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# Android 11 – What's New for Zebra Developers

Zebra Developers
Build Your Edge

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# Android 11 - What's New for Zebra Developers

## Trends over time

| |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
| | Lollipop (5) | Marshmallow (6) | Nougat (7) | Oreo (8) | Pie (9) | 10 | **11** | 12 |
| **Running in the background** | Job Scheduler | Doze mode | Doze “on the go” | Background restrictions | Machine learning for intelligent restrictions | New permission for background location | **Background Location permission** | Restrictive bucket |
| **Notifications** | Quick settings & notification shade | Long press to access options | Direct reply & bundled notifications | Notification channels & snooze | Enhanced messaging experience | Smart Replies | **Foreground Service Types** | Custom notifications<br>FGS notification delay |
| **One or Two other major changes affecting Enterprise** | Material design | Runtime permissions | Multi-window | Changes to the Google Play Store policies | Non-SDK methods actively discouraged | Scoped Storage<br>Device identifiers | **Scoped Storage enforcement<br>Permission logic** | Hibernation<br>Exact alarm permission |
| **Android Enterprise features** | Android for Work, app restrictions | DO mode, lock task mode, managed configs | DPM API enhancements | DPM API enhancements | DPM API enhancements | Transition to DO mode | **DPM API enhancements** | TBD: DPM API enhancements? |

# Android 11 - What's New for Zebra Developers

## Google’s highlighted features

From: https://www.android.com/android-11/

- Conversations / Bubbles
- **Content Capture**
- Predictive Tools / Smart Reply
- Accessibility
- Device Controls / Media Controls
- **Privacy & Security**
- Enterprise: Work profile enhancements

# Android 11 - What's New for Zebra Developers

## Scoped Storage – first introduced in Android 10

- Change in behaviour how an application can handle device mass storage
  - Previously: Application had unrestricted access so long as the appropriate permissions were granted
  - Scoped storage: Applications only have access to an app-specific directory on external storage
- Impact:
  - Ability to read files from external storage is severely curtailed:
    - Media files (images, videos, audio) can be accessed via the Media API & use dedicated shared folders.
    - Any file can be chosen and opened with the Storage Access Framework but that requires a user file picker
  - Only affects applications targeting Android 10 (API level 29) and higher
  - Use case examples:
    - Reading a configuration file from external storage
    - Sharing a log file via external storage
    - Etc.

# Android 11 - What's New for Zebra Developers

## Scoped Storage

- Recommendation previously given for Android 10:

```
<manifest ... >
  <!-- This attribute is "false" by default on apps targeting
       Android 10 or higher. -->
    <application android:requestLegacyExternalStorage="true" ... >
      ...
    </application>
</manifest>
```

# Android 11 - What's New for Zebra Developers

## Scoped Storage

- Zebra are not offering a direct alternative to Scoped Storage.  Developers will need to work within the constraints of the changes made by Google.
- Some developers may be able to take advantage of the new Zebra-proprietary feature, ‘Secure Storage Manager’ (SSM) to work around the limitations of Scoped Storage.  SSM permits the storage of name-value pairs.
  - More information available in due course on techdocs
  - SSM can also persist across an Enterprise reset
- Some developers may be able to take advantage of MANAGED_EXTERNAL_STORAGE, depending on how apps are deployed.

# Android 11 - What's New for Zebra Developers

## Package Visibility and the effect on Zebra features

- If your Application targets Android 11 (API level 30), Android will limit the information your app can get about other apps installed on the device, e.g. the following APIs will return reduced results:
  - queryIntentActivities()
  - getPackageInfo()
  - getInstalledApplications()
- To get visibility into additional applications you will need to use the `<queries>` manifest element.
- This will also affect the following Zebra features: EMDK, OEMInfo & Secure storage manager.

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## Package Visibility and the effect on Zebra features

- OEM Info:

```
<queries>
    <package android:name="com.zebra.zebracontentprovider" />
</queries>
```

- EMDK:

```
<queries>
    <package android:name="com.symbol.emdk.emdkservice" />
</queries>
```

- Secure Storage Manager

```
<queries>
    <package android:name="com.zebra.securecontentprovider" />
</queries>
```

# Android 11 - What's New for Zebra Developers

## Permission Changes - Overview

| Change | Affects | Description |
|---|---|---|
| One-time permissions | Any app running on Android 11 | User is given the option to grant the permission only a single time |
| Changes to “Deny” and “Don’t ask again” logic | Any app running on Android 11 | User pressing “Deny” twice is interpreted as “Don’t ask again” |
| Permissions auto-reset | Apps targeting API 30+ | Permissions are retracted if the app is not used for a while |

**Note: None of these changes affect apps where runtime permissions have been automatically granted**

# Android 11 – What's new for Zebra Developers

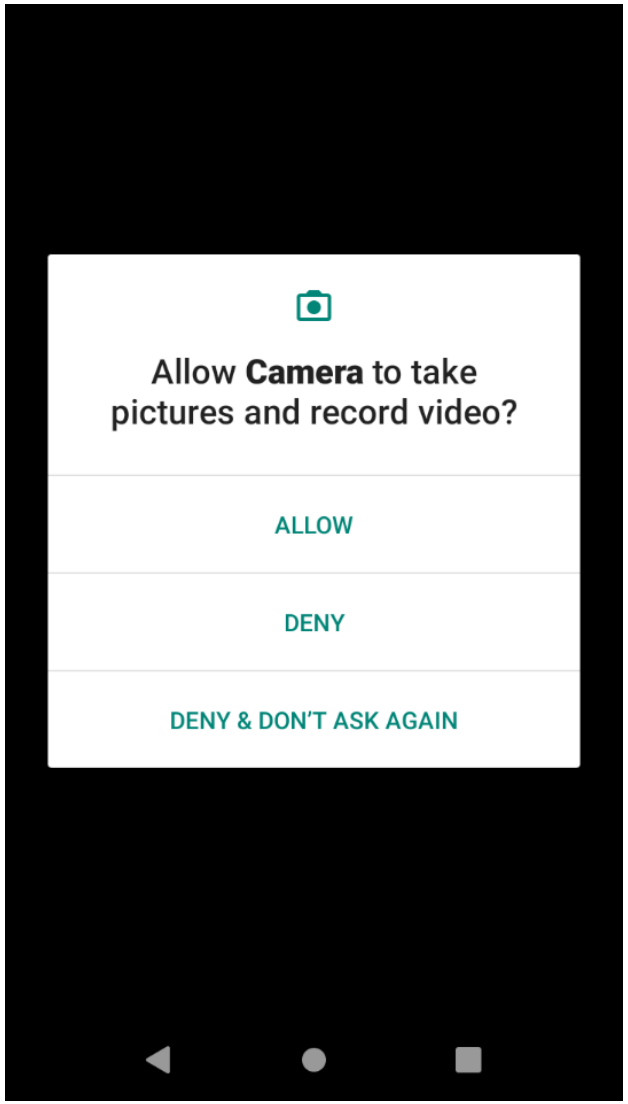
## One-time permissions

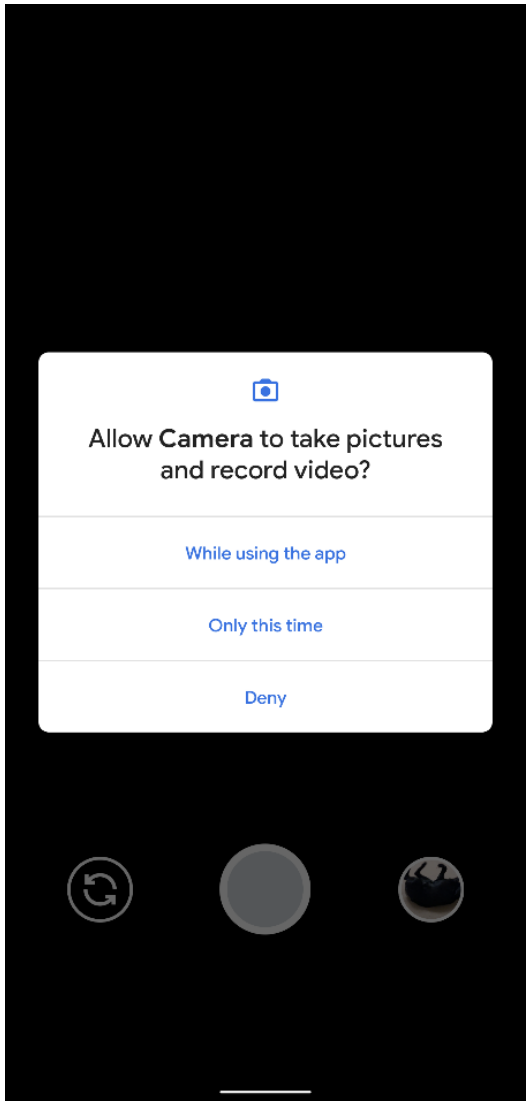
- Left: Camera app running on Android 10
- Right: Camera app running on Android 11

