Zebra Developers

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What's new for Enterprise Developers in Android 11 and 12

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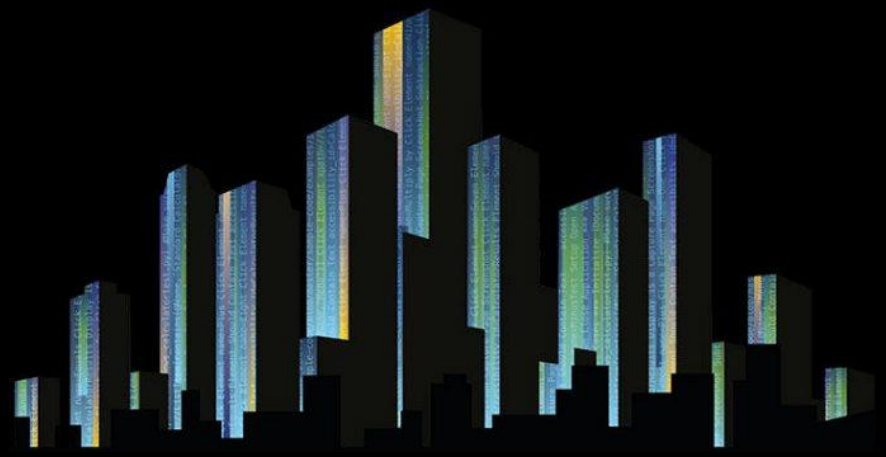

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November 3rd – 5th, 2021

What's new for Enterprise Developers in Android 11 & 12

Agenda

- What's new for Enterprise developers in Android 11
- What's new in Zebra for Android 11:
  - XML → JavaScript performance improvements
  - XML / JavaScript with the EMDK Profile Manager
  - Query provider for API target 30+
- What's new for Enterprise developers in Android 12

What's new for Enterprise Developers in Android 11 & 12

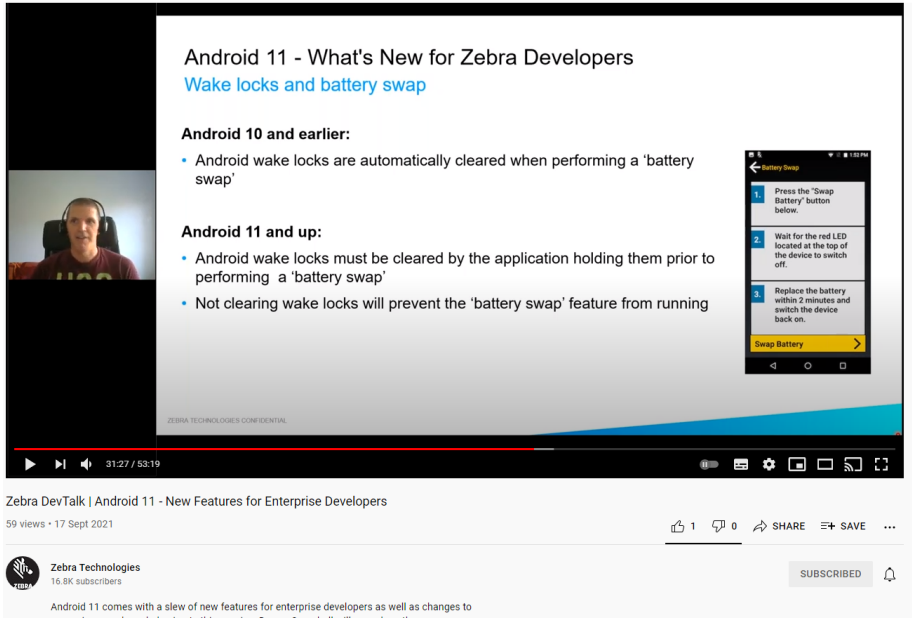
What's new for Enterprise developers in Android 11

- Scoped Storage
- Package Visibility
- Permission Changes
  - One-time permissions
  - Changes to "Deny" & "Don't ask again"
  - Permissions auto-reset
- Location Permission Changes
- Non-Runtime Permission changes
- Foreground Service changes
- Wake locks & battery swap
- Screen Recording
- Wireless Debugging
- Toast API
- Test App Compatibility
- Google Play Store requirements
- Restrictions on Non-SDK Interfaces

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 11

- Recent webinar on this topic:
  - Recording: https://www.youtube.com/watch?v=xm-_8kjiXlM
  - Slides: https://darryncampbell.co.uk/assets/slides/20210915_devtalk_android11.pdf
- Techdocs: Android 11 – Its impact on Zebra Developers:
  - https://techdocs.zebra.com/bestpractices/migration/android11/
- Deep dive into Scoped Storage options:
  - https://developer.zebra.com/blog/scoped-storage-enterprise-applications
- Google documentation:
  - Android 11 changes: https://developer.android.com/about/versions/11
  - Android 11 Enterprise changes: https://developer.android.com/work/versions/android-11



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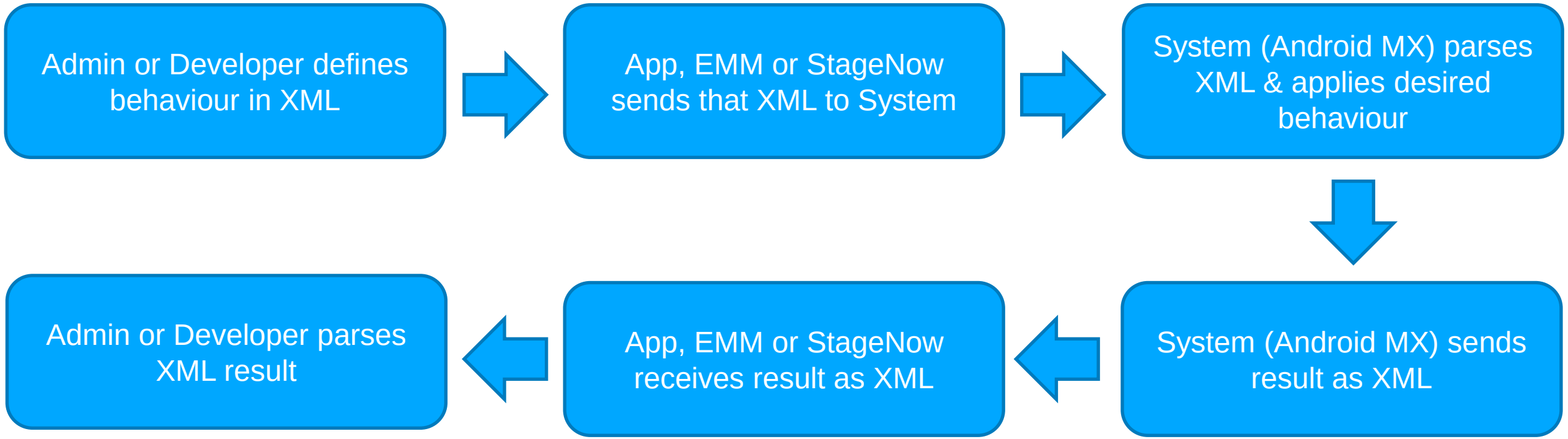
XML → JavaScript performance improvements: Current State (**A10** and below)



Total processing time: 1.30 seconds (representative)

