Metis Compute Board Release Notes

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Document revision history

Revision	Date	Description
1 – PRELIMINARY	2025-10-29	First Issue
2- PRELIMINARY	2025-12-10	Added release 1.3.1 which includes cumulative changes since release 1.2.2.
3- PRELIMINARY	2026-05-05	Added release 1.3.3 which includes cumulative changes since release 1.3.1

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1 Release Description

This **v1.3.3** release builds on v1.3.1 with continued maturation of the Metis Compute Board BSP. It introduces parallel mainline kernel and bootloader support, hardware-specific fixes for HDMI and power management, an updated Metis driver, and groundwork for direct integration of the voyager-sdk into the BSP. Key highlights include:

- Parallel mainline Linux and U-Boot support, complementing the existing downstream kernel path.
- HDMI output enabled in both kernel and bootloader.
- Resolved shutdown reliability issues across both kernel paths.
- Updated Metis driver (v1.6.0) sourced from the public repository.
- GPU governor tuned for stable 4K display performance.
- Audio-over-HDMI multimedia path retained; OpenCV integration deferred pending container compatibility work.
- Preparatory dependencies added for upcoming voyager-sdk integration.

For detailed product specifications and documentation, visit the Metis Compute Board page.

1.1 Release Qualification

This is a production-ready release of the BSP.

1.2 System Components

This release delivers an updated software stack designed to enhance system stability, performance, and hardware compatibility. The following components have been refreshed or introduced as part of this update

Kernel Version	Linux antelao-3588 6.1.148- rockchip-standard
Operating System	Yocto based Linux Voyager Linux 1.3.3 (jenkins_258)
Peripheral Drivers	Metis version 1.6.0
Pre-installed utilities	Winograd, Wireguard VPN, nmcli, fio, strace, pciutils, i2c-tools, mesa-demos, modetest

1.3 Release 1.3.3 Cumulative Changes

Key improvements:

- Hardware enablement – HDMI output added; shutdown behaviour corrected on both kernel paths.
- Updated Metis driver – moved to v1.6.0, now sourced from the public repository at https://github.com/axelera-ai-hub/axelera-driver.
- Display performance – GPU governor switched to performance for stable 60fps at 4K resolution.
- Diagnostics – expanded debugging toolset for hardware bring-up and graphics testing.

1.3.1 Release 1.3.3 (detailed)

System & Distro Configuration

- Updated distribution version to v1.3.3.
- Forced systemd as the default init manager for voyager-minimal images.
- Added security to DISTRO_FEATURES to align with the previously integrated meta-security layer.
- Renamed the generic Axelera machine override from axelera-device to axelera-machine to avoid a naming collision with the upcoming axelera-device BitBake package from the voyager-sdk.

Kernel & Drivers

- Introduced linux-axelera-mainline, bumped through 6.19.10 to the official v7.0 release. Provided in parallel to the existing linux-rockchip 6.1.148 downstream kernel.
- Resolved a shutdown regression on the downstream 6.1.148 kernel where the board's fan and LEDs remained powered after Linux had halted; the PMIC now correctly cuts power on shutdown.
- Resolved a separate shutdown issue on the mainline path by adding system-power-controller; to the rk806 PMIC node in the device tree, ensuring the bootloader and kernel device trees remain consistent.
- Updated the Metis kernel driver to v1.6.0, now fetched from the public repository.
- Added a kernel update that resolves TDMS-mode log spam.
- Inherited the kernel-yocto class so that Axelera-specific .cfg fragments are correctly applied to the kernel configuration rather than merely included in the source directory.
- Dropped legacy 5.10 kernel packages and unused downstream patches.

Bootloader

- Added mainline U-Boot recipe, bumped through 2026.01 to 2026.04.
- Aligned the axe-sbc device tree in U-Boot with the kernel device tree and with the board schematic; removed an untested fusb node that had drifted between the two.

Hardware Support

- Added HDMI support patches to both the kernel and U-Boot.
- Added device tree updates aligning the board configuration with the production schematic.