Note the different options between Android 10 and Android 11:

ALLOW → While using the app

ALLOW → Only this time (one-time permission)



# Android 11 – What's new for Zebra Developers

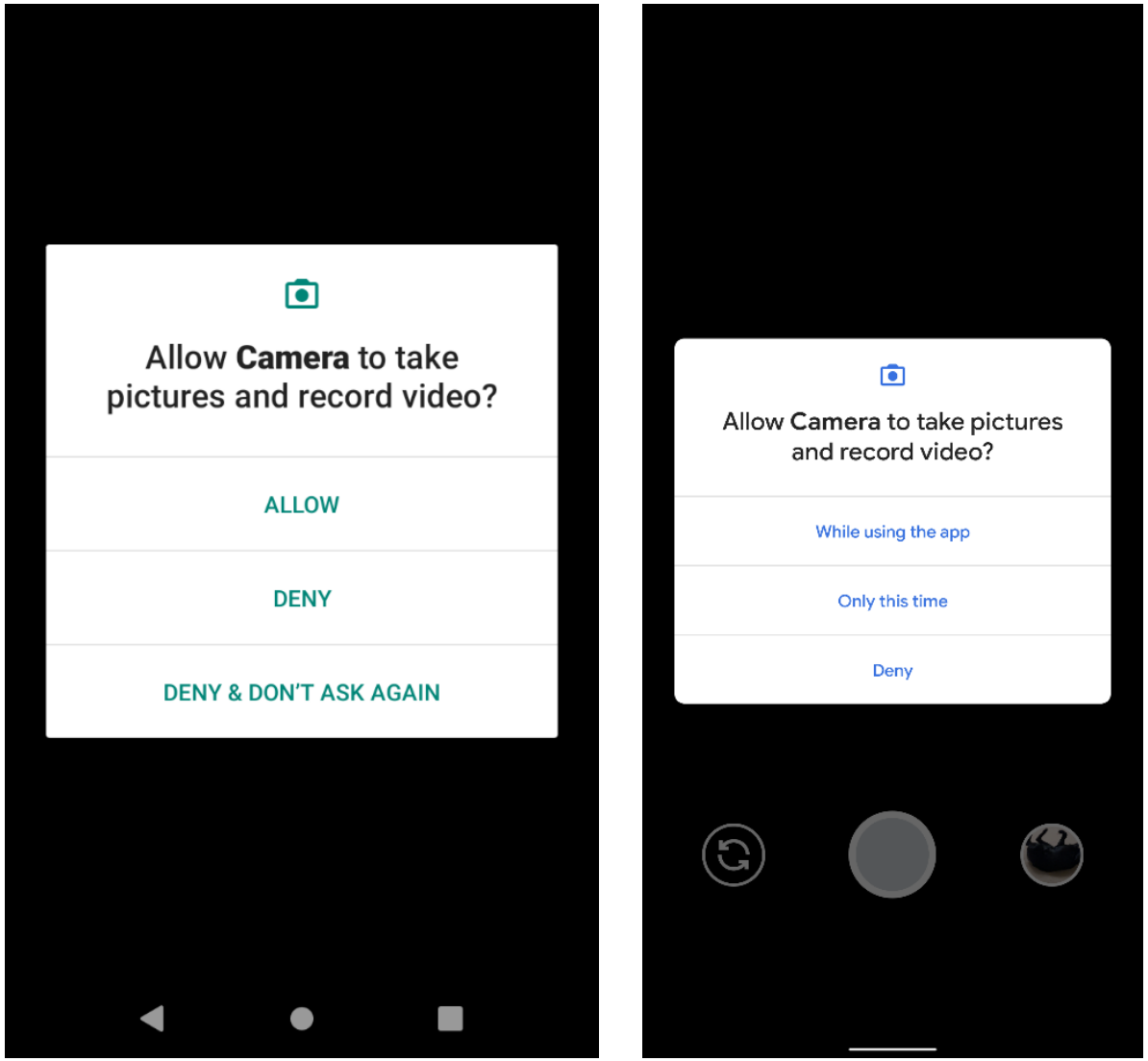
## Changes to "Deny" and "Don't ask again"

- Left: Camera app running on Android 10
- Right: Camera app running on Android 11

Note the different options between Android 10 and Android 11:

DENY → Deny

DENY & DON'T ASK AGAIN → No equivalent, assumed to be the user's intention after the second 'Deny'al.



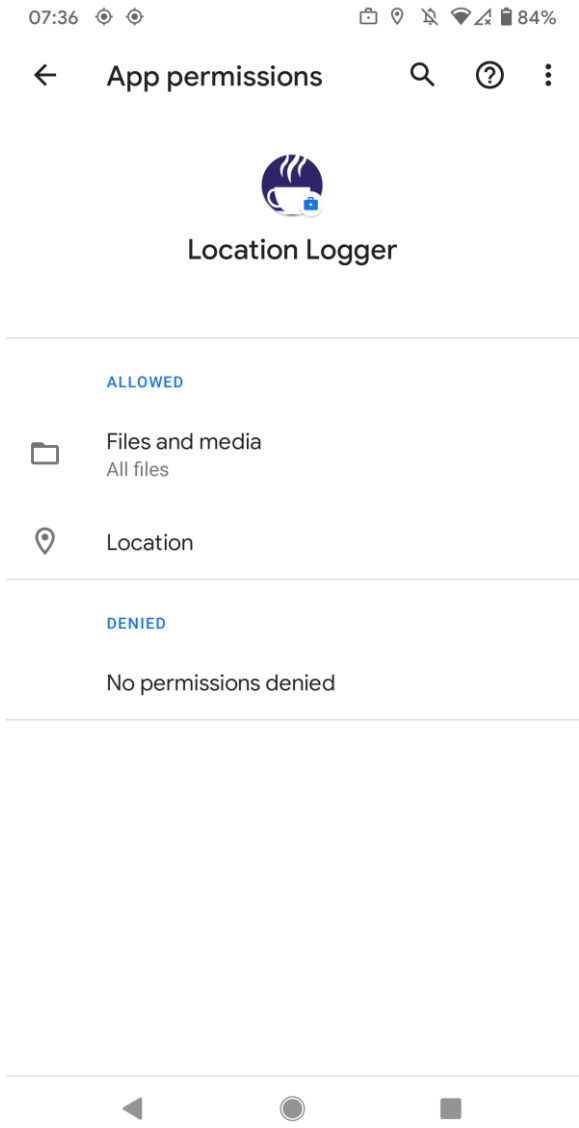
# Android 11 – What's new for Zebra Developers