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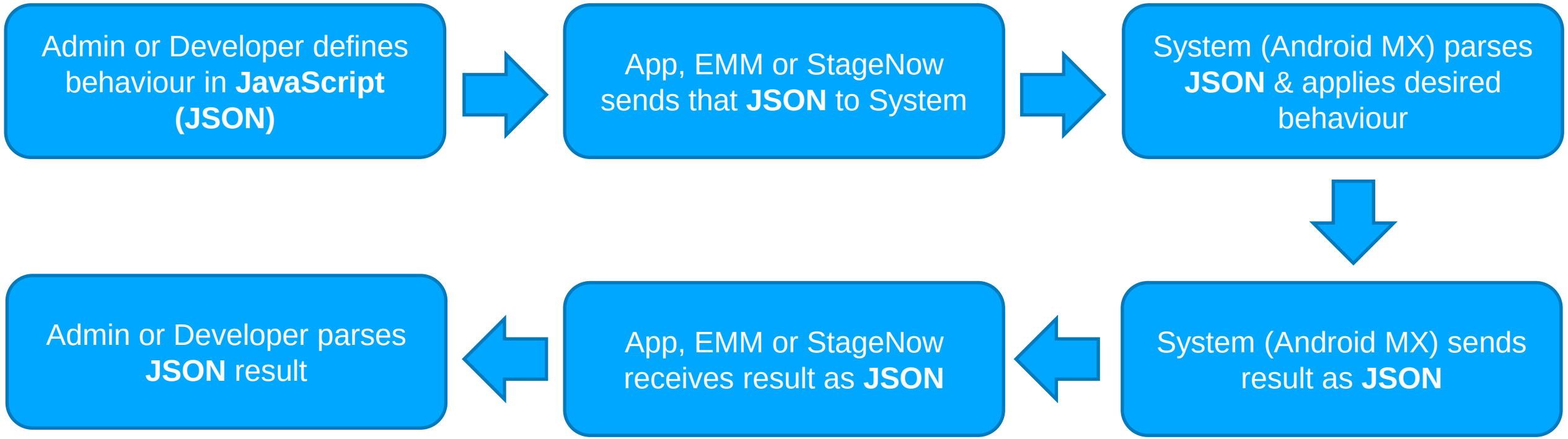
XML → JavaScript performance improvements: Future State (provisionally slated for **A12**)



Total processing time: 0.132 seconds (representative)

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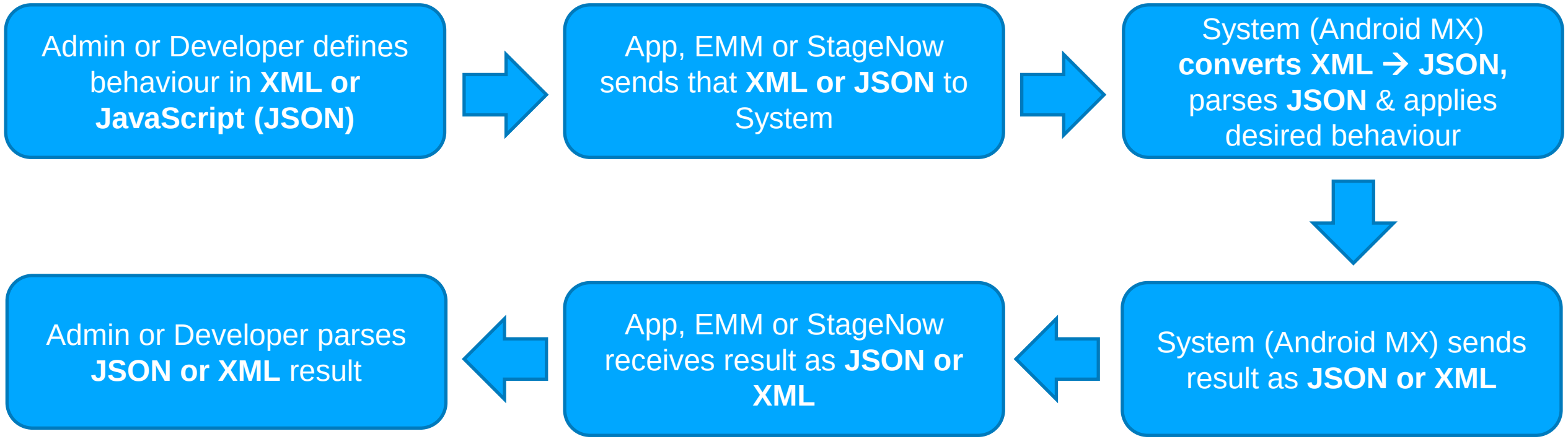
XML → JavaScript performance improvements: Future State : Intermediate State (**A11**)



Total processing time: 0.230 seconds (representative)

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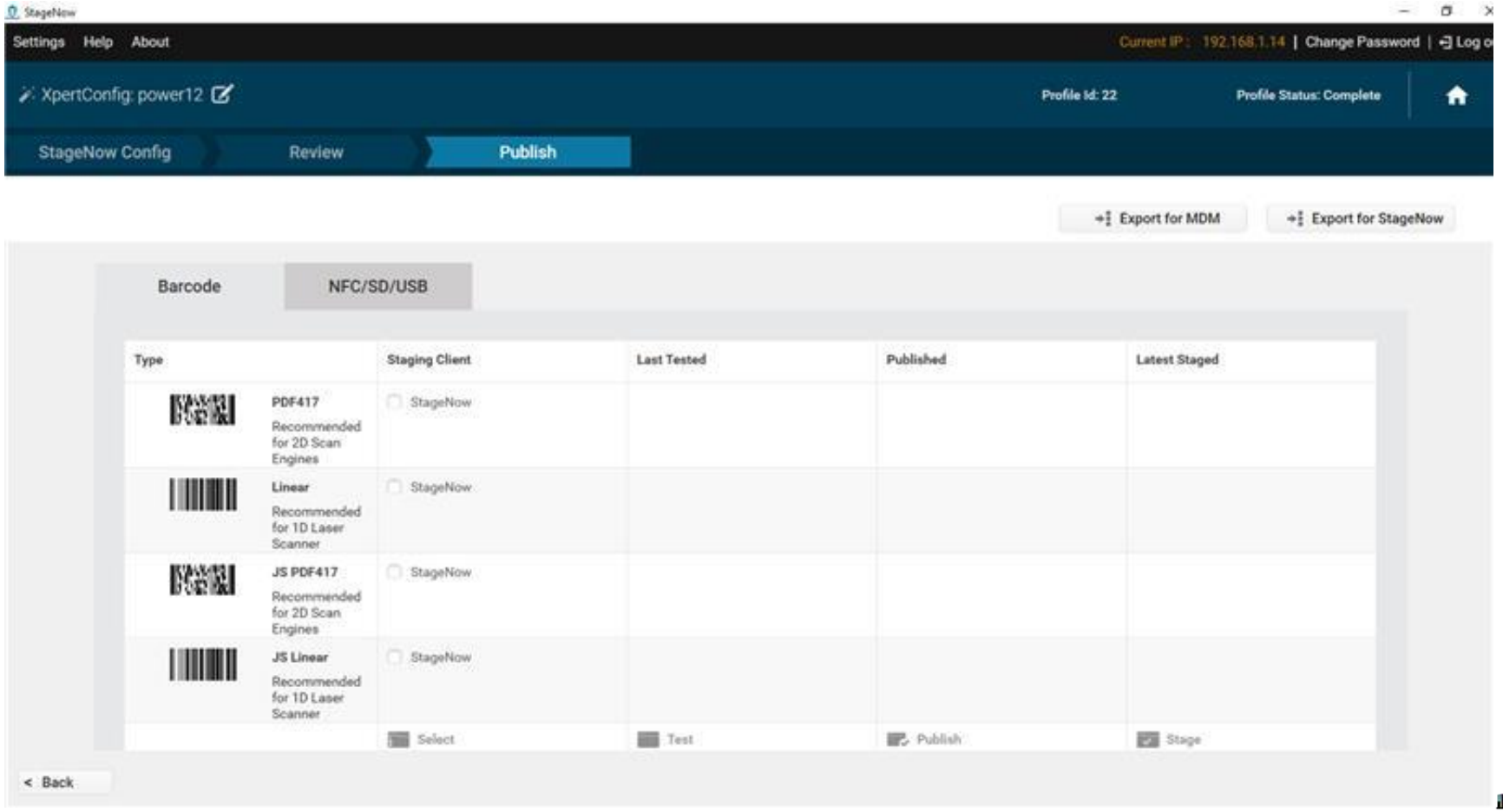
XML → JavaScript performance improvements: What StageNow will look like



