

Zebra Developers

Build Your Edge





Updating your App for Scoped Storage & Enterprise Persistence

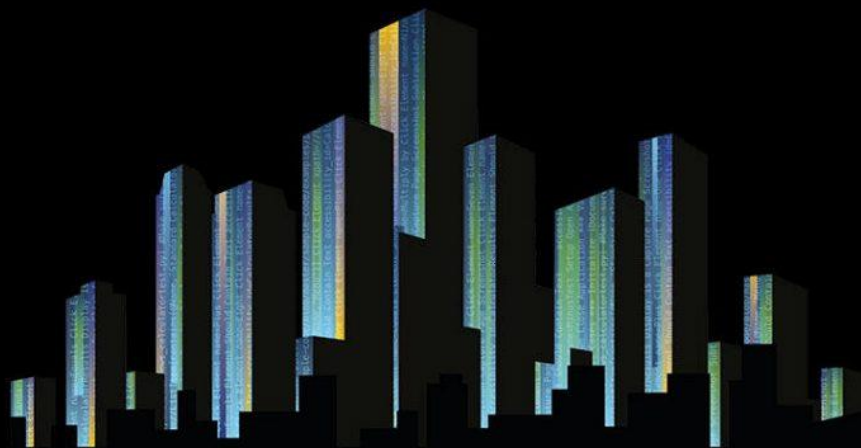


Zebra
DevCon 2021
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@darryncampbell

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Updating your App for Scoped Storage & Enterprise Persistence

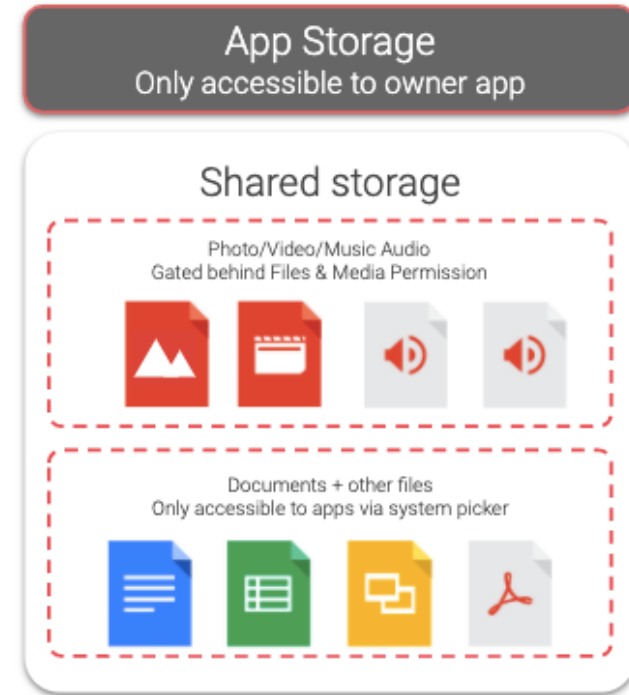
Agenda

- What is Scoped Storage?
- Google recommendations for Scoped Storage
 - Private apps vs. Play Store apps
- Alternatives & recommendations on Zebra devices
 - /enterprise folder
 - Zebra alternatives: Secure Storage Manager
 - Configuring Enterprise Home Screen (EHS)
 - Configuring Enterprise Keyboard (EKB)
 - Configuring Device Central
 - Configuring Enterprise Browser (EB)

Updating your App for Scoped Storage & Enterprise Persistence

What is Scoped Storage?

- 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.