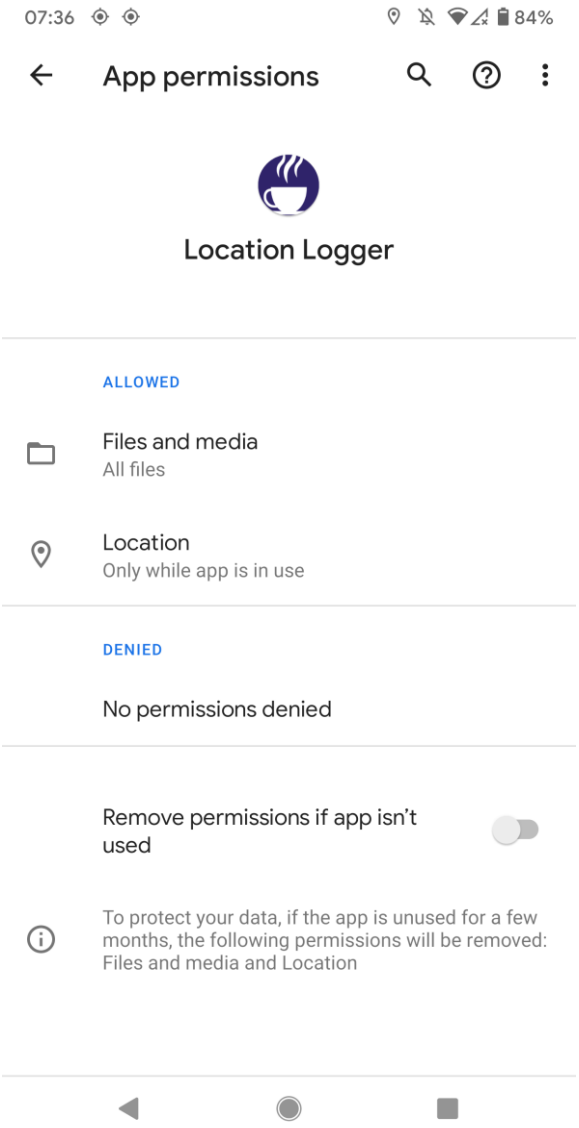
## Permissions auto-reset

- Left: Application running on Android 11 given the storage and location permissions. **App was installed via EMM configured to automatically grant permissions**
- RHS: Application running on Android 11 given the storage and location permissions. App was installed from the Play Store by user.

Note how the auto-reset option is absent where the app was installed via EMM & automatically granted permissions.

N.B. "Remove permissions if app isn't used" is false as the app targeted less than API level 30. If you target 30+ this option is true by default, where shown.