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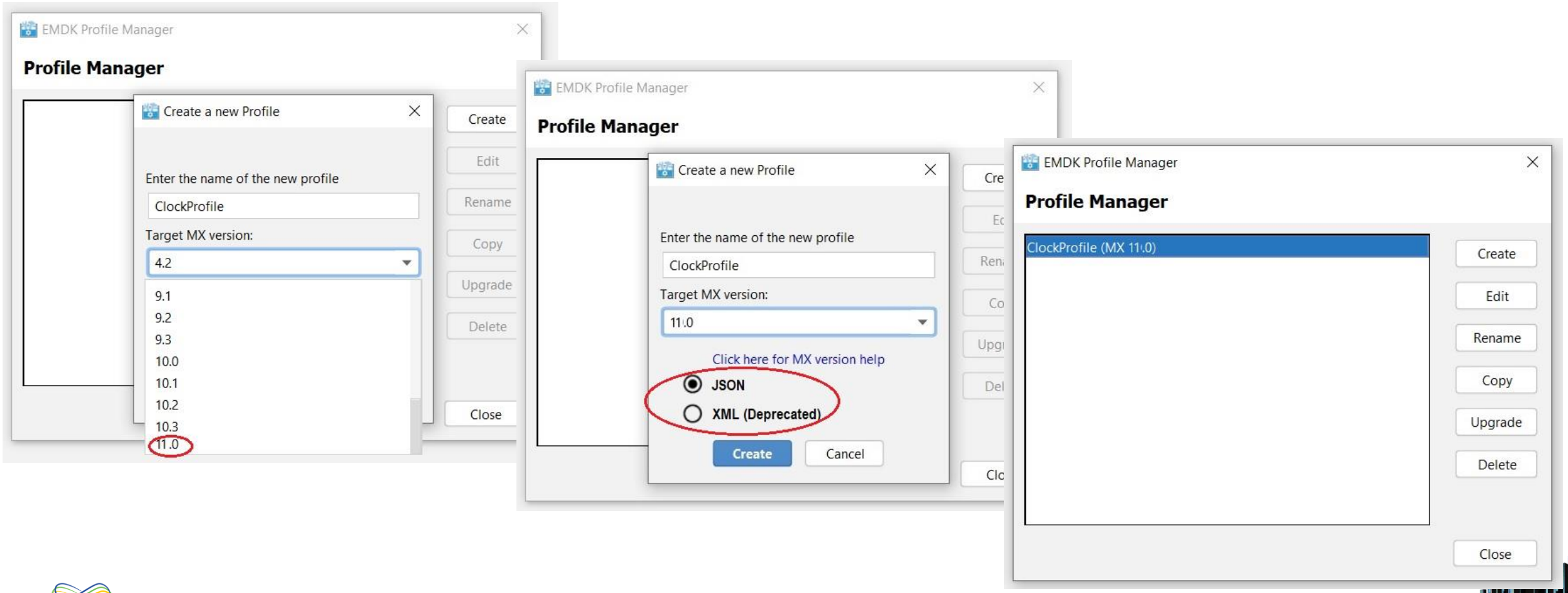
XML / JavaScript with the EMDK Profile Manager



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XML / JavaScript impact on EMDK Profile Manager: Applying EMDKConfig.xml without modification

```
//Assign the profile name used in EMDKConfig.xml/json
private String profileName = "ClockProfile-1";

//Get the ProfileManager object from EMDKManager object (delivered via onOpened() callback) to process the profiles
profileManager = (ProfileManager) emdkManager.getInstance(EMDKManager.FEATURE_TYPE.PROFILE);

//SET – Apply static configuration
EMDKResults results = profileManager.processProfile(profileName, ProfileManager.PROFILE_FLAG.SET, new String[1]);

//Check the return status of processProfile
if(results.statusCode == EMDKResults.STATUS_CODE.CHECK_XML) {

     //Get XML response as a String
     String statusXMLResponse = results.getStatusString();

     //Parse XML response for "parm-error" and "characteristic-error".
     //If the config got applied successfully, there shouldn't be matching entries.

}
```

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What's new for Zebra developers in Android 11

XML / JavaScript impact on EMDK Profile Manager: Applying EMDKConfig.**json** without modification

```
//Assign the profile name used in EMDKConfig.json
private String profileName = "ClockProfile-1";

//Get the ProfileManager object from EMDKManager object (delivered via onOpened() callback) to process the profiles
profileManager = (ProfileManager) emdkManager.getInstance(EMDKManager.FEATURE_TYPE.PROFILE);

//SET – Apply static configuration
EMDKResults results = profileManager.processProfile(profileName, ProfileManager.PROFILE_FLAG.SET, new String[1]);

//Check the return status of processProfile
if(results.statusCode == EMDKResults.STATUS_CODE.CHECK_RESPONSE) {

    //Get JavaScript response as a String
    String statusJSResponse = results.getStatusString();

    //Parse JS response for "ERROR" and "EXCEPTION" strings.
    //If the config got applied successfully, there shouldn't be matching entries of above error strings.
}
```

What's new for Enterprise Developers in Android 11 & 12

What's new for Zebra developers in Android 11

XML / JavaScript impact on EMDK Profile Manager: Applying Dynamic XML from Code

```
//Assign the profile name used in EMDKConfig.xml
private String profileName = "ClockProfile-1";

//Get the ProfileManager object from EMDKManager object (delivered via onOpened() callback) to process the profiles
profileManager = (ProfileManager) emdkManager.getInstance(EMDKManager.FEATURE_TYPE.PROFILE);

//Prepare XML to modify the existing profile
String[] modifyData = new String[1];

//XML Request
modifyData[0] =
            "<?xml version=\"1.0\" encoding=\"utf-8\"?>" +
                    "<characteristic type=\"Profile\">" +
                    "<parm name=\"ProfileName\" value=\"ClockProfile-1\"/>" +

                    "</characteristic "<characteristic type=\"Clock\" version=\“10.2\">" +
                    "<parm name=\"TimeZone\" value=\"" + timeZone + "\"/>" +
                    "<parm name=\"Date\" value=\"" + date + "\"/>" +
                    "<parm name=\"Time\" value=\"" + time + "\"/>" +
                    "</characteristic>";

//Apply dynamic configuration
EMDKResults results = profileManager.processProfile(profileName, ProfileManager.PROFILE_FLAG.SET, modifyData[0]);

//Check the return status of processProfile
if(results.statusCode == EMDKResults.STATUS_CODE.CHECK_XML) {

//Get XML response as a String
String statusXMLResponse = results.getStatusString();

//Parse XML response for “parm-error” and “characteristic-error” strings.
//If the config got applied successfully, there shouldn’t be matching entries.

}
```

