

Keeping Your Android Secure and Snappy

Exploring GrapheneOS and LineageOS

Speaker: Roller Angel Date: Tuesday, November 11, 2025 @ 6:30 PM EDT



Who Am I?

System administrator and open source enthusiast

Modding Android since 2009 (Motorola Droid era)

Currently using GrapheneOS on Pixel 8

Passionate about digital privacy and security

Python developer and FreeBSD/Linux SysAdmin



Why Custom ROMs Matter

The Problems with Stock Android

Bloatware: Pre-installed apps you can't remove

Privacy concerns: Tracking and data collection

Short support cycles: 2-3 years then abandoned

Vendor lock-in: Forced updates, unwanted features

Performance degradation: Devices slow down over time

E-waste: Perfectly good hardware becomes obsolete



Android Open Source Project (AOSP)

The Foundation of Custom ROMs

What is AOSP?

Open-source base of Android

Released by Google under Apache 2.0 license

Free to modify and distribute

No Google services or proprietary code

Custom ROMs = AOSP + Community Enhancements

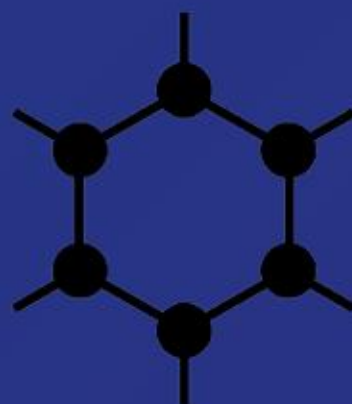
Think of AOSP as the Linux kernel - it's the foundation everyone builds upon.



GrapheneOS

Security-Hardened Android

Open-source mobile OS based on AOSP. Focused on privacy and security. Substantially hardened against exploitation. Compatible with Android apps. Supports sandboxed Google Play Services.



GrapheneOS Security Features

Hardened kernel with memory protection

Enhanced app sandboxing

Per-app network & sensor permissions

Auto-reboot when unlocked too long

Verified boot with custom keys

No Google by default (optional sandboxed Play)



GrapheneOS Device Support

Google Pixels Only

Currently Supported: Pixel 5 and newer (5, 5a, 6, 6a, 6 Pro, 7, 7a, 7 Pro, 8, 8 Pro, 9, 9 Pro)

Why only Pixels? • Strong hardware security features (Titan M chip) • Verified boot support • Long-term security updates from Google • Easily unlockable bootloader • Best documentation and tooling

Extended support: Devices supported beyond Google's timeline



GrapheneOS Trade-offs

What You Give Up

Limited device support: Pixels only

App compatibility: Most apps work, some require Play Services

Banking apps: May not work without sandboxed Play

Google Pay: Doesn't work (SafetyNet/Play Integrity fails)

Convenience features: Less hand-holding, more manual configuration

Learning curve: Security features require understanding

Security and convenience are often at odds. GrapheneOS chooses security.



Who Should Use GrapheneOS?

Recommended for:

Privacy-conscious users: Want minimal data collection

Security professionals: Need hardened mobile OS

High-risk users: Journalists, activists, whistleblowers

Tech enthusiasts: Comfortable with trade-offs

Android purists: Want clean, bloat-free experience

Not recommended for:

Users who need Google Pay

Heavy mobile gamers (some games don't work)

Those who can't troubleshoot issues

Non-Pixel owners (use LineageOS instead)



LineageOS

Android for Everyone

Free and open-source Android distribution. Successor to CyanogenMod (the OG custom ROM). Focuses on user control and customization. Removes bloatware and tracking. Supports 190+ devices officially.



LineageOS Features

No bloatware - clean AOSP base

Privacy Guard for granular permissions

Optional built-in root access

Theme engine for customization

Performance profiles (battery/balanced/performance)

Monthly security patches

microG support (Google Play alternative)



LineageOS Device Support

190+ Officially Supported Devices

Manufacturers: Samsung, Google, OnePlus, Xiaomi, Motorola, Sony, Asus, and more

Device age: Some devices from 2015 still supported

Requirements: Unlockable bootloader, available device tree

Official vs unofficial: Unofficial builds available for 1000+ devices

Check support: wiki.lineageos.org/devices



LineageOS Trade-offs

The Reality Check

Security: Not as hardened as GrapheneOS

SafetyNet: Often fails (no Google Pay, some banking apps)

Camera quality: May be worse than stock ROM

OEM features: Lose manufacturer-specific features

Warranty: Voids warranty (usually)

Maintainer-dependent: Support quality varies by device

Installation complexity: Requires technical knowledge



Who Should Use LineageOS?