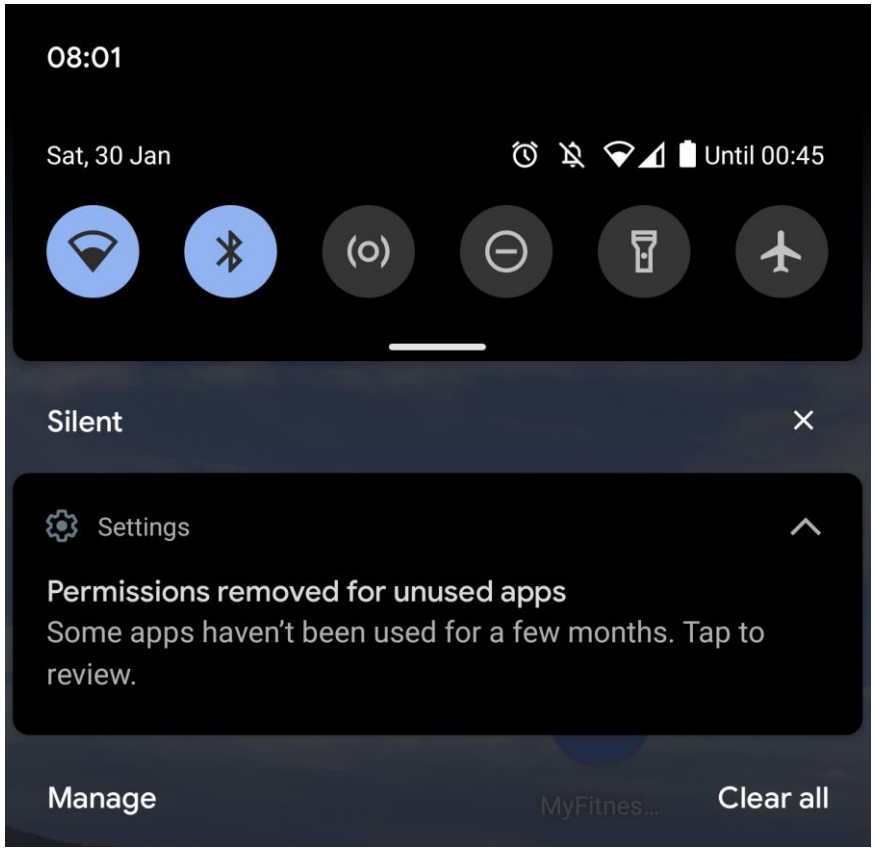


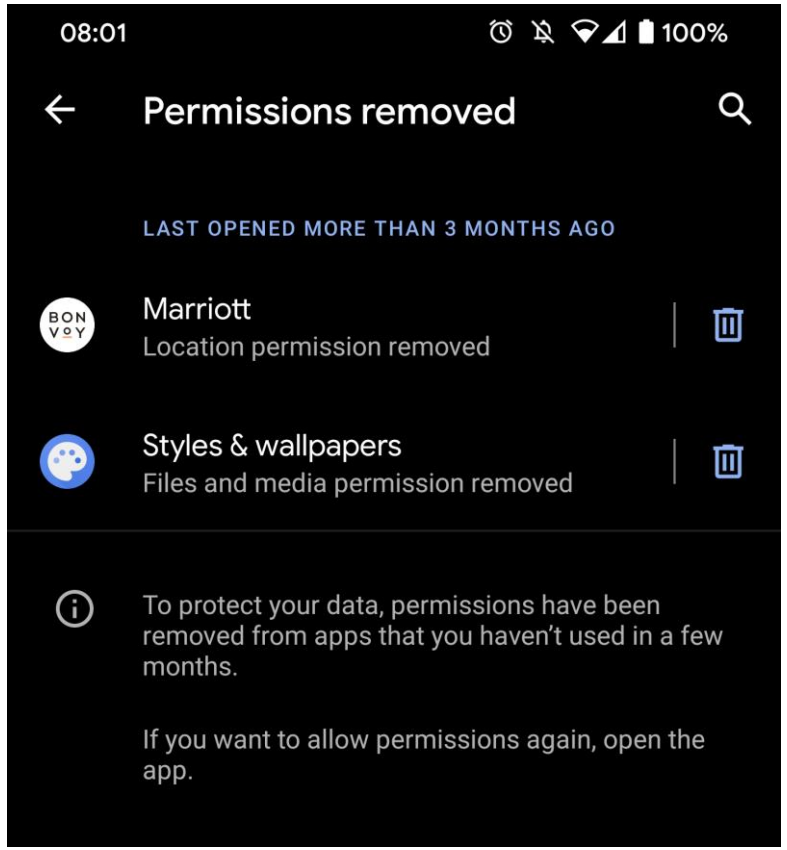



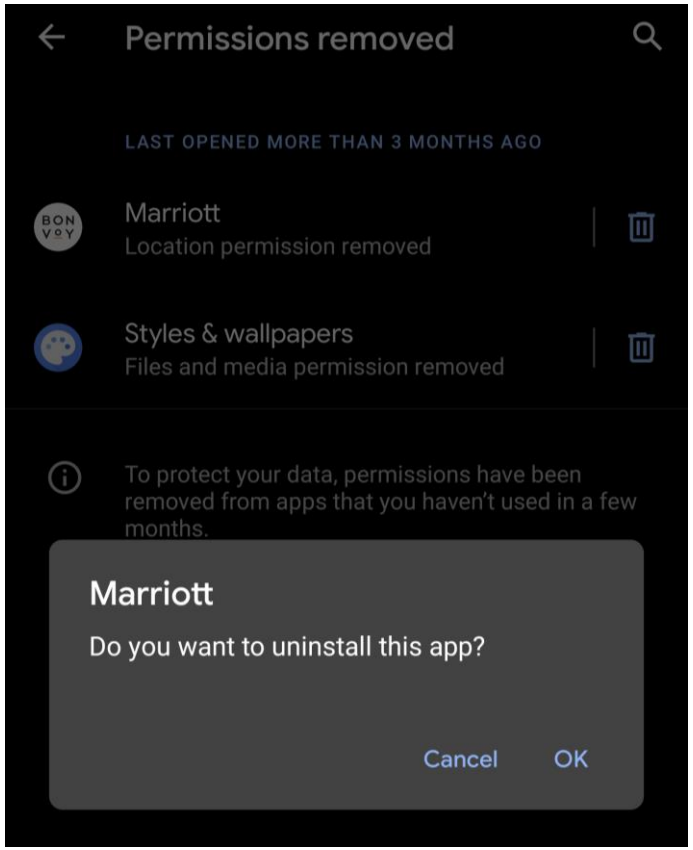
# Android 11 – What's new for Zebra Developers

## Permissions auto-reset – What does the experience look like?

- As seen on my personal phone (1. Notification, 2. Clicked notification, 3. Trash can clicked):



# Android 11 - What's New for Zebra Developers

## Location Permission Changes

Android 11 makes several changes to how location permissions are handled:

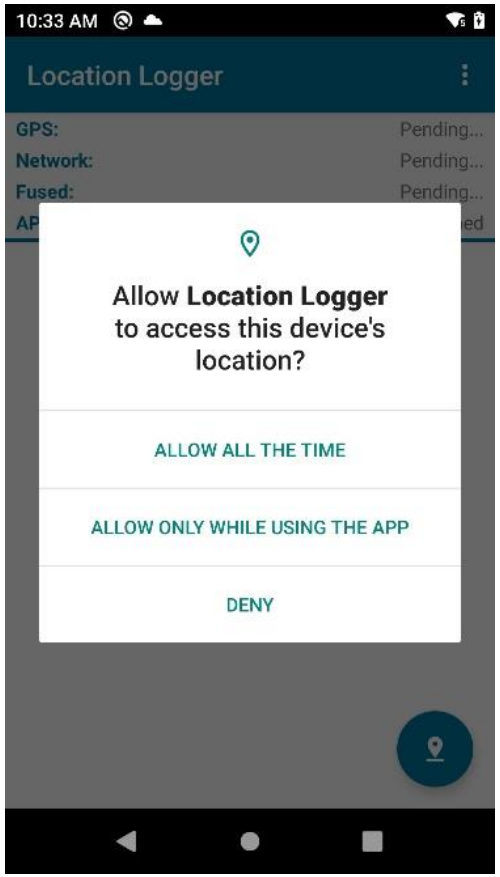
- Applications targeting API level 30 (Android 11) are NOT permitted to request foreground and background location at the same time.
  - They must request ACCESS_BACKGROUND_LOCATION only after the user has granted either FINE or COARSE permission, otherwise all permissions are automatically denied.
- Applications targeting API level 29 (Android 10) or earlier AND requesting both foreground and background location at the same time will present a warning dialog to the user.
  - The default dialog includes a link to the Settings screen which is unlikely to work given Settings are typically disabled in enterprise deployments
- The next few slides will show this behaviour visually

**Note: None of these changes affect apps where runtime permissions have been automatically granted**

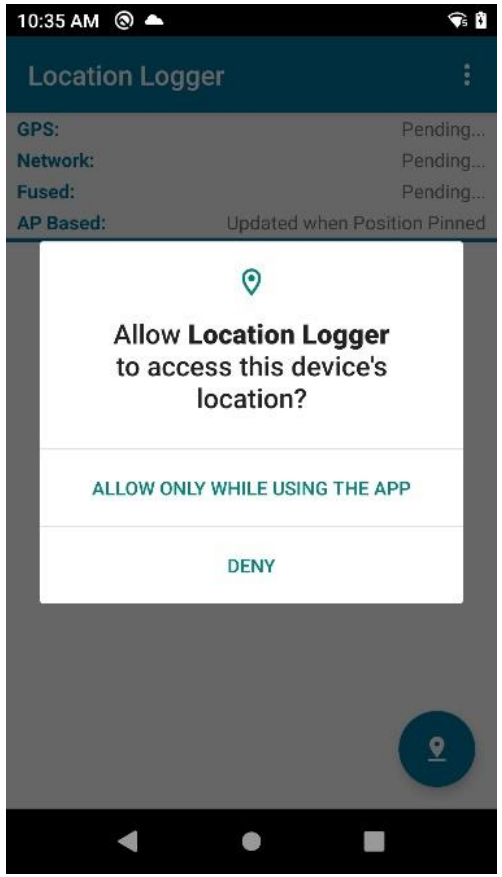
**BUT: The Play Store imposes strict standards on location access (Details)**

# Android 11 - What's New for Zebra Developers

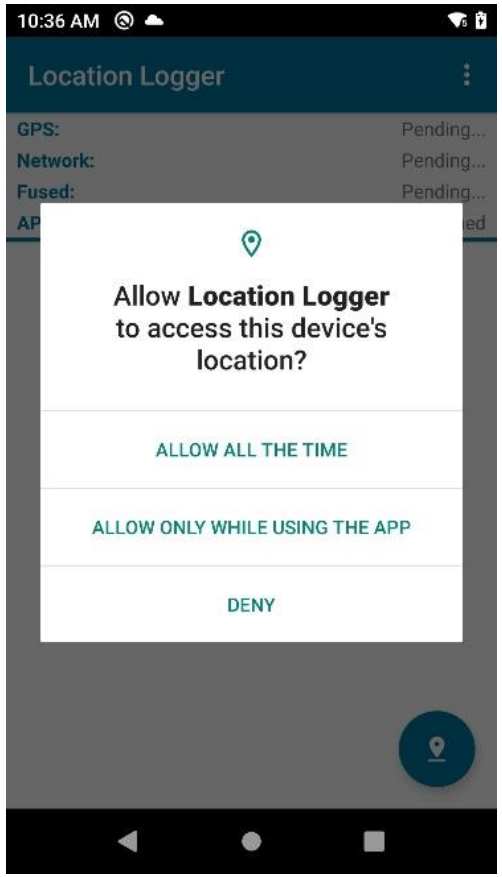
## Location Permission Changes




**Android 10**
Target SDK = **26**
ACCESS_FINE_**LOCATION** only



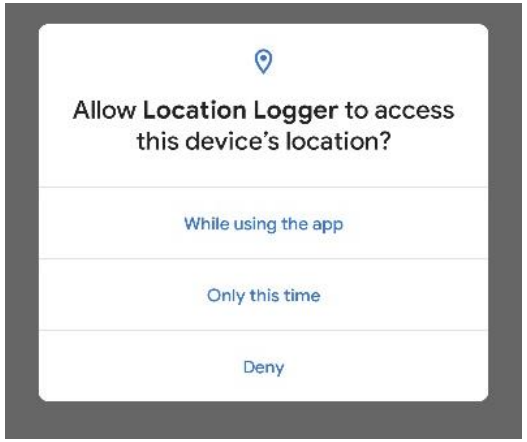

**Android 10**
Target SDK = **29**
ACCESS_FINE_**LOCATION** only




**Android 10**
Target SDK = **29**
ACCESS_FINE_**LOCATION** &
ACCESS_**BACKGROUND**_LOCATION

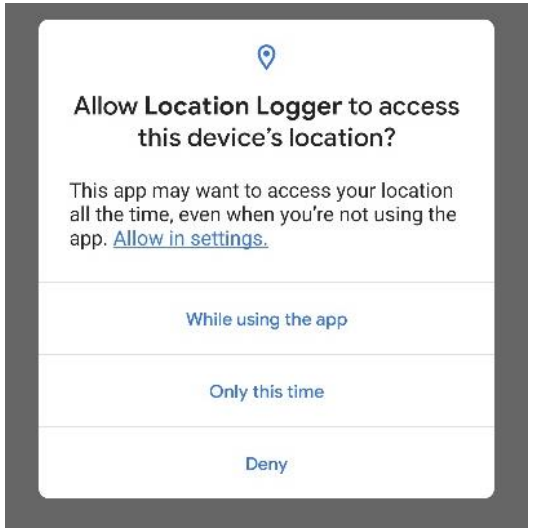
# Android 11 - What's New for Zebra Developers