What's new for Enterprise Developers in Android 11 & 12

What's new for Zebra developers in Android 11

XML / JavaScript impact on EMDK Profile Manager: Applying Dynamic **JSON** from Code

```
//Assign the profile name used in EMDKConfig.json
private String profileName = "ClockProfile-1";

//Get the ProfileManager object from EMDKManager object (delivered via onOpened() callback) to process the profiles
profileManager = (ProfileManager) emdkManager.getInstance(EMDKManager.FEATURE_TYPE.PROFILE);

//Prepare JSON to modify the existing profile
String configStr;

//JSON dynamic configuration (Clock)
try {
    JSONObject clkData = new JSONObject();
    clkData.put("TimeZone", timeZone);
    clkData.put("Date", date);
    clkData.put("Time", time);

    JSONObject config = new JSONObject();
    config.put("Clock", clkData);

    configStr = config.toString();

} catch (JSONException e) {
    e.printStackTrace();
}

//Apply dynamic configuration
EMDKResults results = profileManager.processProfile(profileName, ProfileManager.PROFILE_FLAG.SET, configStr);

//Check the return status of processProfile
if(results.statusCode == EMDKResults.STATUS_CODE.CHECK_RESPONSE) {

    //Get JavaScript response as a String
    String statusJSResponse = results.getStatusString();

    //Parse JS response for "ERROR" and "EXCEPTION" strings.
    //If the config got applied successfully, there shouldn't be matching entries of above error strings.
}
```

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XML / JavaScript impact on EMDK Profile Manager: Handling responses (EMDK Error)

```
<?xml version="1.0" encoding="utf-8"?>
<wap-provisioningdoc>
<characteristic type="status">
    <parm name="code" value="4"/>
    <parm name="description" value="Profile name is empty"/>
    <characteristic type="extended_status">
        <parm name="code" value="0"/>
        <parm name="description" value=""/>
    </characteristic>
</characteristic>
</wap-provisioningdoc>
```

```
{
    "status":
    {
        "code":4,
        "description":"Profile name is empty“,
        "extended_status":
        {
            "code":0,
            "description":""“
        }
    }
}
```

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XML / JavaScript impact on EMDK Profile Manager: Handling responses (Exception applying profile)

```
<?xml version="1.0" encoding="UTF-8"?>
<wap-provisioningdoc>
<characteristic type="status">
    <parm name="code" value="6"/>
    <parm name="description" value="Review the XML for details"/>
    <characteristic type="extended_status">
        <parm name="code" value="0"/>
        <parm name="description" value=""/>
    </characteristic>  </characteristic>
<characteristic-error type="Clock" version="10.2“ desc=“exception”>
    <parm name="AutoTimeZone" value="false"/>
    <parm name="TimeZone" value="GMT+05:45"/>
    <parm name="AutoTime" value="false"/>
    <parm name="CoordinateSystem" value="1"/>
    <parm name="Date" value="2014-11-22"/>
    <parm-error name="Time" value=“xxxx“ desc=“Exception in updating time.”/>
</characteristic-error>  </wap-provisioningdoc>
```

```
{"status":{
    "code":12,
    "description":"Review the JavaScript response for details",
    "extended_status":{
        "code":0,
        "description":""} },
"response": {\"status\":\"EXCEPTION\",\"msg\":\"Task
completed\",\"result\":\"[
{\"command\":\"setSystemSetting\",\"message\":\"AutoTimeZone:Suc
cessfully applied setting -
auto_time_zone\",\"resultsUpdated\":[{}],\"status\":\"SUCCESS\"},
{\"command\":\"setTimeZone\",\"message\":\"Successfully updated
time zone.
\”GMT+05:45\",\"resultsUpdated\":[{}],\"status\":\"SUCCESS\"},
{\"command\":\"setSystemSetting\",\"message\":\"AutoTime:Success
fully applied setting -
auto_time\",\"resultsUpdated\":[{}],\"status\":\"SUCCESS\"},
{\"command\":\"setTime\",\"message\":\"Time:\"Exception in updating
time. \"xxxx\",\"resultsUpdated\":[{}],\"status\":\"EXCEPTION\"},
{\"command\":\"setDate\",\"message\":\"\"Successfully updated date.
\"2021-05-02\",\"resultsUpdated\":[{}],\"status\":\"SUCCESS\"}]\"}“}
```

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What's new for Zebra developers in Android 11

Query provider for API target 30+

- 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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Query provider for API target 30+