Graphics & Multimedia

- Switched the Mali GPU devfreq governor from simple-ondemand to performance, allowing a stable 60fps under OpenGL acceleration on 4K displays.
- Disabled Vulkan support in line with the Rockchip Yocto BSP recommendation; correspondingly removed the Vulkan mount from the container startup script to prevent container launch failures.
- Removed deprecated Wayland configuration; xwayland=true is now the only setting required.
- OpenCV support in GStreamer was introduced and subsequently withdrawn in this release cycle, as libgstopencv was found to break container functionality. The OpenCV dnn module remains available outside the GStreamer pipeline.

Voyager-SDK Preparatory Dependencies

- Added simde recipe, required by the voyager-sdk and runtime.
- Added libzip, with a compatibility shim from the Yocto-provided v5 to the v4 ABI expected by the SDK.
- Added the meta-qt6 layer to the kas configuration, required by the axelera-runtime.
- Enabled the OpenCV dnn module for deep neural network support.

Tools & Utilities

- Added strace, pciutils, and i2c-tools to the minimal image to aid hardware bring-up and debugging.
- Added mesa-demos (including glxgears and gears_x11) to support GLX/EGL testing.
- Installed modetest to enable graphics-subsystem testing under labgrid.

1.4 Previous Changes

1.4.1 Release 1.3.1

Aligned drivers to the latest SDK; improved system reliability and PCI handling; enhanced USB stability; added audio-over-HDMI and new benchmarking tools; optimized the partition scheme and removed unused components; updated bootloader and partition layout; added support for new RTC hardware; updated kernel and Metis driver; prepared security features via meta-security integration; delivered maintenance fixes/optimizations for OTA reliability, image generation, and bootloader configuration; included minor security and CI enhancements.

Key improvements:

- USB performance improvement – resolved previous speed issues for SuperSpeed devices.
- Multimedia improvements – added audio-over-HDMI support via ALSA and GStreamer.
- Enhanced Metis driver – aligned with latest SDK for better PCI stability.
- Benchmarking tools – introduced Flexible I/O Tester (fio) for storage performance testing.
- Security & reliability – strengthened system services and prepared for future security integration.

System & Distro Configuration

- Updated distribution version to v1.3.1
- Improved system reliability by ensuring pstore service waits for /var/lib volatile mount before execution.
- Added meta-security layer for future security enforcement and antivirus integration.
- Temporarily removed ClamAV from image for release readiness.
- Added Git hash to `/etc/os-release` for traceability.
- Ensured reproducible builds by disabling stamp caching for `os-release`.

Kernel & Drivers

- Aligned Metis driver with SDK 1.5.0, ensuring consistent PCI reset handling across supported configurations.
- Updated PCI device check script for broader compatibility.
- Adjusted U-Boot environment and Mender configuration for consistent operation across configurations.
- Fixed CPU stall issue in `linux-rockchip` by updating kernel SRCREV.

Testing & Diagnostics

- Disabled USB autosuspend via udev rules to resolve SuperSpeed USB enumeration issues on cascaded controllers.

Tools & Utilities

- Added Flexible I/O Tester (fio) for SATA performance benchmarking.
- Added `stress-ng` to the testing toolset.
- Added `iperf3` for network performance testing.
- Added `axelera-device` machine override for simplified `.bbappend` handling.

Audio & Multimedia

- Introduced ALSA utilities and enabled GStreamer plugins with ALSA support, enabling audio-over-HDMI testing.

Bootloader & Partitioning

- Optimized partition scheme for compatibility across supported boards.
- Removed unused trust partition from WKS file to prevent ambiguous behavior during image generation.
- Moved U-Boot environment to a dedicated partition with fixed size and position.
- Added support for boot_a and boot_b partitions in U-Boot and WIC layout.
- Implemented post-update script to flash boot.img into boot partition for compatibility with Rockchip boot process during Mender updates.
- Adjusted U-Boot SRC_URI alignment for consistency.
- Updated env_mender to optimize boot strategy using booting_android and bootm.