## Location Permission Changes




**Android 11**
Target SDK = **29 (A10)**
ACCESS_FINE_**LOCATION** only

**Android 11**
Target SDK = **30 (A11)**
ACCESS_FINE_**LOCATION** only




**Android 11**
Target SDK = **29 (A10)**
ACCESS_FINE_**LOCATION** &
ACCESS_**BACKGROUND**_LOCATION

**NO DIALOG SHOWN**

**Android 11**
Target SDK = **30 (A11)**
ACCESS_FINE_**LOCATION** &
ACCESS_**BACKGROUND**_LOCATION

# Android 11 - What's New for Zebra Developers

## Location Permission Conclusion

- The behaviour of your application running on Android 11 will change regardless of whether you modify the target SDK level.
- Location permissions are still runtime permissions and so subject to the changes discussed previously
- Requesting both location and background location in the same request on Android is not allowed, regardless of your target SDK.
- Enterprise apps which have runtime permissions automatically granted will **NOT be affected** by these changes since they only affect how the options are presented to the user.
  - In my testing, even an app targeting Android 11 and requesting both foreground and background location permission in the same request has both of these requests fulfilled.
  - You will still need to comply with the Play Store process for background location.
- Runtime permissions can be automatically granted either via your EMM or by installing the applications using StageNow

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## Other changes to Permissions (**Not Runtime Permissions**)

- System Alert Window
  - Google has changed how the user manually grants this permission, they need to manually pick the appropriate application from the top-level settings screen: https://developer.android.com/about/versions/11/privacy/permissions#system-alert
  - Recommendation is to use MX Access Manager via StageNow or EMM (using OEMConfig) to **automatically grant** this permission.
    - Permission Access Feature Name: SYSTEM_ALERT_WINDOW
- Package Usage Stats
  - Google has changed when these stats are available (e.g. how much network an app uses)
  - Recommendation is to use MX Access Manager via StageNow or EMM (using OEMConfig) to **automatically grant** this permission.
    - Permission Access Feature Name: PACKAGE_USAGE_STATS

# Android 11 - What's New for Zebra Developers

## Foreground Service Changes

- Android 10 introduced Foreground Service Types
  - If your foreground service accessed device location then you need to give it the “location” type.

- Android 11 extends Foreground Service Types
  - If your application accesses the camera, give it the “camera” type
  - If your application accesses the microphone, give it the “microphone” type
- These types allow Android to determine what these services are allowed to do
  - E.g. FGS launched from a background app cannot use the camera or microphone

# Android 11 - What's New for Zebra Developers

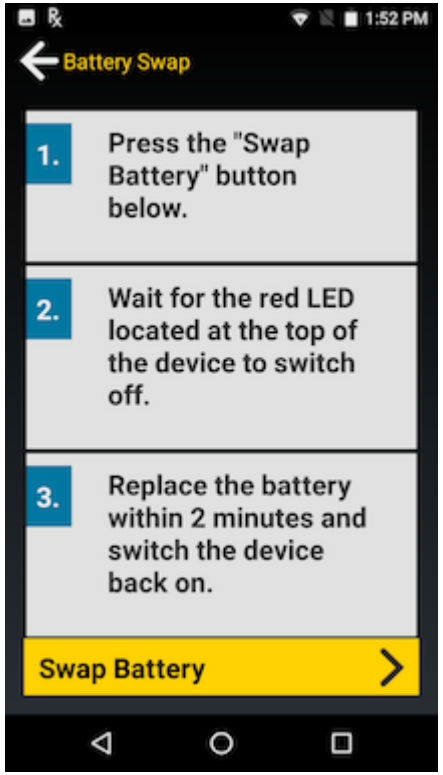
## Wake locks and battery swap

**Android 10 and earlier:**

- Android wake locks are automatically cleared when performing a ‘battery swap’

**Android 11 and up:**

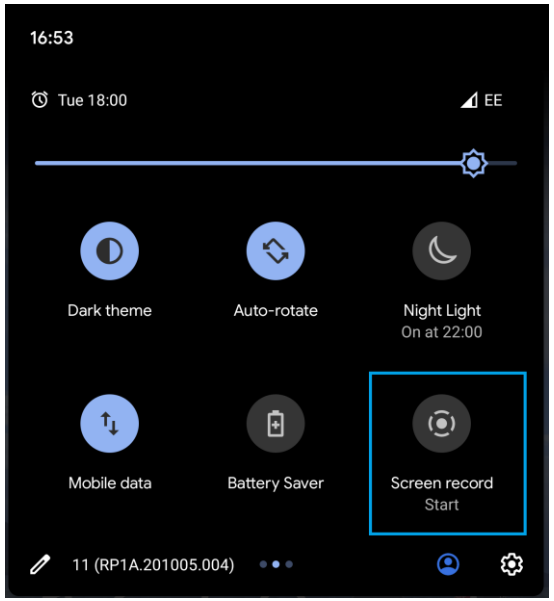
- Android wake locks must be cleared by the application holding them prior to performing  a ‘battery swap’
- Not clearing wake locks will prevent the ‘battery swap’ feature from running

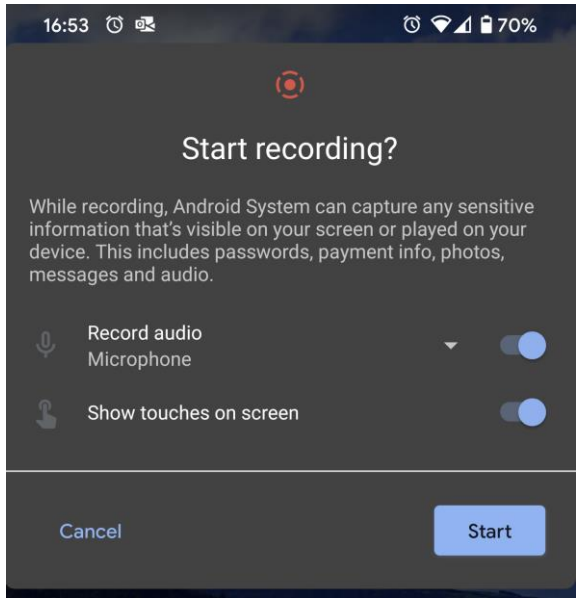


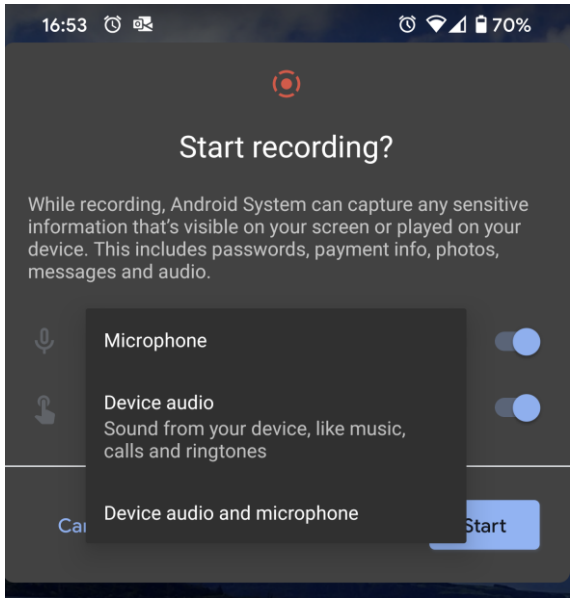
# Android 11 - What's New for Zebra Developers

