interpolation option in mpv. But it can introduce corruption and other side effects.

Troubleshoot

The user-space components are selected with the best possible availability of stable components at the time of release.

The user-space components are available to the users through open source policy. Please be adviced to upgrade the open source user-space components as per need and resolution through latest user-space.

The Embedded release for open source component is based on Ubuntu 18.04.1 distribution.

Here are a few troubleshoot pointers for resolution for non-amdgpu components.

1. In multi-GPU use-case, a monitor connected to APU doesn't come up while boot during multiscreen rendering. The monitor connect to dGPU loads correctly.
   This issue happens because of gnome desktop environment used by 18.04.1. The gnome desktop environment does not support multi-screen configuration. To fix this issue, use XFCE desktop environment.
2. dmesg points to "Bandwidth validation fails", one of the monitors gets blackout after connecting more than 2 - 4K monitors on MF
   When display load fails the bandwidth validation, there is no fallback mechanism provided through the Linux OS. Under such situation, customers can reduce the refresh rates or resolution of monitor for the getting the monitor lightup.
3. Unigine Heaven Pro shows white screen
   Follow the following steps to allow GLSL #extension directives in the middle of shaders

   1. Install driconf (sudo apt-get install driconf)
   2. Run driconf (sudo driconf)
   3. In application settings add Unigine heaven if it does not exist (application name: Unigine Heaven, Executable name: heaven_x64)
   4. Add: Allow GLSL #extension directives in the middle of shaders: Yes (using "add setting" button. You can remove all other settings if present)
   5. Retry unigine heaven

4. Suspend/Resume with and without playback
   Use systemctl suspend rather than pm-suspend.

   Below link suggests the usage of systemctl suspend.
   https://askubuntu.com/questions/1792/how-can-i-suspend-hibernate-from-command-line
   More details on why systemd is preferred over other tools
   https://wiki.archlinux.org/index.php/Systemd

12. Support

Please contact your Field Applications Engineer for support on this release.