Android Tools

- Updated `android-tools` to fetch correct ADB ID using `cpuinfo`.
- Added `android-gadget-setup` for device serial identification.

1.4.2 Release 1.2.1

NOTE:

Required Update Path (BSP 1.2 → BSP 1.3)

Customers must perform a physical update over USB by connecting the SBC to a host system and flashing directly via USB.

OTA cannot be used for this transition.

A maintenance release focused on bug fixes and incremental improvements to Mender workflows, partition handling, and overlayfs stability. Includes minor adjustments to CI reporting and container behavior.

Distro & User Environment

- Updated `DISTRO_VERSION` to `v1.2.1`.
- Exported additional system paths (`/sbin`, `/usr/sbin`) to all users.
- Updated `voyager-users.bbclass` to set consistent `PATH` for all users:
    - `/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin`

1.4.3 Release 1.2.0

Delivers a significant architectural shift with read-only rootfs, full Mender OTA integration, and new partitioning for factory and data persistence. Includes kernel upgrades, U-Boot consolidation, overlayfs support, CI improvements, Docker integration, and additional tools for stress and USB performance testing.

Distro & Versioning

- Bumped distro to `v1.2.0` (final) and intermediate tags (`rc1`–`rc4`) for development cycle.
- Added BSP version to image filenames.
- Introduced `cve-extra-exclusions` file documenting CVEs deemed impractical to resolve.

Kernel & Drivers

- Upgraded `linux-rockchip` kernel to `v6.1.148`.
- Fixed DTS Makefile typo.
- Updated `kernel-modules` to `v1.4.0-rc2` for Metis driver improvements.
- Updated CVE exclusion list to latest from Nanbield.

Bootloader (U-Boot)

- Added redundant environment and enlarged `fw_env.config` for Mender.
- Patched U-Boot to use device paths instead of UUIDs.
- Organized patches into board-specific directories.

Filesystem & Partitioning

- Transitioned rootfs to read-only.
- Updated `fstab` entries from `rw` to `ro`.
- Added overlayfs support for `/home` and `/etc`.
- Added factory and data partitions:
- Factory: persistent files (SSH keys, calibration data).
- Data: mutable storage and Mender updates.
- Adjusted WKS and Rockchip image handling:
    - Shortened partition names.
    - Ensured ext4 format and proper alignment.
- Removed obsolete `auto-extend-partition` recipe.
- Added preinit script to handle overlayfs edge cases.

Mender OTA Integration

- Added full Mender support:
    - `mender.inc`, `mender-config.inc`, and U-Boot integration.
    - Redundant rootfs for A/B updates.
- Added recipes:
    - `mender-files-setup`

    - `mender-commit-check`
- Customized `mender-systemd-growfs-data.service` to wait for udev settle.

Image & User Management

- Removed base `voyager-image`; maintained `voyager-image-weston`.
- Simplified user handling:
    - Moved logic to `voyager-users.bbclass`.
    - Unified Weston service file using global `WESTON_USER`.
- Simplified `EXTRA_USER_PARAMS`.

Graphics & GUI

- Fixed GPU variant for RK3588 (`MALI_VERSION=g13p0`) to support OpenCL 3.x.
- Added X11 forwarding in `sshd_config`.
- Weston service improvements:
    - Single service file for all boards.
    - Group permissions updated to `axelera`.

CI & Build Infrastructure

- Updated `meta-mend`:
    - Removed Java dependency.
    - Enabled PDF report generation via asynchronous API.
- Added `WS_ENABLE_PDF_REPORT` for CI artifact archiving.
- Added signer for `meta-arm` and switched to signed tag `yocto-4.0.6`.

Tools & Utilities

- Added `stress-ng` for memory performance testing.
- Added `u3loop` tool and suite for USB 3.0 benchmarking.
- Reintroduced package manager support for targeted driver updates.

Docker Integration

- Configured Docker to use `/data/docker` for container storage.
- Added `docker.service` with dependency on `data.mount`.
- Updated `daemon.json` for custom data root.