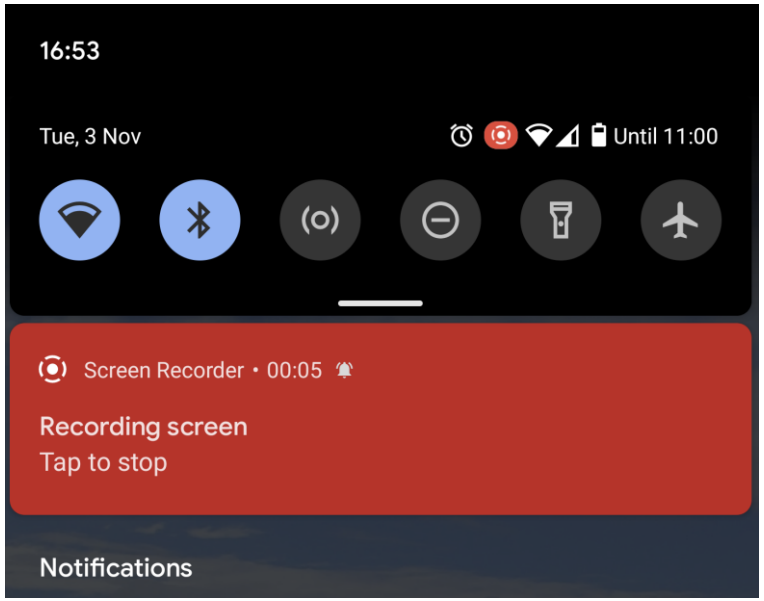
## Screen Recording

- Supported out of the box & accessible from the quick settings menu
- Requires manual provisioning to enable the option in quick settings



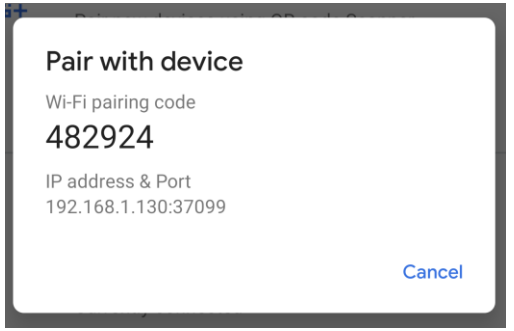



# Android 11 - What's New for Zebra Developers

## Wireless Debugging



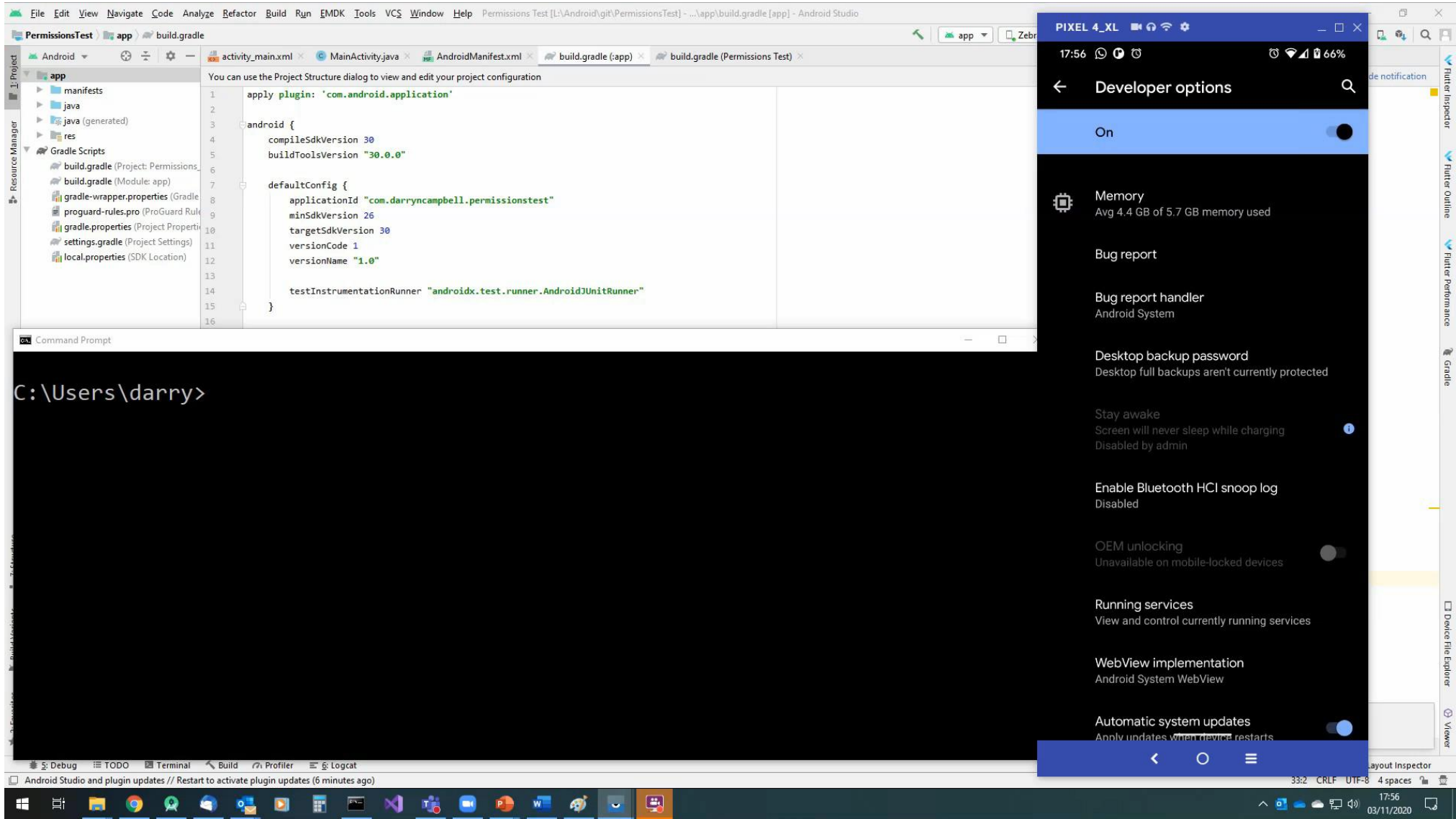

- From https://developer.android.com/studio/command-line/adb#connect-to-a-device-over-wi-fi-android-11+

1. Update to the latest SDK Platform tools
2. Enable Wireless debugging from the developer options **(Not required to connect the device first)**
3. On the dialog that asks Allow wireless debugging on this network? Click Allow.
4. Select **Pair device with pairing code**. Note the pairing code, IP address & port number.
5. adb pair ipaddr:port using the IP address and port from the previous step
6. Enter the pairing code from step 4.
7. adb connect ipaddr:port using the IP address and port under wireless debugging

