CALYXOS

IMPLEMENTING CONFIGURABLE DEVICE SECURITY WITH SECURITY LEVELS

AAYUSH GUPTA | CHIRAYU DESAI

Overview

- Security Levels in CalyxOS
- Prerequisites
- Development
- Planned Features

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SECURITY LEVELS

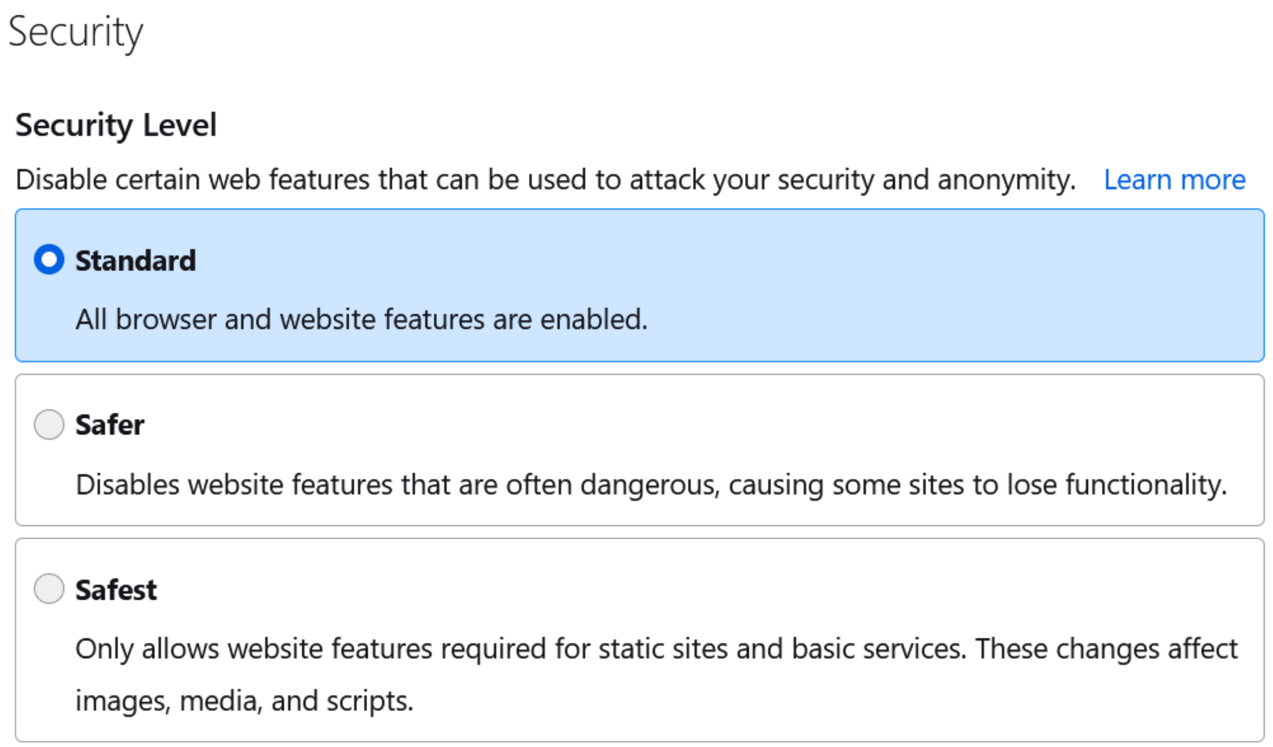
What are Security Levels and why do we need them?

Why do we need Security Levels?

- Users might not be familiar with the available features
- Finding the best combination of settings takes time
- Easily switching between combinations isn’t possible
- Expert opinion is helpful
- Many more as per cases

Security Levels

- Offers easily configurable choices as per requirements
- Pre-configured by experts
- Restricts users from dangerous actions/options



Security

Security Level

Disable certain web features that can be used to attack your security and anonymity. Learn more

● **Standard**
All browser and website features are enabled.

○ **Safer**
Disables website features that are often dangerous, causing some sites to lose functionality.

○ **Safest**
Only allows website features required for static sites and basic services. These changes affect images, media, and scripts.