- **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>
```

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Trends over Time

								
	Lollipop (5)	Marshmallow	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 behaviour	Restrictive bucket, FGS Launch Restrictions
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, FGS UX 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 Device identifiers	Scoped Storage enforcement Permission logic	App Hibernation, Exact alarm permission
Android Enterprise features	Android for Work, app restrictions	DO mode, lock task, managed configs	DPM API changes	DPM API changes	DPM API changes	Transition to DO mode	DPM API changes	DPM API changes

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What's new for Enterprise developers in Android 12

Restrictive App Standby bucket

- Extension to app bucket priorities, introduced in Android Pie
- The buckets:
  1. Active: App is currently being used or was used recently
  2. Working set: App is in regular use
  3. Frequent: App is often used, but not every day
  4. Rare: App is not frequently used
  5. **Restricted: This is the new state**
  6. Never: The app has never been run
- Just as with the existing bucket logic, you have no way as a developer to influence which app your bucket is in and the best advice is to work with restrictions.

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Applies to: All apps

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Bucket	Description
Active	User is currently engaged with the application and Android considers it to be in the foreground. **Restrictions:** none
Working set	Application is not currently active but runs often. **Restrictions:** Jobs and Alarms will be deferred. No restrictions on network access or FCM.
Frequent	Application is used regularly but not necessarily every day. **Restrictions:** Jobs and Alarms will be deferred for longer than applications in the working set. No restrictions on network access but Firebase Cloud Messaging is limited to 10 high priority messages a day.
Rare	Application is not often used. **Restrictions:** Jobs and Alarms will be deferred for longer than applications in the frequent set. Network access is deferred and FCM is limited to 5 high priority messages a day.
Restricted	"Your app is less likely to be placed in the restricted bucket if your app uses system resources responsibly" **Restrictions:** Jobs & inexact Alarms only run once per day, fewer expedited jobs can run. FCM is limited to 5 high priority messages a day. **Restrictions apply even when the device is charging, unlike other buckets**.
Never	Application has been installed but never run. "The system imposes **severe restrictions** on these apps."

Applies to: All apps

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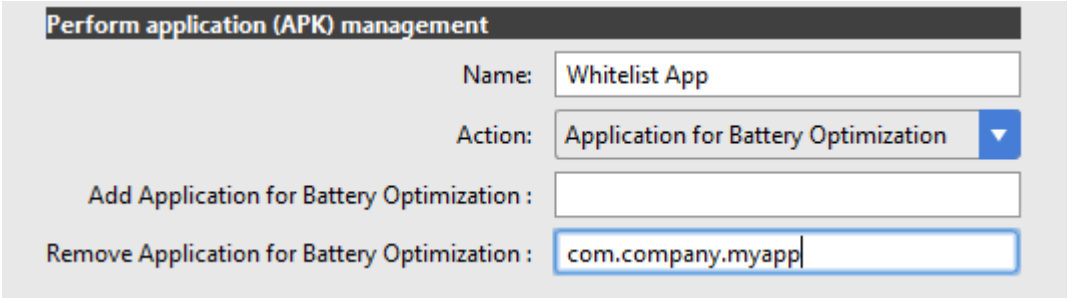
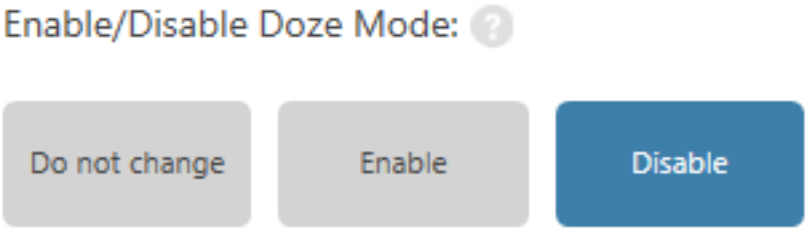
Restrictive App Standby bucket

- In common with all bucket-based restrictions, **applications which are on the doze exception list are exempt from bucket-based restrictions**.
  - *Not recommended for all apps as will increase power consumption*.
- Zebra have a couple of administrator features to whitelist an application:
  - Whitelist a particular app with the App Manager



  - Disable Doze Mode entirely on the device with the Power Manager



Applies to: All apps

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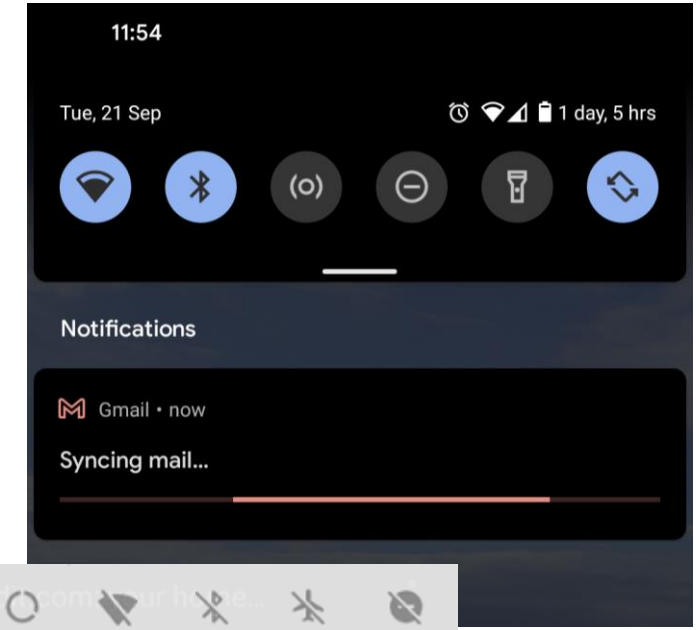
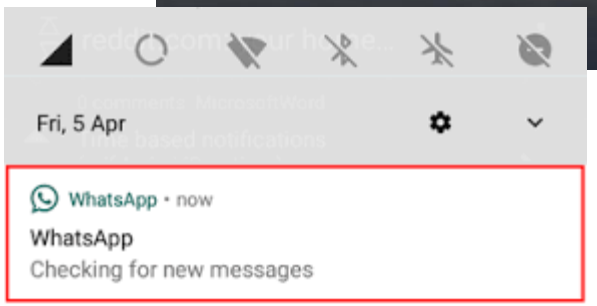
What's new for Enterprise developers in Android 12

Foreground Service Notifications UX delay

- Apps frequently use a Foreground Service to circumvent Android background restrictions
- Some applications use this feature for short activity, to be sure that Android permits it:
- Real world examples you may have seen a brief notification for:
  - Gmail: Syncing mail
  - Covid exposure app: Contact tracing active
  - WhatsApp: Checking for new messages / deleting messages





- **In A12, this brief notification will not be seen for 10 seconds, to improve user experience.**
- Some exceptions exist: Notification has action buttons; FGS performs media playback has phone capabilities; notification has opted out of this behaviour

Applies to: All apps

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Foreground Service Launch Restrictions

- Apps that target A12 can no longer start FGS while running in the background
- Apps are encouraged to use WorkManager where possible, including the new expedited jobs.
  - Expedited jobs are expected to complete in less than 3 minutes
  - Expedited jobs are run immediately, *provided the system does not have excessive workload*.
  - If the task is not urgent, use a standard WorkManager periodic or scheduled job.
  - See also JobInfo.Builder.setExpedited documentation
- Most alarms (except SCHEDULE_EXACT_ALARM) cannot set FGS when their alarm fires

- More detail: https://developer.android.com/about/versions/12/foreground-services
- Exceptions exist, see next slide

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Foreground Service Launch Restrictions

- Exceptions:
  - App transitions from a user-visible state or has an activity on the back stack of an existing task
  - App receives a high priority FCM
  - User performs a UI interaction, e.g. taps on a bubble, notification, widget or activity
  - App is the current device input method
  - App receives a geofencing or activity recognition transition
  - **After the app receives ACTION_BOOT_COMPLETE**, ACTION_LOCKED_BOOT_COMPLETE or ACTION_MY_PACKAGE_REPLACED Intent
  - App receives Timezone changed Intents
  - App receives BLUETOOTH_CONNECT or BLUETOOTH_SCAN Intents
  - **User turns off battery optimizations for your app**

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Applies to: Apps targeting A12+ (API Level 31+)

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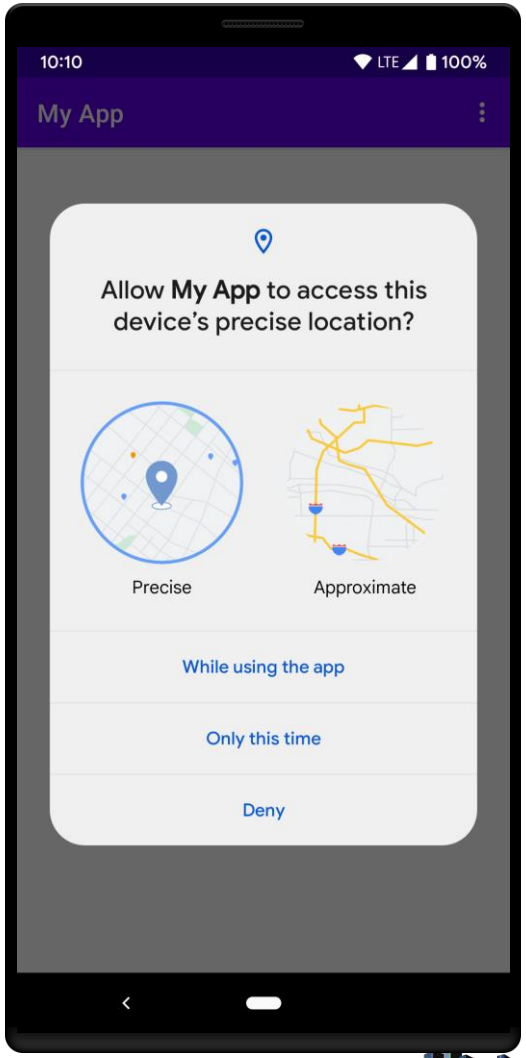
What's new for Enterprise developers in Android 12

Approximate Location

- Apps requiring ACCESS_FINE_LOCATION (*GPS provider*) should request BOTH ACCESS_FINE_LOCATION and ACCESS_COARSE_LOCATION (*Network provider*) in the same runtime permission request.
  - Requesting only fine location will result in the request being ignored
- Will receive the dialog on the right
- User may choose to only grant coarse location, which your app must handle
- Separate from related permission rules such as ACCESS_BACKGROUND_LOCATION and one time permission requests
- **Most enterprise apps will pre-grant runtime permissions**
- More information on Approximate location: Android docs
  - Apps which only request coarse location are unaffected by this change



Applies to: Apps targeting A12+ (API Level 31+)

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App Hibernation

- Expansion of the 'Permission auto-reset' behaviour introduced in Android 11
- If the user does not "interact" with your app for "a few months" it is put into a hibernation state
- Examples of "interaction":
  - Resuming one of your app's activities
  - Interact with a widget belonging to your app
  - Tap (not dismiss) on one of your app's notifications
- What does hibernation look like:
  - App cache is cleared
  - Application cannot run background jobs
  - Application cannot receive FCM push notifications
  - Similar behaviour to if the user force-stops your app

Applies to: Apps targeting A12+ (API Level 31+)

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App Hibernation

- You can request your app be exempt from hibernation by sending an Intent, Intent.ACTION_APPLICATION_DETAILS_SETTINGS.
  - Takes the user into the settings screen to exempt your app
  - Requires manual interaction
- Test the hibernation behaviour with adb shell commands

- **TBD: Ways to automatically exempt your app from hibernation without relying on user interaction**

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Safer Component Exporting

- Activities, Services or Broadcast receivers that use Intent Filters must explicitly declare the android:exported attribute for these components.
- Prior to A12, not declaring android:exported on a component that included an Intent Filter would implicitly default to "true", therefore *there should be no functional change*, just the need to update your app manifest.
- Not declaring android:exported will prevent your app from installing on A12