# Android 11 - What's New for Zebra Developers

## Wireless Debugging

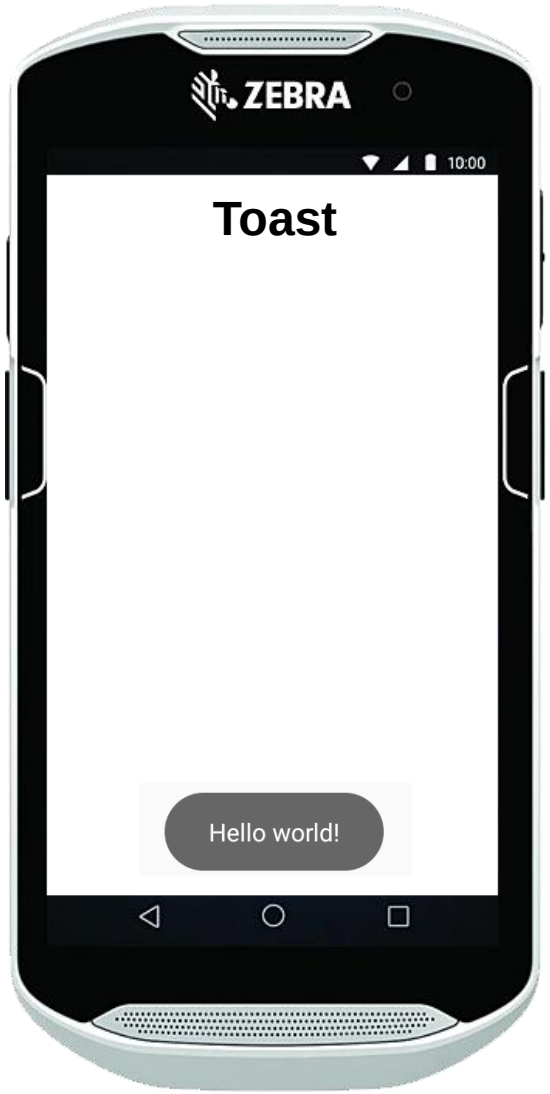
- Demo, 1m 17s
- https://youtu.be/sM-Cru6X1oI

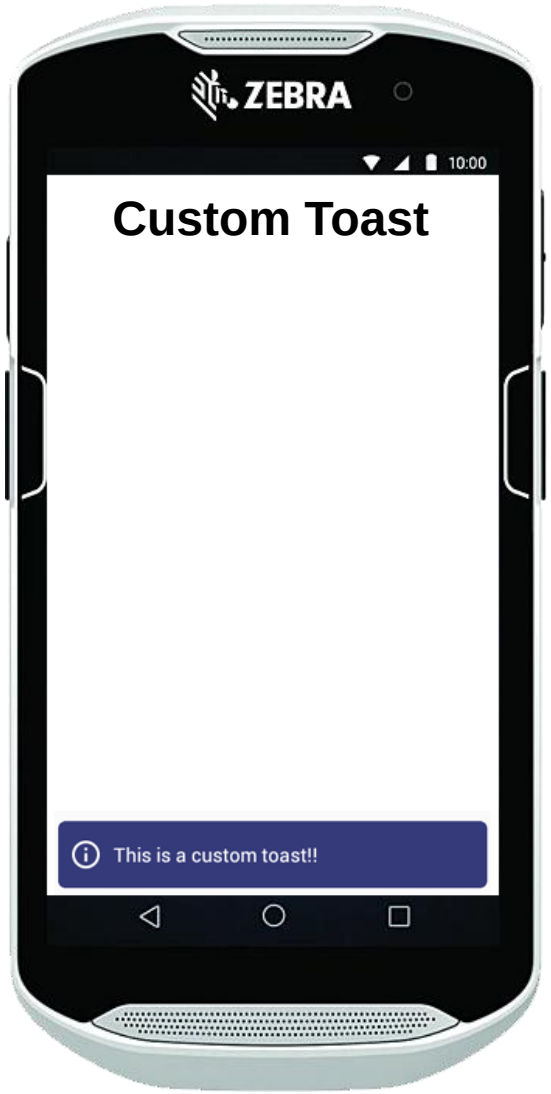


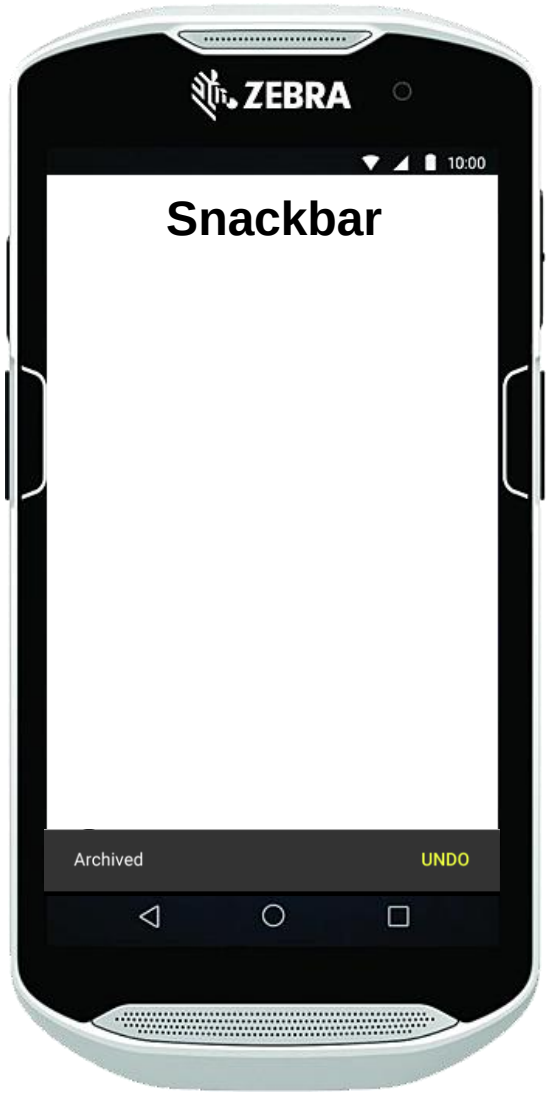
# Android 11 - What's New for Zebra Developers

## Toast API changes

- **Custom toasts are deprecated**.
- Any application that tries to launch a custom toast from the background will fail
- Any application that tries to launch a custom toast from the foreground will succeed but log a warning.