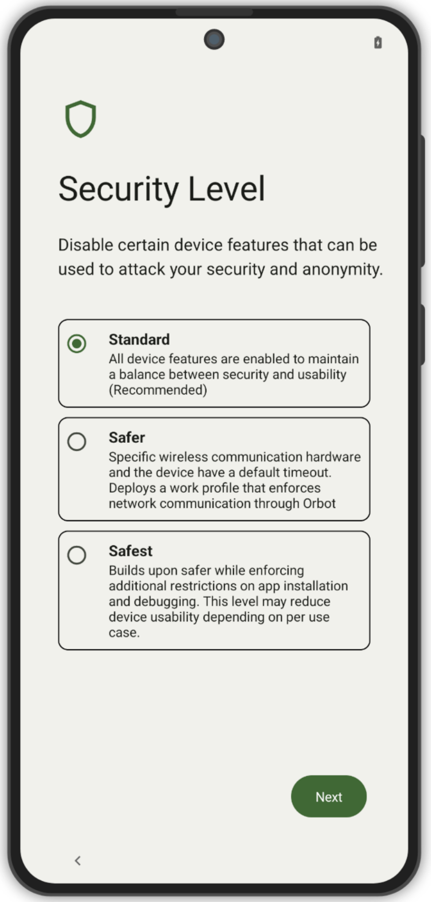
Security Levels in Tor Browser

SECURITY LEVELS IN CalyxOS

Standard, Safer and Safest

Security Levels in CalyxOS

- Configurable device security level
- Options shown during first time setup
- Offers three different levels, inspired from Tor browser
- Currently in development
- Standard level offers default features



Security Level

Disable certain device features that can be used to attack your security and anonymity.

[✓ **Standard**] All device features are enabled to maintain a balance between security and usability (Recommended)

Safer Specific wireless communication hardware and the device have a default timeout. Deploys a work profile that enforces network communication through Orbot

Safest Builds upon safer while enforcing additional restrictions on app installation and debugging. This level may reduce device usability depending on per use case.

Security Levels in CalyxOS (Contd.)

- Second level: Safer
- Builds upon Standard
- Sets timeout for Wi-Fi, Bluetooth (automatically turn off if not used)
- Sets device to automatically reboot after a certain period of non-usage
- Deploys Work Profile
- Enforces Orbot as Always-On-VPN (Work Profile only)

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Security Levels in CalyxOS (Contd.)

- Third level: Safest
- Builds upon Safer
- Disables USB Data Signaling
- Prevents installation of apps from unknown sources
- Disables debugging features
- Disables javascript JIT in chromium

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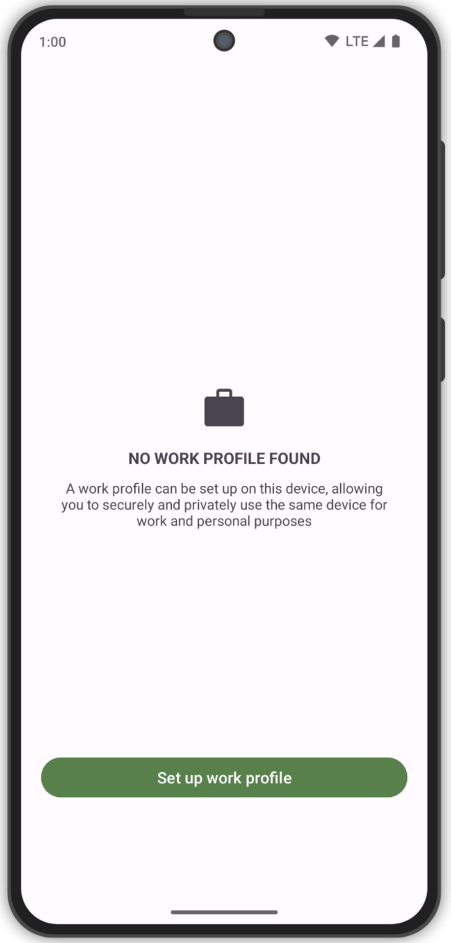
PREREQUISITES

Bellis and Other Options

Bellis (Work Profile app)

- Allows users to provision and manage Work Profile
- Simple and easy UX
- Written in Kotlin and material3
- Compatible with both AOSP and Gradle build systems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LTE

NO WORK PROFILE FOUND

A work profile can be set up on this device, allowing you to securely and privately use the same device for work and personal purposes