Recommended for:

Device longevity: Extend life of older devices

Customization fans: Want to tweak everything

De-Googleers: Want Google-free Android

Bloatware haters: Sick of pre-installed junk

Tinkerers: Enjoy modding and experimenting

Non-Pixel owners: Want custom ROM but don't have Pixel

Not recommended for:

Users who want it "just to work"

Those who need cutting-edge security

Heavy camera users (on some devices)

Anyone afraid of voiding warranty



GrapheneOS vs LineageOS

Side-by-Side Comparison

Feature	GrapheneOS	LineageOS
Primary Focus	Security	Customization
Device Support	Pixels only	190+ devices
Security Hardening	Extensive	Minimal
App Compatibility	Excellent	Excellent
Google Play Services	Sandboxed	Via microG
Root Access	Not recommended	Built-in option
Customization	Limited	Extensive
Learning Curve	Steep	Moderate
Community Size	Smaller, focused	Large, diverse
Update Frequency	Rapid	Monthly

Security Comparison

Beyond the Basics

Stock Android:

- Baseline security (good but not great)
- Vendor bloatware may contain vulnerabilities
- Updates slow and limited

LineageOS:

- Removes bloatware (reduces attack surface)
- Monthly security patches
- Minimal security hardening

GrapheneOS:

- All of LineageOS benefits
- Extensive kernel hardening
- Memory corruption mitigations
- Stronger sandboxing
- Ongoing security research and improvements



Installation Process

General Steps (Varies by ROM and Device)

1. Research: Verify device support
2. Backup: Full backup of all data
3. Unlock bootloader: Enable OEM unlocking
4. Download: ROM image and tools
5. Flash ROM: Via recovery or web installer
6. Reboot: Set up from scratch

 **WARNING:** *Unlocking bootloader ERASES ALL DATA! Voids warranty on most devices.*

GrapheneOS: Web installer (easiest) LineageOS: Custom recovery (more steps)

What You'll Need

Hardware:

Supported device (>80% battery)

Quality USB cable

Computer (Windows/macOS/Linux)

Software:

ADB and Fastboot (Android Platform Tools)

ROM image for your device

USB drivers (Windows only)

 *Budget 2-3 hours for first-time installation*



Avoiding Common Mistakes

Wrong ROM variant: Verify device codename carefully

Skipping backups: Don't skip them!

Low battery: Keep device >80% charged

Bad USB cable: Use quality cables

Ignoring installation guide warnings

Rushing through steps

💡 *TIP: Practice with ADB before starting. Verify you can boot into fastboot mode and back.*



Testing Your Setup

Verify ADB and Fastboot Work

Test your tools before starting the installation:

```
# Check ADB connection
adb devices

# Boot to bootloader/fastboot
adb reboot bootloader

# Verify fastboot connection
fastboot devices

# Exit fastboot mode
fastboot reboot
```

If these commands work, you're ready to proceed!

After Installation

First Boot and Configuration

First boot takes 5-10 minutes - be patient!

GrapheneOS setup:

Set up PIN/password (required)

Configure security settings

Optionally install sandboxed Play Store

Install apps from Aurora Store or F-Droid

LineageOS setup:

Configure privacy settings

Enable/disable root access

Install apps from Aurora Store or F-Droid

Consider microG for Google services



Essential Apps for Custom ROMs

App Stores:

F-Droid (FOSS apps)

Aurora Store (anonymous Play Store)

Obtainium (direct from devs)

Key Apps:

Browser: Vanadium, Brave, Firefox

Passwords: Bitwarden, KeePassDX

2FA: Aegis Authenticator

Messaging: Signal

Camera: OpenCamera



Official Resources

Official Resources:

GrapheneOS: grapheneos.org

LineageOS: lineageos.org

Official documentation and installation guides

Community:

GrapheneOS: discuss.grapheneos.org

LineageOS: reddit.com/r/LineageOS

XDA Developers forums (device-specific)



Other Resources

PrivacyGuides.org (privacy recommendations)

F-Droid.org (open source app repository)

YouTube: plenty of installation tutorials

Support:

Read the docs first!

Search forums before asking

Be specific when describing issues



Choosing Your ROM

A Simple Decision Tree

```
Do you own a Pixel 5 or newer?  
├─ NO → Go with LineageOS (if supported) or stay stock  
└─ YES → Continue  
    |  
    Is security your #1 priority?  
    ├─ YES → Choose GrapheneOS  
    └─ NO → Continue  
        |  
        Do you need root access or extensive customization?  
        ├─ YES → Consider LineageOS (also available for Pixels)  
        └─ NO → Choose GrapheneOS (better security, less hassle)
```

Still unsure? GrapheneOS for security, LineageOS for freedom.



My Journey with Custom ROMs

2009: Motorola Droid - first Android device modded

Explored: MIUI (loved the customization!)

Settled on: GrapheneOS (daily driver since 2021)

Why GrapheneOS won for me:

Security features provide real peace of mind

Excellent stability and reliability

Fast security updates

Sandboxed Play Services work well

Knowledgeable community

What I miss:

Google Pay (but that's the point!)

Some customization options

Root access for tinkering



Key Takeaways

Custom ROMs extend device lifespan and reduce e-waste

GrapheneOS prioritizes security - best for privacy-conscious users with Pixels

LineageOS prioritizes freedom - best for customization and wide device support

Both are viable alternatives to stock Android

Installation requires preparation but is accessible to technical users

Trade-offs exist - no ROM is perfect for everyone

Strong communities exist to help you succeed

Your choice depends on your priorities: security, customization, or device support

The best ROM is the one that matches your priorities and device.



Questions?

Let's discuss your custom ROM journey

Discussion topics:

Your device and ROM compatibility

Specific concerns about installation

Security vs usability trade-offs

App compatibility questions

Getting started resources