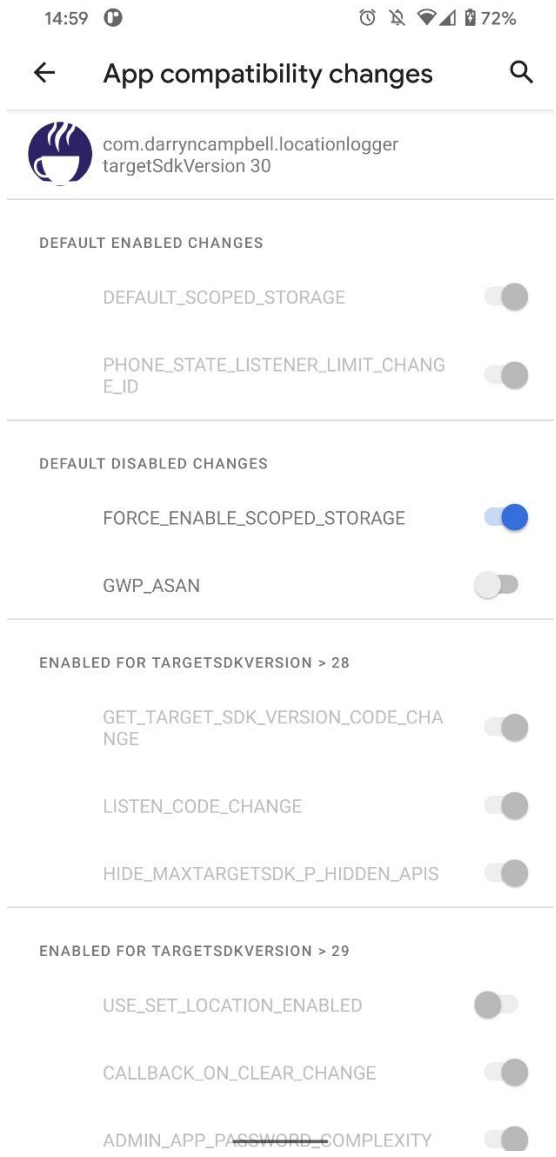



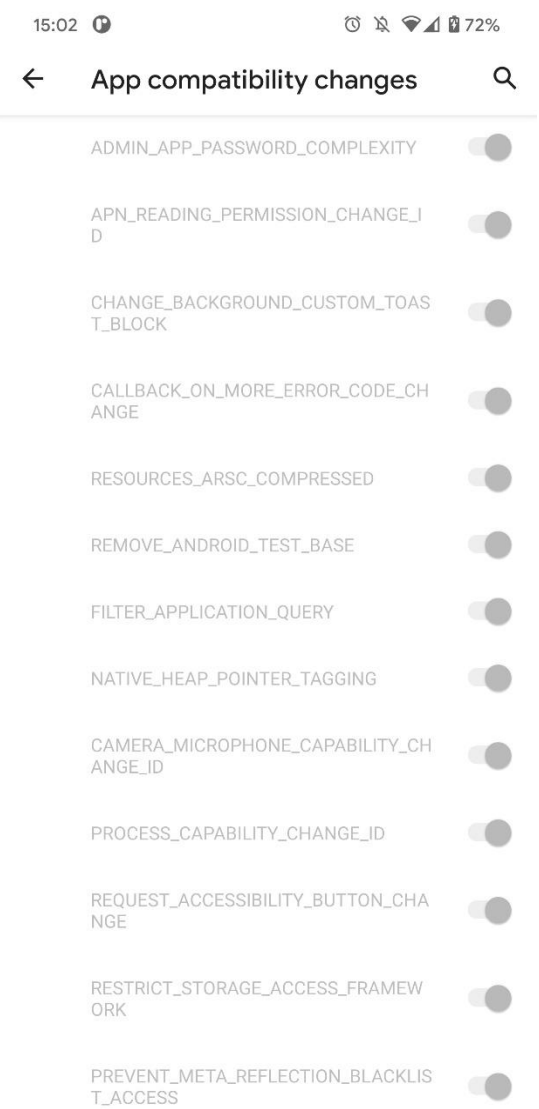



# Android 11 - What's New for Zebra Developers

## Test app compatibility

- Selectively enable the new Android 11 restrictions
- Useful for testing your app as you address the new Android restrictions incrementally.
- Only (currently) applicable for changes from Android 10 → Android 11
- Note CAMERA_MICROPHONE_COMPATIBILITY_CHANGE_ID for the changes to foreground services
  - There is no equivalent setting for location, introduced in Android 10.
- For testing / debugging only – not for use in production.



# Android 11 - What's New for Zebra Developers

## Changes to the Google Play Store requirements

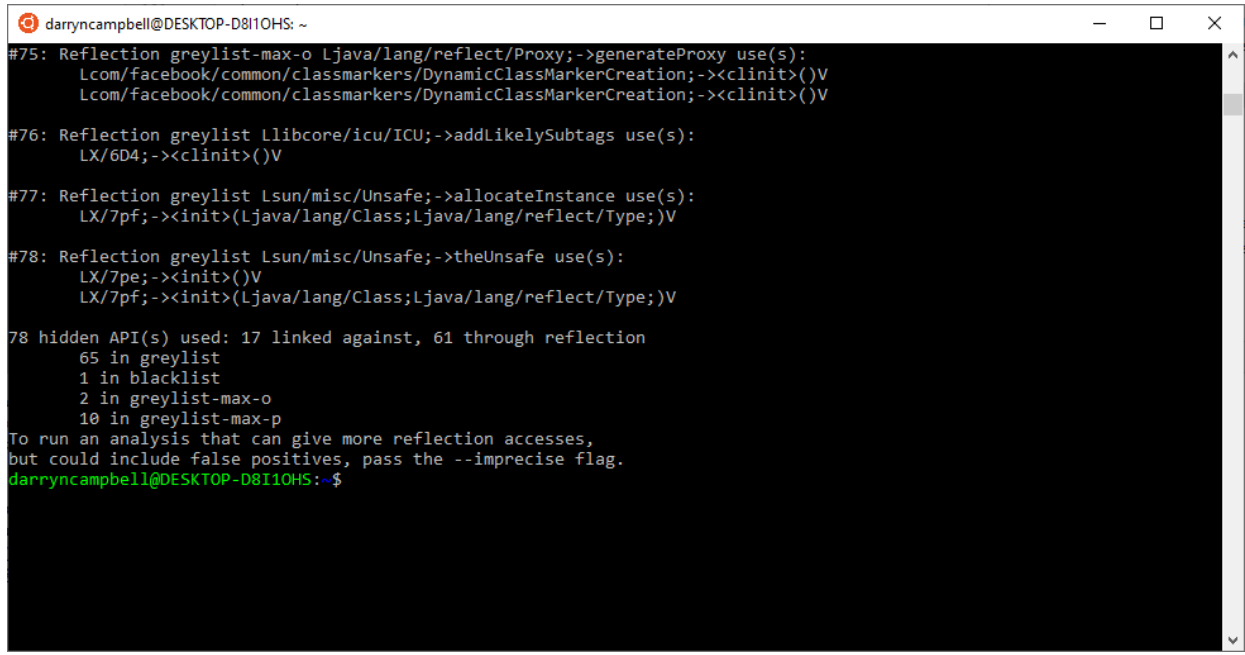
- To be allowed in the Google Play Store applications need to target a recent API level
  - May well change application behaviour.  Google have an extensive & detailed documentation.
- The required API level updates annually (changes apply in August & November)
- This will affect more and more of our customers as organizations move to managed Android and the Managed Play Store
- Customers should also consider other Play Store policies such as content restrictions & harmful app scanning
- Latest SDK level requirements (link)
- Apps also need to be submitted as **.aab, not apk**.

| API level requirement | Starting date |
|---|---|
| Android 8.0 (API level 26) | • 1 August 2018: Required for new apps<br>• 1 November 2018: Required for app updates |
| Android 9 (API level 28) | • 1 August 2019: Required for new apps<br>• 1 November 2019: Required for app updates |
| Android 10 (API level 29)* | • 3 August 2020: Required for new apps<br>• 2 November 2020: Required for app updates |
| Android 11 (API level 30)* | • 2 August 2021: Required for new apps<br>• 1 November 2021: Required for app updates |

# Android 11 - What's New for Zebra Developers

## Restrictions on Non-SDK interfaces

- Designed to prevent access to APIs not part of the public API set
- APIs are classified into whitelist (allowed), graylist (allowed with caveats) or blacklist (disallowed)
- Google have dedicated documentation for this and we have an article on the developer portal
- Various forms of analysis exist for a developer to detect if they are calling any forbidden APIs



# Android 11 - What's New for Zebra Developers

## Conclusions

- Major changes are Scoped Storage and Permission changes
- Scoped Storage
  - "**`requestLegacyExternalStorage`**" no longer available for applications targeting API level 30
  - Need to comply with Google's restrictions.
  - If your app is using external storage, this will most likely require a **code change**.
- Runtime Permissions
  - One-time, Changes to 'Don't ask Again' logic, auto-reset
  - Only applicable for applications who do not automatically allow runtime permissions
- Incremental advances in existing features and restrictions
  - Enterprise specific features largely aimed at COPE and BYOD deployments.

# Android 11 - What's New for Zebra Developers

## Resources

- Wireless debugging demo: https://youtu.be/sM-Cru6X1oI
- Zebra best practices for Android migration: https://techdocs.zebra.com/bestpractices/migration/
  - Contains links to previous advice for Android Marshmallow, Nougat, Oreo, Pie and 10.
- What's New for Android 11 and the impact on Zebra Developers:
  - https://techdocs.zebra.com/bestpractices/migration/android11/
- Blog on Scoped Storage in Enterprise: https://developer.zebra.com/blog/scoped-storage-enterprise-applications
- Google published documentation for each new release (samples, behaviour changes, API changes)
  - Lollipop, Marshmallow, Nougat, Oreo, Pie, 10, 11, 12
- Google published documentation for new Android Enterprise features (primarily EMM focused)
  - Nougat, Oreo, Pie , 10, 11, 12

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# Questions?

http://developer.zebra.com

Zebra Developer Community – LinkedIn Group

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