Updating your App for Scoped Storage & Enterprise Persistence

What is 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>
```

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What is Scoped Storage?

Is my app subject to Scoped Storage?

Target SDK of application	Android version on device	App has specified requestLegacyExt flag?	Is app subject to scoped storage?
Does not matter	Oreo	Does not matter	No
29	A10 or A11	Yes	No
29	A10 or A11	No	Yes
30	A10	Yes	No
30	A10	No	Yes
30	A11	Does not matter	Yes

Updating your App for Scoped Storage & Enterprise Persistence

What is 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.
 - 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.

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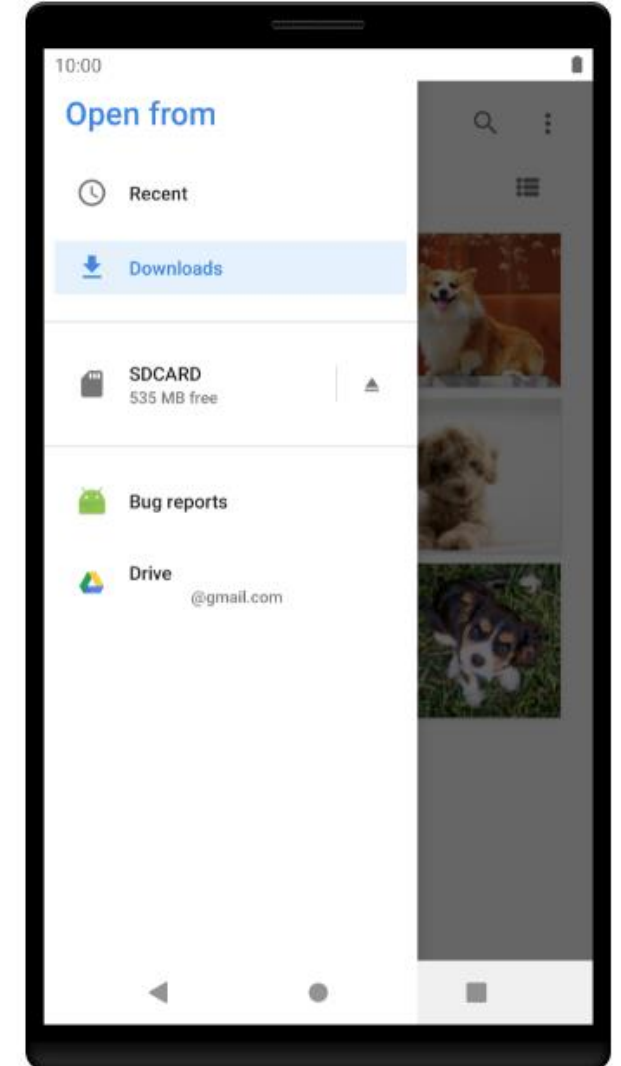
Google Recommendations for Scoped Storage

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Google Recommendations for Scoped Storage

Storage Access Framework (SAF)

- Android API based on content providers:
<https://developer.android.com/guide/topics/providers/document-provider>
- Includes:
 - Document provider (to share files between processes)
 - Client app (your app)
 - Picker (shown right)
- The requirement to use a file picker means SAF is unsuited for unattended use cases such as remote provisioning or remote configuration



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Google Recommendations for Scoped Storage

Dedicated shared folder for media storage

- Part of standard Android data storage:
<https://developer.android.com/training/data-storage/shared/media>
- The following file types can be shared using the media store:
 - Images
 - Videos
 - Audio files
- Because of the limited mime types supported, the media folders will only apply to a limited set of Enterprise Use cases
 - Note, whilst the Downloaded files folder is referenced in the documentation, be aware that applications accessing the downloads folder through the recommended [MediaStore API](#) will only be able to see their **own** files.



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Google Recommendations for Scoped Storage

Use a file provider to share files

- Android's recommended system to share files from one application to another is known as the FileProvider: <https://developer.android.com/training/secure-file-sharing/setup-sharing>
- If your use case involves sharing a file directly from one application on-device to another, you might consider doing so with a file provider rather than a world readable / world-writeable location.

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Google Recommendations for Scoped Storage

Use managed configurations in preference to config.file

- If you are currently using a configuration file and deploying / reading that file from a world readable / world writeable location, you should consider using managed configurations in preference.
- Android documentation: <https://developer.android.com/work/managed-configurations>
- This is particularly applicable to enterprise deployments through an EMM.

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Google Recommendations for Scoped Storage

Manifest options:

- `requestLegacyExternalStorage`
 - You can continue to request this flag and, provided your application continues to target API level 29, your application will never be subject to scoped storage.
 - Remember: Applications cannot be posted in the Play store which target anything lower than API level 30
- `preserveLegacyExternalStorage`
 - You can set this flag and your application will not be subject to scoped storage during any upgrade.
 - A fresh install of the app will ignore this flag and your app **will** be subject to scoped storage.

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Google Recommendations for Scoped Storage

Manifest options:

- **MANAGE_EXTERNAL_STORAGE**
 - Your application will not be subject to scoped storage if it declares and is granted the **MANAGE_EXTERNAL_STORAGE** permission.
 - Caveat: When granted by the user, this permission requires them to navigate into the settings screen to grant the app 'special access'.
 - Note: access can be granted via OEMConfig (for EMMs) or StageNow
 - Caveat: Applications cannot be posted to the Play Store unless they meet [pre-defined use cases](#)

```
<uses-permission  
    android:name="android.permission.MANAGE_EXTERNAL_STORAGE"/>
```

The Google Play store has a policy that limits usage of **MANAGE_EXTERNAL_STORAGE**

```
android.Manifest.permission  
public static final String MANAGE_EXTERNAL_STORAGE = "android.permission.MANAGE_EXTERNAL_STORAGE"  
  
