AMD Embedded Linux Driver 2024.40 Release Notes

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Chapter 1 Overview

Note: *This Ubuntu software package shall be used for evaluation purposes only. Customers using this package in production environments or using this package for further distribution must ensure that Ubuntu license terms are adhered to. Contact your AMD FAE for more information.*

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

New features supported in this release:

- Kernel Migration to 6.6.53 LTS.
  - eSPI Rel-4 driver patch porting on new 6.6.53 kernel
  - PCI driver for SPI2 controller and SPI NAND support patches porting on new 6.6.53 kernel
- Bug Fixes

Chapter 2 Linux® Kernel Support

- 6.6.53 LTS

Chapter 3 Linux Distribution Support

- Ubuntu 24.04.1

Chapter 4 Component Versions

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

The patches present in the patches folder of this release package must be applied on top of the git commit mentioned in the following 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	6.6.53 LTS	4ad9fa5c30edc19acf05b2960dd686c29cbe75a2	*https://github.com/gregkh/linux/commits/v6.6.53/*
Libdrm	2.4.123	25dec5b91fe4d2638787d033a0b22b6c1dc145e0	*https://gitlab.freedesktop.org/mesa/drm/-/tree/libdrm-2.4.123*
Mesa	24.3.0	f1f246cfda65eff82fba3be1caf2d23bdeda60cc	*https://gitlab.freedesktop.org/mesa/mesa/-/tree/mesa-24.3.0*
Ddx	23.0.0	7025aefcdf9673665588cf291c5d71beb39cce89	*https://gitlab.freedesktop.org/xorg/driver/xf86-video-amdgpu/-/tree/xf86-video-amdgpu-23.0.0*
Wayland	1.23.1	a9fec8dd65977c57f4039ced34327204d9b9d779	*https://gitlab.freedesktop.org/wayland/wayland*
Libva	2.22.0	217da1c28336d6a7e9c0c4cb8f1c303968a675f1	*https://github.com/intel/libva.git*
LLVM	18.1.8	3b5b5c1ec4a3095ab096dd780e84d7ab81f3d7ff	*https://github.com/llvm/llvm-project*
Firmware	Main	6e4e94b02da0357ed7db03b2120b02e378c403e0	*https://git.kernel.org/pub/scm/linux/kernel/git/firmware/linux-firmware.git*
Vulkan	2024.Q4.1	8591585576634011fe9b5a049548e290ae24bc27	*https://github.com/GPUOpen-Drivers/AMDVLK/tree/v-2024.Q4.1*
Supported Applications			
LunarG Vulkan SDK	1.3.296.0	NA	*https://vulkan.lunarg.com/sdk/home#linux*
Vulkan CTS	1.3.10.0		*https://github.com/KhronosGroup/VK-GL-CTS/tree/vulkan-cts-1.3.10.0*
RGP	2.3	NA	*https://github.com/GPUOpen-Tools/radeon_gpu_profiler/tree/v2.3*

Chapter 5 Features Supported on Ryzen™ Embedded processors

Supported features are shown in the following table.

Feature Group	Feature Supported	V1500	V3000	V2000	R2000
2D	2D acceleration	NA	NA	Yes	Yes
3D	EGL 1.4, 1.5, EGL extensions.	NA	NA	Yes	Yes
	OGL 4.5, OGL 4.6	NA	NA	Yes	Yes
	GLX 1.4	NA	NA	Yes	Yes
	DRI3 support	NA	NA	Yes	Yes
	DRI3 updates (VDPAU, VAAPI)	NA	NA	Yes	Yes
	Vulkan Open Source	NA	NA	Yes	Yes
2D	10 bit Display	NA	NA	No	No
Audio	DP Audio supports for standard	NA	NA	Yes	Yes
Audio	I2S Audio	NA	NA	Yes	Yes
Display	EDID (Basic)	NA	NA	Yes	Yes
Display support	X and Desktop support	NA	NA	Yes	Yes
	Tear Free Desktop	NA	NA	Yes	Yes
	Partial support RandR 1.4 capabilities	NA	NA	Yes	Yes
	Kernel Mode Setting	NA	NA	Yes	Yes
	4K60Hz display support	NA	NA	Yes	Yes
	Multi-GPU support (see table below for dGPU pairing)	NA	NA	No	No
	Number of displays supported (see display support table below)	NA	NA	-	-
	4K cinema	NA	NA	Yes	No
	DP MST	NA	NA	Yes	Yes
	Single Large Surface (SLS)	NA	NA	Yes	No
Play back	Play back support MPV player using VAAPI / VDPAU	NA	NA	Yes	Yes
	Play back support for Gstreamer using VAAPI, gstomx (not recommended)	NA	NA	Yes	Yes
	1080p 24fps, 30 fps and 60fps video play back	NA	NA	Yes	Yes
	4k 30fps video play back	NA	NA	Yes	Yes
	4k 60fps video play back	NA	NA	Yes	Yes
Power Management	Power Play support to re-clock	NA	NA	Yes	Yes