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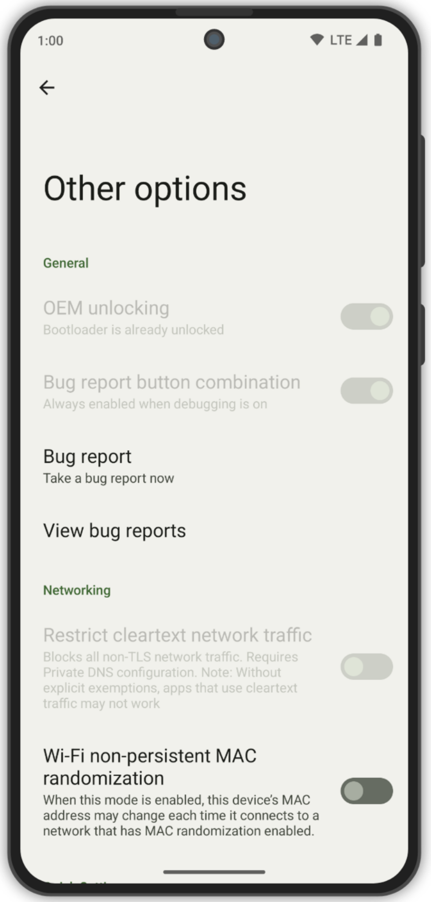
Other Options

- Added to the Settings
- Contains options used by users frequently (contained in developer options) for security & privacy gains
- Maintains security requirement for certain switches
- Available when debugging features are disallowed



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Other options

General

OEM unlocking
Bootloader is already unlocked

Bug report button combination
Always enabled when debugging is on

Bug report
Take a bug report now

View bug reports

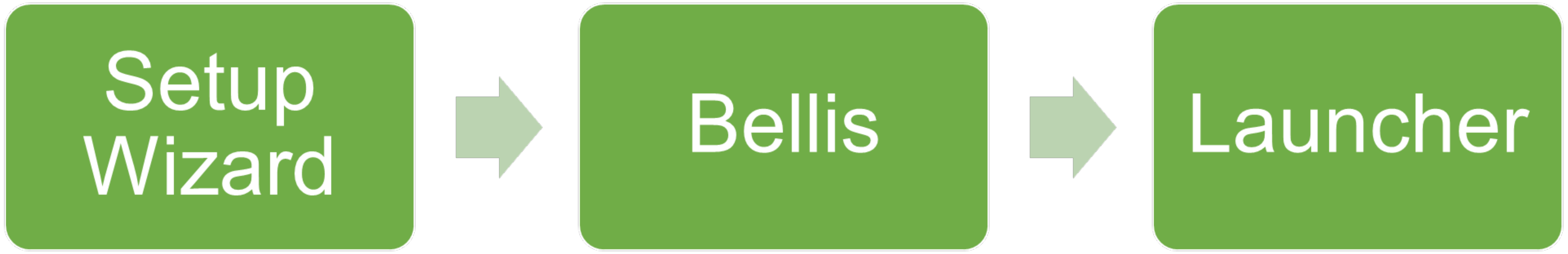
Networking

Restrict cleartext network traffic
Blocks all non-TLS network traffic. Requires Private DNS configuration. Note: Without explicit exemptions, apps that use cleartext traffic may not work

Wi-Fi non-persistent MAC randomization
When this mode is enabled, this device's MAC address may change each time it connects to a network that has MAC randomization enabled.

DEVELOPMENT

Work Profile Provisioning and Restrictions



Flow While Setting Security Levels

```java
/**
 * Device operating mode
 *
 * Apply privacy/security improving settings based on the mode.
 * Values are:
 * 0: Standard (default)
 * 1: Safer
 * 2: Safest
 * @hide
 */
public static final String GARLIC_LEVEL = "garlic_level";

/** @hide */
public static final Validator GARLIC_LEVEL_VALIDATOR =
        new InclusiveIntegerRangeValidator(0, 2);
```

[CalyxOS/platform_calyx-sdk]

```
Intent intent = new Intent(
        DevicePolicyManager.ACTION_PROVISION_MANAGED_DEVICE_FROM_TRUSTED_SOURCE)
        .putExtra(DevicePolicyManager.EXTRA_PROVISIONING_DEVICE_ADMIN_COMPONENT_NAME,
                new ComponentName(BELLIS_PACKAGE, BELLIS_PACKAGE
                        + BELLIS_DEVICE_ADMIN_RECEIVER_CLASS))
        .putExtra(DevicePolicyManager.EXTRA_PROVISIONING_ADMIN_EXTRAS_BUNDLE,
                persistableBundle)
        .putExtra(DevicePolicyManager.EXTRA_PROVISIONING_SKIP_EDUCATION_SCREENS, true);
```