```
<service android:name="com.example.app.backgroundService"
         android:exported="false">
    <intent-filter>
        <action android:name="com.example.app.START_BACKGROUND" />
    </intent-filter>
</service>
```

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Pending Intent Mutability

- Pending Intents (PIs) are used in some Zebra enterprise APIs, e.g. Enterprise Keyboard allows you to receive layouts via a Pending Intent
  - This works by you providing a PI to the interface which is updated with the return values requested
- In A12, you must specify the mutability of each Pending Intent you create
- Android recommends to declare your PI as immutable in most cases
- **Remember your PI MUST be MUTABLE if you intend it to be modified, as in the above example for Enterprise Keyboard.**

Kotlin Java

```
PendingIntent pendingIntent = PendingIntent.getActivity(getApplicationContext(),
        REQUEST_CODE, intent,
        /* flags */ PendingIntent.FLAG_IMMUTABLE);
```

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Applies to: Apps targeting A12+ (API Level 31+)

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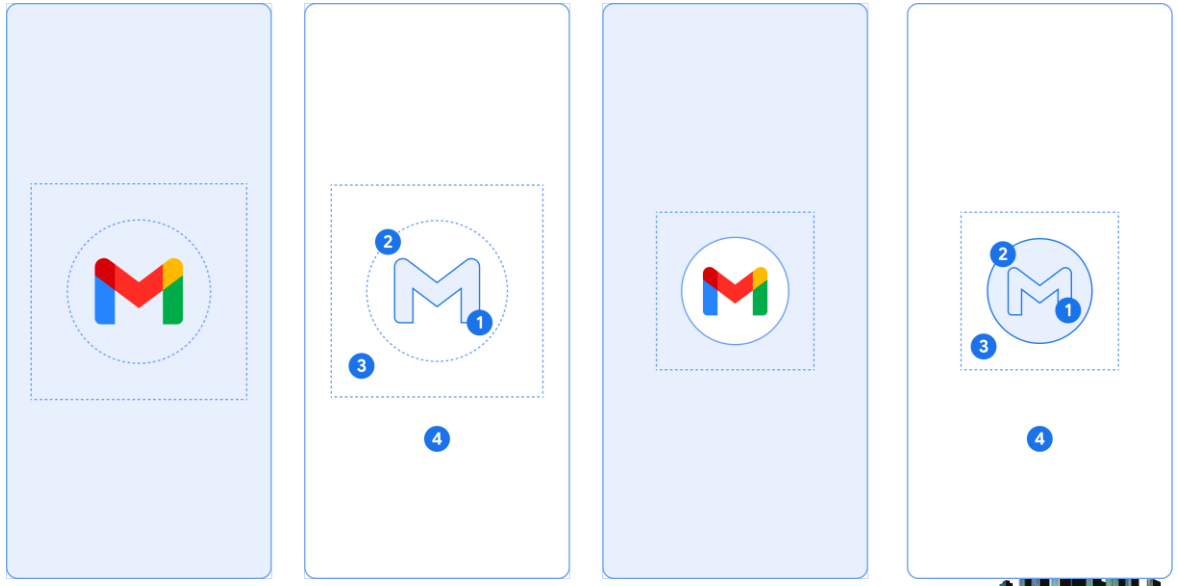
New Splash screen API

- Today: applications are displaying splash screens using either a launcher theme or some other custom logic
- In A12: A new Splash screen API has been introduced:
  - Animatable with enter and exit animations
  - Customizable adaptive icon and background
- Google documentation:
  - Splash screen feature
  - Migrating your splash screen
- Compat library exists to support <A12



Applies to: All apps

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What's new for Enterprise developers in Android 12

Bouncy Castle implementation removed (per Google docs):

Android 12 has removed many BouncyCastle implementations of cryptographic algorithms that were previously deprecated, including all AES algorithms. The system instead uses the Conscrypt implementations of these algorithms.

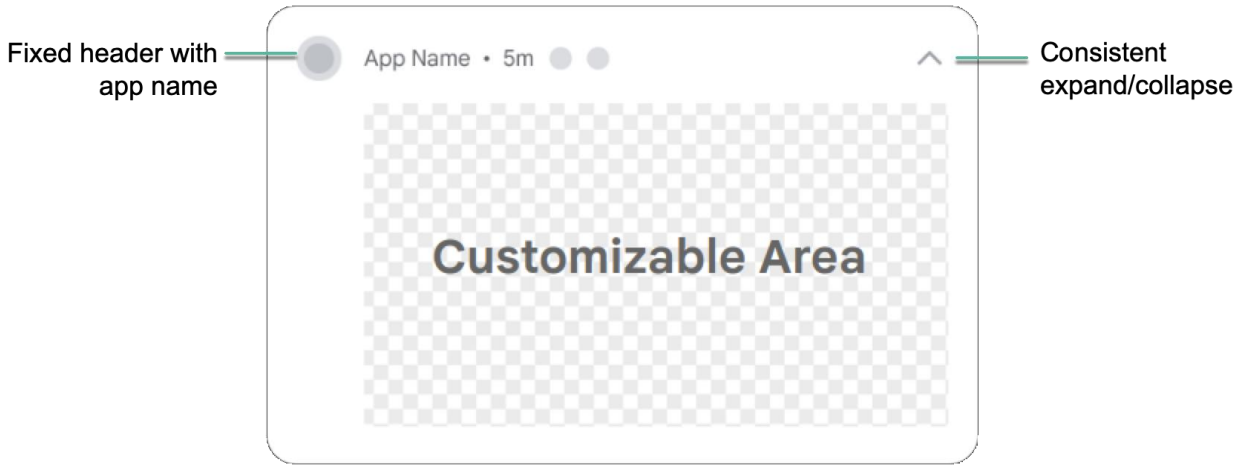
This change affects your app if any of the following are true:

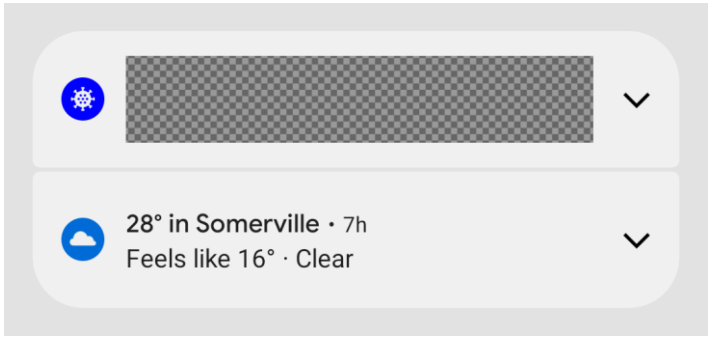
- **Your app uses 512-bit key sizes.** Conscrypt doesn't support this key size. If necessary, update your app's cryptography logic to use different key sizes.