Feature Group	Feature Supported	V1500	V3000	V2000	R2000
	Initial GPU reset support	NA	NA	Yes	Yes
	Power Play sysfs interface for manually selecting clock speeds	NA	NA	NA	Yes
	S3	Yes	Yes	Yes	Yes
	S5	Yes	Yes	Yes	Yes
VDPAU Post Processing	Deinterlace	NA	NA	Yes	Yes
VDPAU Post Processing	Edge Enhancement	NA	NA	Yes	Yes
VAAPI Postprocessing	Deinterlace	NA	NA	Yes	Yes
Transcode	4k Encode	NA	NA	Yes	No
Video Quality	Scaling and color space conversion (CSC)	NA	NA	Yes	Yes
	Pull down detection and Deinterlacing	NA	NA	Yes	Yes
	Support for software scaling	NA	NA	Yes	Yes
	Support for hardware scaling	NA	NA	No	Yes
	10-bit Decode with 10-bit render	NA	NA	NA	Yes
Compute	OpenCL	NA	NA	No	No
dGMA –OpenGL		NA	NA	Yes	NA
dGMA - OpenCL		NA	NA	No	NA
fTPM		Yes*	Yes	Yes	Yes
RJ45-10G-Base-T (Marvell PHY)	10M	Yes*	Yes	NA	NA
	100M	Yes*	Yes	NA	NA
	1G	Yes*	Yes	NA	NA
	2.5G	No	Yes	NA	NA
	10G	Yes*	Yes	NA	NA
SFP+ (connector)	10M	No	Yes	NA	NA
	100M	No	Yes	NA	NA
	1G	Yes*	Yes	NA	NA
	10GBASE_KR [AN=OFF, ON]	NA	Yes	NA	NA
	2.5G [AN=OFF]	NA	Yes	NA	NA
	10G	Yes*	Yes	NA	NA
AIC1 – Inphi CS4223 Optical Fiber PHY (SFP+)	10M/100M/1G/10G	NA	Yes	NA	NA
AIC1 – TI DS125 Series Re-Timer (SFP+)	10M/100M/1G/10G	NA	Yes	NA	NA
AIC2 – 1G-Base-T (Marvell 88E1512P)	10M/100M /1G	NA	Yes	NA	NA
AIC2 – 10G-Base-T (Marvell AQR113C)	10M/100M/1G/2.5G/10G	NA	Yes	NA	NA

Feature Group	Feature Supported	V1500	V3000	V2000	R2000
AIC3 – 1G-Base-T (Broadcom BCM54220)	10M/100M /1G	NA	Yes	NA	NA
AIC3 – 10G-Base-T (Broadcom BCM84892)	100M/1G/2.5G/10G	NA	Yes	NA	NA
eMMC	BC	Yes	No	Yes	Yes
	HS200	Yes	No	Yes	Yes
	HS400	Yes	No	Yes	Yes
	(USB/PCIe to eMMC bridge)	No	Yes	No	No
SD Card	SD UHS I – SDR50	Yes	No	Yes	Yes
	SD UHS I – SDR104	Yes	No	Yes	Yes
	SD UHS I – SDR104	Yes	No	Yes	Yes
Peripherals (I/O)	I2C	Yes	Yes	Yes	Yes
	USB	Yes	Yes	Yes	Yes
	USB 4.0	No	Yes	No	No
	SATA	Yes	Yes	Yes	Yes
	UART	Yes	Yes	Yes	Yes
	WDT	Yes	Yes	Yes	Yes
	SMBUS	Yes	Yes	Yes	Yes
	SPI Kernel Driver	Yes**	Yes**	Yes**	Yes**
	eSPI	No	Yes	No	No

*****Bilby platform only

******To use the SPI kernel driver on Bilby/Fox platforms, the BIOS which has enabled SPI Entry in the ACPI table is required. The default BIOS does not have this feature. Please contact your FAE for the required BIOS.