[CalyxOS/platform_packages_apps_SetupWizard]

```kotlin
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)

    when (intent.action) {
        DevicePolicyManager.ACTION_GET_PROVISIONING_MODE -> {
            val provisioningMode = intent.getParcelableExtra(
                DevicePolicyManager.EXTRA_PROVISIONING_ADMIN_EXTRAS_BUNDLE,
                PersistableBundle::class.java
            )?.getInt(DevicePolicyManager.EXTRA_PROVISIONING_MODE, 0)

            intent.putExtra(DevicePolicyManager.EXTRA_PROVISIONING_MODE, provisioningMode)
            setResult(RESULT_OK, intent)
            finish()
            return
        }
        DevicePolicyManager.ACTION_ADMIN_POLICY_COMPLIANCE -> {
            PostProvisioningHelper.completeProvisioning(this)
            setResult(RESULT_OK)
            finish()
            return
        }
        DevicePolicyManager.ACTION_PROVISIONING_SUCCESSFUL -> {
            PostProvisioningHelper.completeProvisioning(this)
        }
    }
}
```

[CalyxOS/platform_packages_apps_Bellis]

PLANNED FEATURES

Better Tor Integration with multiple work profiles, OS Updates and More

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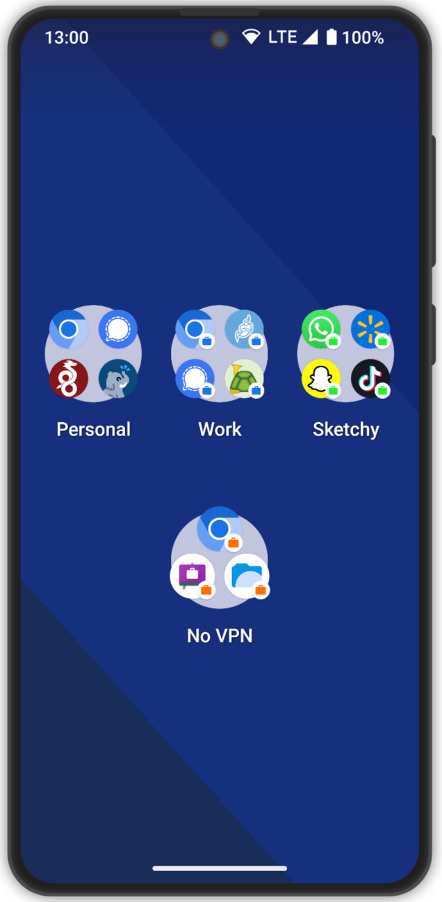
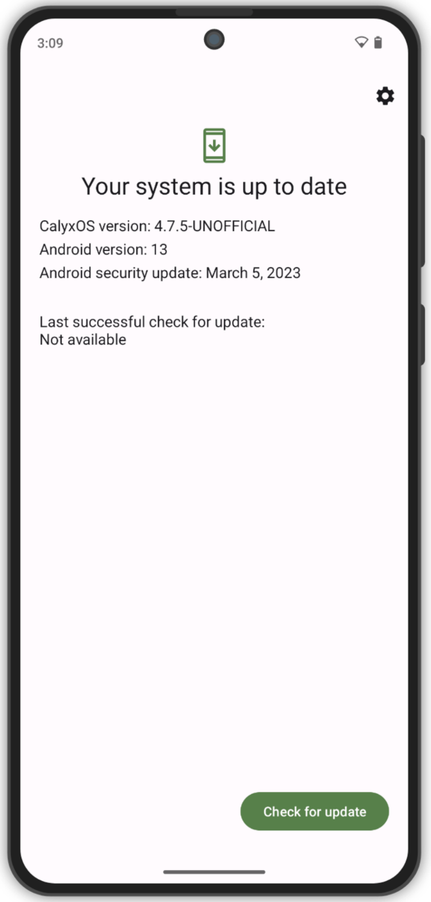
Multiple Profiles

- Allows provisioning multiple Work Profiles
- Isolate apps not just from your workplace but from each other
- Turn off entire sets of apps at once
- Protect and encrypt some apps with a separate passphrase
- Use different VPNs for different profiles



OS Updater

- Streams updates from server
- Simple and easy UX
- Written in Kotlin and Material3
- Compatible with both AOSP and Gradle build systems
- Planned to fetch updates over Tor



Your system is up to date

CalyxOS version: 4.7.5-UNOFFICIAL
Android version: 13
Android security update: March 5, 2023

Last successful check for update:
Not available

Miscellaneous Features

- Open dialer helpline links in tor browser
- Allow server selection for connectivity check
- Route microg traffic over Tor
- Reset device after *X* failed attempts
- More under discussion

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THANK YOU

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