



ANDROID CUSTOM OPERATING SYSTEMS

The hidden operating systems investigators need to understand

An Android handset may look familiar while running software that is fundamentally different from the manufacturer’s original operating system. For investigators, identifying the installed OS can be as important as identifying the device itself.

What is a custom ROM?

A custom ROM is an alternative operating-system build installed in place of, or alongside, a device’s stock Android software. Some are designed around privacy and security; others prioritise customisation, performance, longer device support or independence from Google services. Not every alternative OS is Android-based.

The most operating systems

PLATFORM	INVESTIGATIVE SIGNIFICANCE
GrapheneOS	Security-hardened Android, supported on selected Pixel devices. Offers strong app sandboxing and configurable Google Play compatibility.
LineageOS	Broad device support and a stock-like Android experience. Some Google apps may be absent or installed separately.
CalyxOS / /e/OS	Privacy-oriented Android alternatives that can reduce dependence on Google services; configurations vary.
crDroid / DerpFest	Feature-rich Android derivatives with extensive customisation. Forensic behaviour depends on build, device and security patch level.
Sailfish OS / Ubuntu Touch	Alternative mobile operating systems; application ecosystems and data storage differ from conventional Android.

Why do people install them?

Reasons include privacy, reduced tracking, control over permissions, removal of pre-installed software, extending older hardware’s life and experimenting with new features. Installation alone is not evidence of criminality.



What changes for an investigator?

- Standard forensic extraction support may be limited, inconsistent or absent.
- Device encryption, locked bootloaders, secure boot and user profiles can affect lawful access.
- App availability, backup locations, cloud synchronisation and Google account artefacts may differ.
- An unlocked bootloader does not automatically mean user data is accessible; unlocking can erase data.

A practical approach to recognising and documenting alternative mobile operating systems.

Initial examination: record before interacting

- Photograph the device, lock screen, visible notifications and any OS or boot branding.
- Document the make, model, apparent OS, build number, Android security patch level and any observed bootloader warnings.
- Record date, time, network state, power state, SIM/eSIM details and visible connected peripherals.
- Preserve the device in accordance with current legal authority, organisational policy and specialist advice; avoid speculative rebooting or unlocking.

Investigative opportunities

Consider associated cloud accounts, synced services, messaging platforms, browser profiles, removable storage, local backups and connected computers. Network, provider and account records may offer independent corroboration where direct handset extraction is not feasible. Attribute accounts and activity using multiple sources rather than relying on a device name or IP address alone.

Common assumptions to avoid

- “Android” does not guarantee that a conventional Android forensic workflow will work.
- Absence of Google services does not prove absence of cloud data.
- A privacy-focused ROM does not necessarily provide anonymity.
- The ROM name alone cannot establish what data is retained or recoverable.



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1. Privacy and security-focused ROMs

ROM / OS	Main characteristics
GrapheneOS	Security-hardened Android, sandboxed Google Play, isolated profiles and enhanced USB protections.
CalyxOS	Privacy-focused Android, microG support and application firewall.
/e/OS	De-Google'd Android with microG and alternative cloud services.
iodéOS	Privacy-focused Android with tracker and network filtering.
LineageOS	Open-source Android with broad device support and optional Google services.
CopperheadOS	Security-focused Android distribution.
DivestOS	Former privacy and security-focused Android project; discontinued.
Replicant	Free-software Android distribution with limited hardware compatibility.

These systems differ considerably in security design, Google integration, device support and update policies.

2. Alternative Linux mobile operating systems

These are not conventional Android custom ROMs, but investigators may encounter them on smartphones.

Operating system	Main characteristics
Sailfish OS	Linux mobile operating system with optional Android application support.
Ubuntu Touch	Ubuntu-based mobile OS, Lomiri interface and optional Waydroid.
postmarketOS	Linux distribution targeting smartphones and other devices.
Mobian	Debian-based mobile Linux distribution.
PureOS	Privacy-oriented GNU/Linux used on compatible mobile hardware.
Plasma Mobile	Linux mobile interface used with compatible distributions.



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3. Customisation and performance ROMs

ROM	Main characteristics
crDroid	Extensive customisation and performance controls.
DerpFest	Pixel-style Android with additional settings.
Evolution X	Pixel-style experience with customisation.
PixelOS	Google Pixel-style interface and features.
Pixel Experience	Pixel-style Android; discontinued project.
ArrowOS	Minimalist Android experience.
RisingOS	Extensive interface customisation.
BlissRoms	Customisation across multiple supported devices.
Havoc OS	Additional interface and system controls.
Resurrection Remix	Extensive customisation; primarily historical.
AOSP Extended	Additional features beyond stock Android.
OmniROM	Independent Android aftermarket distribution.
Paranoid Android	Custom Android interface and system features.
Project Elixir	Pixel-inspired Android customisation.
Project Matrixx	Customisable Android distribution.
SuperiorOS	Additional customisation and interface options.
AlphaDroid	LineageOS-based customisation.
SparkOS	AOSP-based custom ROM.
Project Infinity X	Extensive customisation.
AxionAOSP	Minimalist, performance-oriented Android.
Corvus OS	Gaming-oriented customisation.
Nitrogen OS	Android customisation and performance.
Syberia OS	Additional Android system features.
Cherish OS	Customisable Android experience.
CarbonROM	Android aftermarket firmware.
DotOS	Interface design and customisation.

Some are actively maintained, while others have limited or historical builds. Availability must be checked against the exact handset.

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