- **Your app uses invalid key sizes with KeyGenerator.** Conscrypt's implementation of KeyGenerator performs additional validation on key parameters, compared to BouncyCastle. For example, Conscrypt doesn't allow your app to generate a 64-bit AES key because AES only supports 128-, 192-, and 256-bit keys.
  - BouncyCastle allows keys of invalid sizes to be generated, but later fails if these keys are used with a Cipher. Conscrypt fails earlier.
- **You initialize your Galois/Counter Mode (GCM) ciphers using a size other than 12 bytes.** Conscrypt's implementation of GcmParameterSpec requires an initialization of 12 bytes, which NIST recommends.

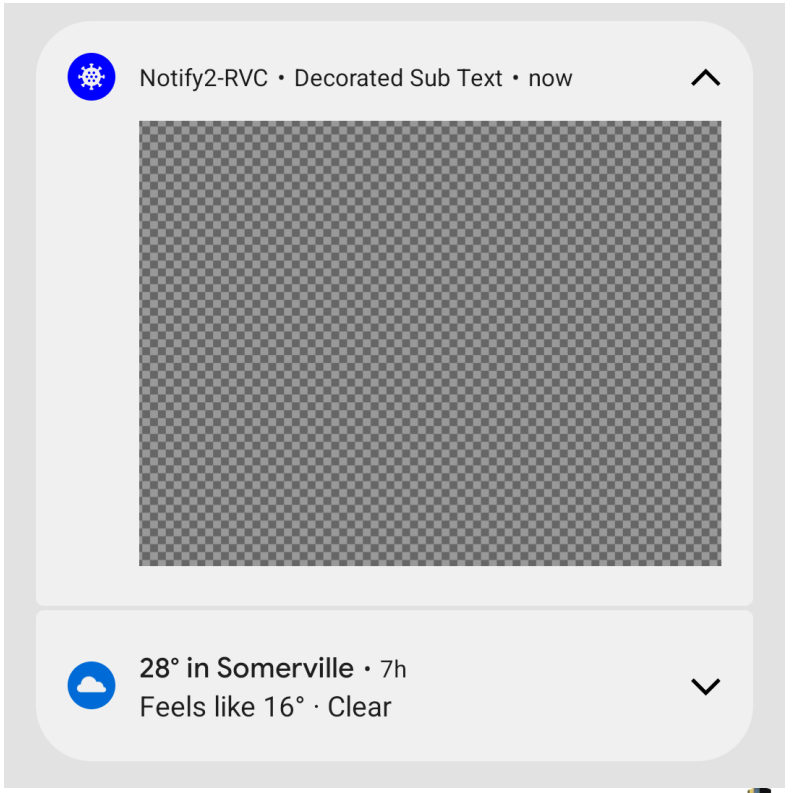
What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

Custom Notifications: Previously the entire notification could be customized but in A12, only a portion of the notification area can be customized







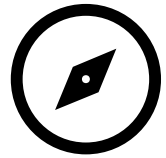
Applies to: Apps targeting A12+ (API Level 31+)

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

Motion Sensors are rate-limited

- User privacy enhancement in A12
- Motion sensors including accelerometer, gyroscope and geomagnetic field sensor are affected.
- Frequency is limited to 200Hz or 50Hz depending on API
- New permission, HIGH_SAMPLING_RATE_SENSORS, can be requested
  - This has protection level 'normal' and allows access to sensors at greater than 200Hz



- Rate limiting also applies if the user disables the camera / microphone via the new settings toggles, regardless of whether your app requests HIGH_SAMPLING_RATE_SENSORS

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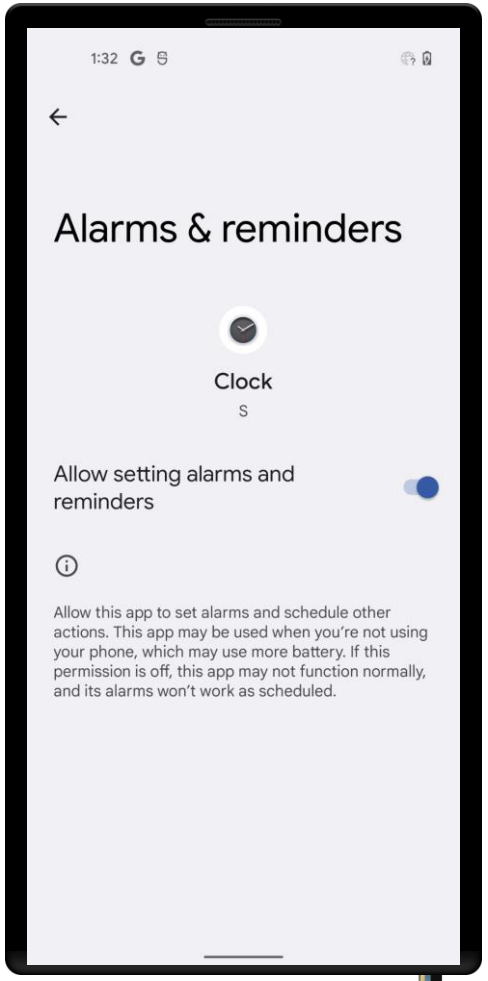
Applies to: Apps targeting A12+ (API Level 31+)

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

Exact Alarm Permission

- Android 12 requires the "Alarms & reminders" special app access for apps that target Android 12, then set exact alarms. What is an 'exact' alarm?:
  - setAlarmClock()
  - setExact()
  - setExactAndAllowWhileIdle()
- Inexact alarms are unaffected
- App can request via a specific Intent but requires user interaction
- **TBD: How to grant this permission in enterprise without user interaction**
- Apps granted the "Alarms & reminders" app access are exempt from the new Foreground service restrictions



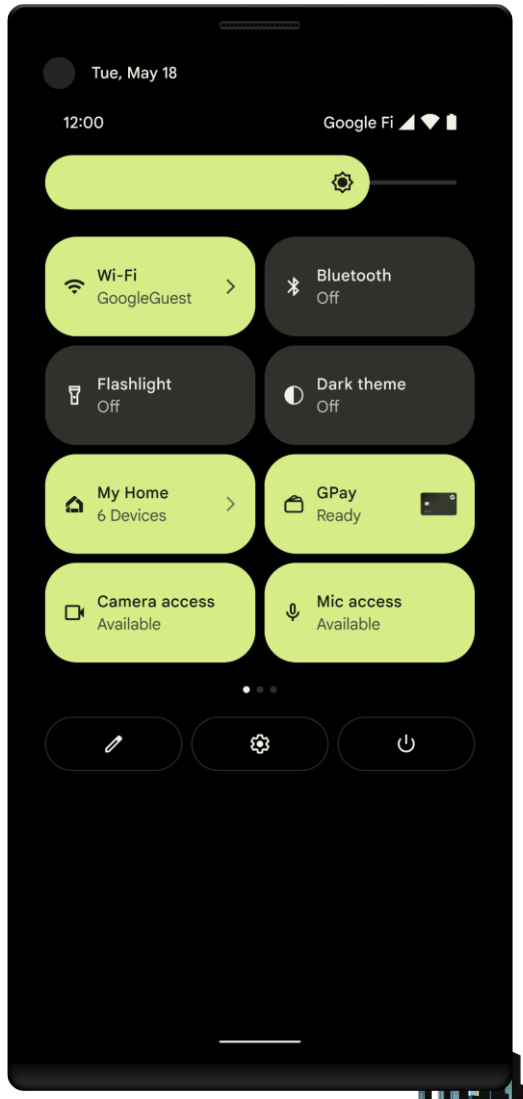
Applies to: Apps targeting A12+ (API Level 31+)