Chapter 6 Features Supported on Ryzen™ Embedded processors with iGPU

The 2024.40 Linux driver is **not supported** by any AMD Embedded dGPUs.

HW codec and display support is only applicable to Ryzen Embedded processors with integrated graphics.

6.1 Display Support:

Platform	**Max Number of external 4K display(s)**	
R2000	R2312 R2314 R2514	3
	R2544	4
V2000	4	
V1500	NA	
V3000	NA	

6.2 HW Codec Support

Codec	API	Middleware/Framework
H.264 decode	VAAPI	ffmpeg-VAAPI, gst-VAAPI
H.265 decode	VAAPI	ffmpeg-VAAPI, gst-VAAPI
MPEG2 decode	VAAPI	ffmpeg- VAAPI, gst-VAAPI
VC1 decode	VAAPI	ffmpeg- VAAPI, gst- VAAPI
H.264 encode	VAAPI	gst-VAAPI
VP9 decode	VAAPI	Ffmpeg-VAAPI

Chapter 7 Platforms Supported

Embedded SoC Version	Models/OPN's	AMD Customer Reference board
Ryzen Embedded **V3000** Series	V3C48, V3C44, V3C18I, V3C18, V3C16, V3C14, V3G18i, V3G48	FOX
Ryzen Embedded **V2000** Series with AMD Radeon Graphics	V2748, V2546, V2718, V2516	CELADON
Ryzen Embedded **V1500**	YE1500C4T4MFH, YE1500C4T4MFB	BILBY
Ryzen Embedded **R2000** Series with AMD Radeon Graphics	R2314, R2312, R2514, R2544	BILBY

Chapter 8 Tested Platform Configurations

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

V3000 Series	
CPU	V3000
OPNs	Latest Revision: AIC1; AIC2 ; AIC3; B1-DVT Sampels: V3C48;V3C18i;V3C44; V3C14; V3C16;V3C18, V3G18i, V3G48;
Board Type	Fox, Direct Mount
TDP	V3C48 (8-core 45W CPU) V3C44 (4-core 45W CPU) V3C18I (8-core 15W CPU extended temperature) V3C18 (8-core 15W CPU) V3C16 (6-core 15W CPU) V3C14 (4-core 15W CPU) V3G18I (8-core 15W CPU) V3G48 (8-core 45W CPU)
BIOS version	RFX100CB (Insyde) RFE1008A (EDKII)
Memory (DDR5)	2x16 GB [Direct Mount]
DIMMs	DDR5, 4800 MT/s
Storage disk	Samsung M.2 NVME 500 Gb and SATA SSD Crucial 250 Gb
Ethernet connectors	• 10G SFI Optical: Finisar (FTLX8574D3BCV and FTLX8574D3BCL), Intel (FTLX8574D3BCV-IT) • 10G Optical DAC: Fiberstore (SFPP-A020) • 10G KR (Backplane): Molex DAC cable (747521101) and AMPHENOL SFP DAC CABLE (571540002) • 1G Bel SFP [SFP-1GBT-06] and Finisar [FCLF8520P2BTL]

V1500	
CPU	V1500
OPNs	YE1500C4T4MFH, YE1500C4T4MFB
TDP	16-25W
BIOS version	RBB120EA_RV_PCO
RAM	16GB (2x8GB DDR4 2400)
Storage disk	M.2 SATA

V2000	
APU	V2000
APU TDP	10-25W, 35-54W
BIOS version	RCO100BA
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	SSD, M.2

R2000 Series	
APU	R2000
APU TDP	12-25W (R2312), 12-35W (R2314, R2514), 35-54W (R2514)
BIOS version	RBP1004A
VRAM setting	4GB
RAM	16GB
Display Convertors / Dongles Used	DP to HDMI, HDMI
Storage disk	SSD, M.2

Chapter 9 Issues Fixed

V3000 Issues:

1. SPI NAND Write speed improved to 3.5 Mb/s by enabling HID2 DMA support
2. Support for I2C SDA line stuck low issue

Chapter 10 Known Issues/Limitations

Generic Issues

1. SW installation time increased due to transition from Debian(install.sh) installation to source build(rbh.sh) installation.