Security & SSH

- Moved SSH keys to `/factory/ssh` for persistence.
- Fixed read-only configuration issues in OpenSSH:
    - Switched to `sshd.socket`.
    - Linked `sshd_config_readonly` to `sshd_config`.

1.4.4 *Release 1.1.0*

Introduces major updates across the Voyager Linux platform, including new filesystem utilities, terminal enhancements with xfce4-terminal, kernel and driver updates, container workflow improvements, and integration of CVE scanning via meta-mend. Also adds networking tools, user credential changes, and Weston configuration refinements.

System & Distro Configuration

- Updated `DISTRO_VERSION` to `1.1.0` and ensured it reflects the latest tagged release in system metadata (`/etc/os-release`).
- Added BSP version to image filenames for traceability.
- Integrated `meta-mend` for CVE scanning and PDF report generation.
- Added support for CVE exclusions via `cve-extra-exclusions`.

Image & Filesystem Enhancements

- Added full `gzip` package (with `zgrep`) and `mkfs.ext4` via `e2fsprogs-mke2fs`.
- Added GNU `tar` for full archive support.
- Removed `auto-extend-partition` recipe (superseded by Mender).
- Added support for fixed-size rootfs and factory partition sizing.
- Added `overlayfs` as a distro feature.
- Updated Weston configuration to use `xterm-256color` for high-color support.

User Interface & Terminal

- Replaced `weston-terminal` with `xfce4-terminal` to support 24-bit color.
- Added `meta-xfce` layer and dependencies.
- Set default encoding of `xfce4-terminal` to UTF-8.

Kernel & Modules

- Upgraded to Linux kernel `v6.1.148`.
- Metis driver supports SDK `v1.4.0-rc2`.
- Addressed race conditions and IRQ threading for MSI mode.

Networking

- Added `networkmanager` and `nmcli`.
- Added `wireguard` tools and required kernel configurations.

User & Access Configuration

- Set root password to `AxeRoot2025`.
- Updated user passwords:
  - `antelao`: AxeAntelao2025
- Unified Weston service file using `${WESTON_USER}` variable.

- Ensured Weston runs under main platform user

Testing & Diagnostics

- Added support for `testusb` tool.
- Added `u3loop` tool and suite for USB 3.0 loopback benchmarking.
- Added `stress-ng` for memory performance evaluation.

Container & CI Integration

- Refactored `start_axelera.py` for better UX, error handling, and display detection.
- Enabled container version selection.
- Removed unnecessary mounts (`voyager-sdk`, `/dev/mali0`).
- Added persistent `shared` directory for host-container data exchange.
- Injected `JENKINS_BUILD_ID` into environment for traceability.
- Moved Mend variables to environment for CI override.
- Updated `meta-mend` SHA256 handling for optional builds.

Bootloader & U-Boot

- Added redundant rootfs support for A/B updates.
- Patched U-Boot to use device paths instead of UUIDs.
- Updated `fw_env.config` for compatibility across boards.

System Services & Init

- Fixed PCIe rescan scripting (removed `sudo` dependency).
- Mitigated `/var/tmp` type mismatch issue.
- Improved overlay mount handling for `/etc` and `/home`.
- Dropped `setup-directories` due to circular dependencies; replaced with post-processing.

1.5 Known Issues

1.5.1 Release v1.3.3

- **Resolved**: Show stats not working with inference.py.
- Video output may exhibit reduced frame rates under certain conditions.

1.5.2 Release v1.3.1

- **Resolved**: USB ports near power connector not functioning at full speed (addressed by USB autosuspend workaround in 1.3.1-rc0).
- Show stats not working with inference.py.

1.5.3 Release v1.2.2

- Show stats not working with inference.py
- USB ports (1) and (2) close to the power connector not functioning at full speed

1.6 Support

For further information and support please visit:

- **Axelera AI Docs Portal**: https://docs.axelera.ai
- **Axelera AI Community**: https://community.axelera.ai
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