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

Camera / Microphone toggles & indicators

- New Quick Settings options to toggle camera and Microphone access for ALL apps
- No need to re-write applications to handle these toggles:
  - Apps will receive a blank camera feed when camera is disabled
  - Apps will receive a silent audio feed when mic is disabled
  - System state can be detected by app
- Also accessible from the privacy screen in the settings menu
- Does not affect emergency services functionality
- Full screen apps will show camera / mic indicators when in use
- **These options are <u>likely not user accessible</u> in enterprise deployments**



Applies to: All apps

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

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)

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

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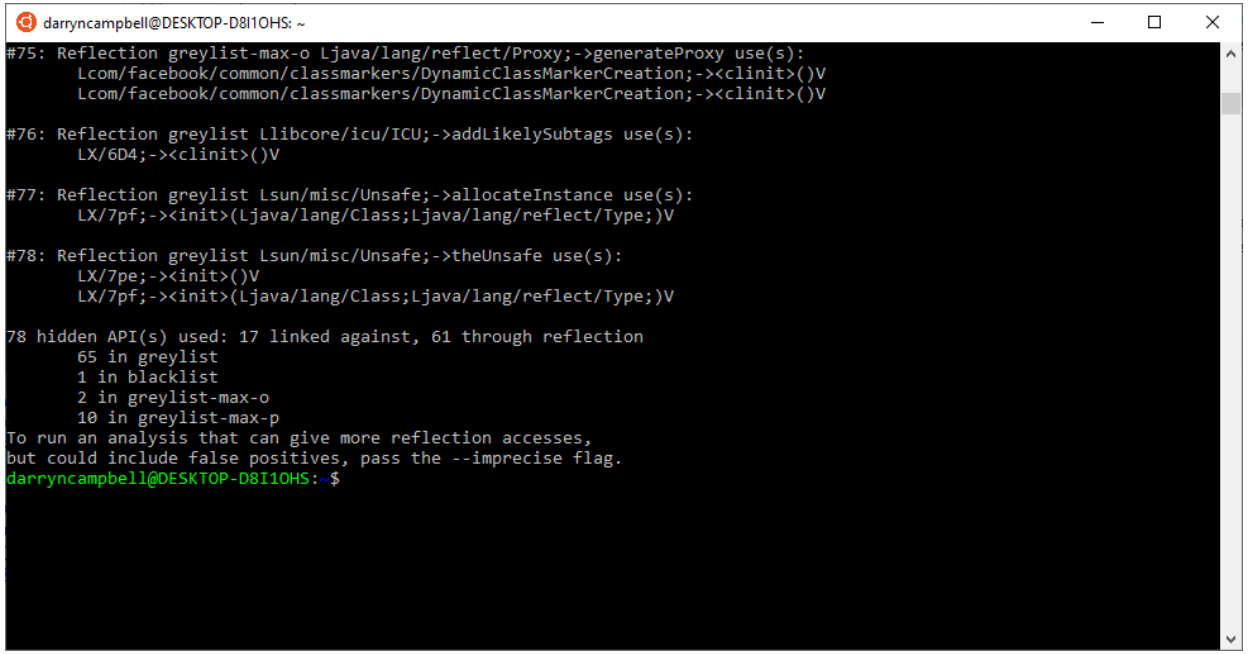
Applies to: All apps

What's new for Enterprise Developers in Android 11 & 12

What's new for Enterprise developers in Android 12

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
- Specific list of A12 changes is here.
- Various forms of analysis exist for a developer to detect if they are calling any forbidden APIs



What's new for Enterprise Developers in Android 11 & 12

Resources

- Android 11:
  - DevTalk: https://www.youtube.com/watch?v=xm-_8kjiXlM
  - Slides: https://darryncampbell.co.uk/assets/slides/20210915_devtalk_android11.pdf
  - Detailed overview on TechDocs: https://techdocs.zebra.com/bestpractices/migration/android11/
- Android 12:
  - Behaviour changes (all apps): https://developer.android.com/about/versions/12/behavior-changes-all
  - Behaviour changes (Target A12): https://developer.android.com/about/versions/12/behavior-changes-12
  - Features & changes (Summary): https://developer.android.com/about/versions/12/summary
  - What's new for enterprise in A12: https://developer.android.com/work/versions/android-12

What's new for Enterprise Developers in Android 11 & 12

Questions?

https://developer.zebra.com

Zebra Developers Community – LinkedIn Group

@ZebraDevs

https://github.com/ZebraDevs

Thank You

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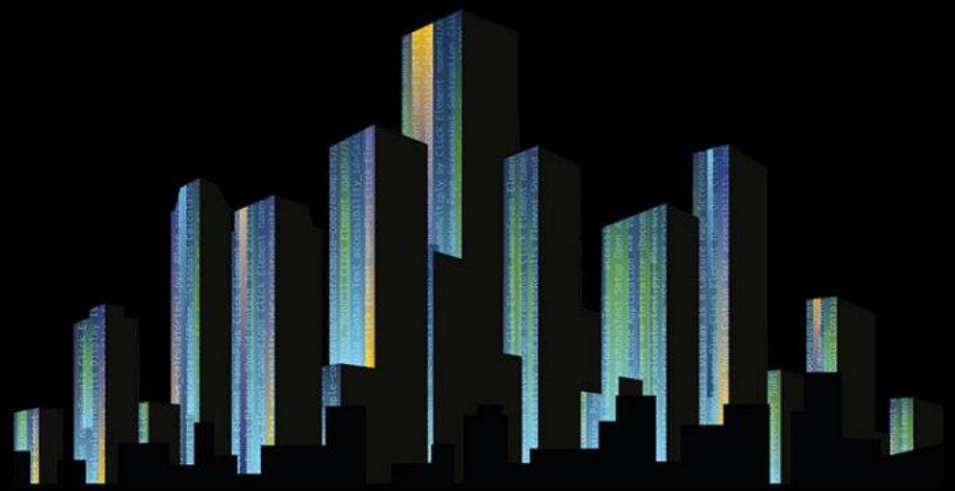

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