Steps	Time Taken				
	R2000	V2000	V1000/R1000	V1500P	V3000
sudo ./rbh.sh --prep kernel_source 2>&1 | tee rbh_prepkernel.log	4m 51s	2m 54s	4m 12s	3m	2m 32s
sudo ./rbh.sh --build kernel_source 2>&1 | tee rbh_buildkernel.log	55m 35s	23m 11s	47m 52s	1hr 16m 2s	29m 47s
sudo ./rbh.sh --buildall 2>&1 | tee rbh_buildall.log	55m 33s	32m 26s	49m 9s	1hr 20m 40s	32m 22s
sudo ./rbh.sh --postinstall 2>&1 | tee rbh_postinstall.log	8s	7s	8s	9s	8s
Total Time taken	1hr 56m 7s	58m 38s	1hr 41m 13s	2hr 39m 51s	1hr 4m 49s

V3000 Issues:

1. Use Ethernet DAC cable of length <= 5 meters.
2. V3000 is cpu variant, so make sure to add “nomodeset” in grub param
3. V3000 need to use in headless mode. If display is needed, then use E9175 dGPU
4. UART provisioned for 1 x4 wire and 4 x2 wire modes only
5. On Fox RJ45 and 2.5G or 1G speed selection in BIOS, hot-plug and hot-insert of cable always triggering speed switching to 10G. Issue specific to V3C18i OPN.
6. Ethernet stability issues
   a. AIC1 InPhi Phy 10G link stability issue in P2P mode only; mitigating with switch as link partner instead of another Fox
   b. Link detection issues on SFP Port 0/1 for 1G speed with FS copper module (SFP-GB-GE-T 1000BASE-T) with Cat 5 UTP cable

   c. Link up failure issue after S3 on SFP+ Connector, with 1G/100M/10M as speed and 1G Bel modules connected on both the ports
   d. Link up issues after S3 on AIC2-1G-BaseT phy ports
   e. AIC3 BCM 10G phy has link stability issues for 100M/2.5G/1G speed modes, when using "ifconfig <i/f> down" command
      i. For any BCM related phy issues, get in touch with BCM support
   f. AIC3 Link up success but fails to get DHCP IP for 100M speed with 10G PHY
   g. Randomly link up will fail on Inphi Phy 10G SFP+ (DAC/Optical) module Hot Plug and unplug multiple times.
   h. With 10G KR AN ON sometimes link up takes very long time.
7. Refer "FOX Platform User Guide (ID: 57102)" from *https://devhub.amd.com/reference-platform/fox/* for USB-C J60 port, RJ45, AIC1, AIC2 and AIC3 rework details
8. Macronix spinand chip write fails with HID2 DMA support. (Working with Winbond spinand).

V1500 Issues:

1. Less throughput with 10G SFP+ ethernet port interfaces issue when both ports (Port-0 and Port-1) simultaneously executing iperf3 in bidirectional mode.

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 Microsoft Teams® video conference, PPT, browser on 3x4k display configuration.
4. Stutter and lag observed with 4k videoplay back with thin client config.
5. Stutter observed at times on secondary displays with 3x4k config.
6. One of the displays goes blank after boot with 3xTrue 2K MST configuration.
7. Sporadically Type C to Type C Hot plug fails.
8. Minor stutter observed at times with vaapi playback with MST-4K@30hz.
9. VP9 Codec is not supported

Common Issues:

1. Few of the display blank out with MST hub in 5.4 kernel.
2. Failures are observed while running Vulkan CTS-1.3.2.0.
3. 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.
4. 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.
5. All MST displays goes blank while booting with MST Hub and MST off on the monitors.
6. Tearing/Stutter observed during 4k@60fps playback on 2x4k monitors.

Workaround: Use zaphord Head configuration to play 4k@60fps video on multi monitor setup.

7. Hard hang observed for Piglit tests.
   Workaround: Piglit test passed without arb_tessellation_shader-tes-gs-max-output test cases.
8. Issues with refresh rate change/rotate using xrandr command.
9. Export MESA_GLES_VERSION_OVERRIDE=3.2 to run OGL ES 3.2 CTS.
10. Hot plug results in blank display of one of the monitors when using startx mode.
11. B-frame support is not available in vaapi encode.
12. Observed Test failures while running OGL CTS(v 4.6)

XGBE:

1. [XGBE]: Force mode(Auto negotiation disabled) is not supported in RJ45.
2. Can’t concurrently enable SFP+ and RJ45 interfaces.
3. No receive Split header support.

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
10G SFP+ DAC 1m	Finisar	SFPP-PC01
10G SFP optical	Intel	AFBR-709DMZ-IN3

Chapter 11 Support

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