< Android API 30 Platform >
```

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Private apps vs. Managed Play Store apps vs. Play Store apps

Public applications

- Can only use `MANAGE_EXTERNAL_STORAGE` if they comply with Google's stated use cases in their Play Store policy for all files access.

Private applications

- CAN make use of `MANAGE_EXTERNAL_STORAGE`, not subject to the Play Store policy for all files access.

Applications distributed to specific organizations through the managed Play Store

- Gray area: Recommend you follow guidance for public applications

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Alternatives & Recommendations on Zebra Devices

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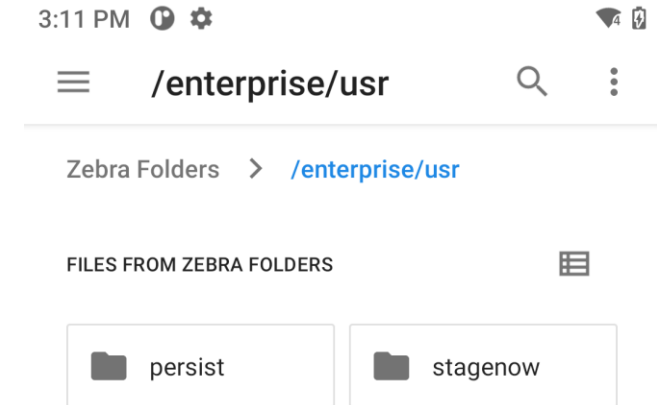
Zebra Recommendations: [/enterprise](#)

/enterprise folder

- Folder exists today on all our mobile devices
- Used for offline storage and persists across an enterprise reset

Use with caution:

- Not inherently secure
- “Circumvents” scoped storage

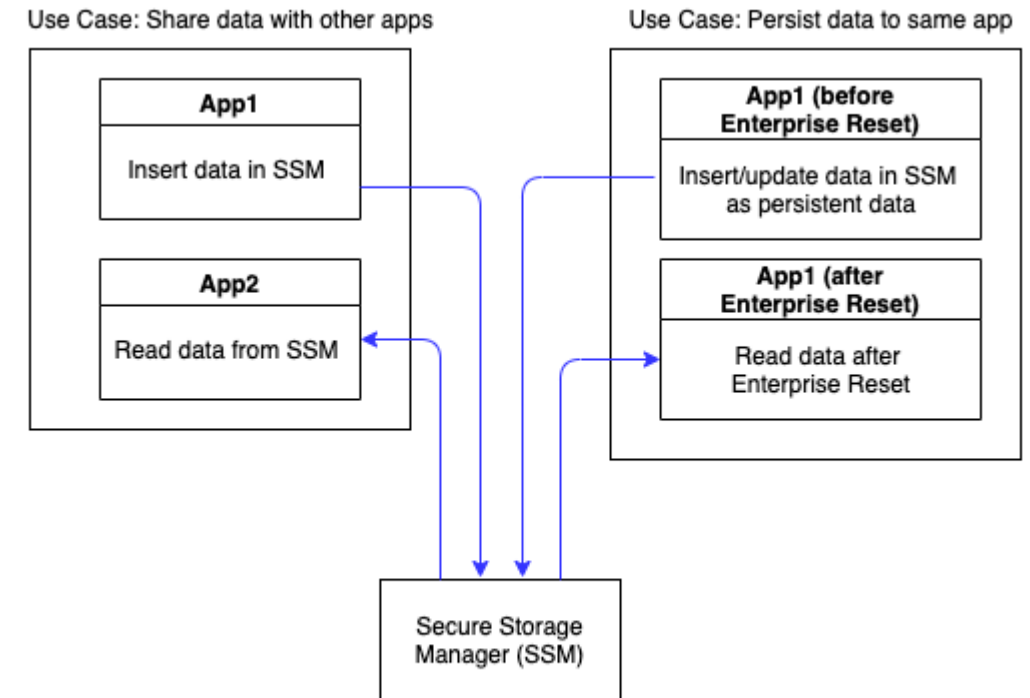


Updating your App for Scoped Storage & Enterprise Persistence

Zebra Recommendations: Secure Storage Manager

Secure Storage Manager: Initial Release

- Available on Zebra devices running Android 11 TODAY
- Share key-value pairs with another app securely
- Persist key-value pairs across an enterprise reset
- Will address *some* scoped storage use cases



→ Blue arrows indicate data flow

Updating your App for Scoped Storage & Enterprise Persistence

Zebra Recommendations: Secure Storage Manager

Secure Storage Manager (Initial Release): Demo

4:23 PM

SSM Sample A

Packages with permission to access data:

Package 1: com.darryncampbell.ssm_sample.a
Sig 1: MIIC5DCCAacwCAQEWdQYJKoZIhvcNAQ...

Package 2: com.darryncampbell.ssm_sample.b
Sig 2: MIIC5DCCAacwCAQEWdQYJKoZIhvcNAQ...

Data to Store:

Name: key

Value: data

Persist Across Enterprise Reset: ☐

Input Data Format: Encrypted? ☐

Output Data Format: Plain Text

Result: Unable to create content resolver, please check your manifest

INSERT UPDATE DELETE ALL

4:24 PM

SSM Sample B

Packages with permission to access data:

Package 1: com.darryncampbell.ssm_sample.b
Sig 1: MIIC5DCCAacwCAQEWdQYJKoZIhvcNAQ...

Package 2: com.darryncampbell.ssm_sample.a
Sig 2: MIIC5DCCAacwCAQEWdQYJKoZIhvcNAQ...

Data to Store:

Name: key

Value: data

Persist Across Enterprise Reset: ☐

Input Data Format: Encrypted? ☐

Output Data Format: Plain Text

Result: Unable to create content resolver, please check your manifest

INSERT UPDATE DELETE ALL

Updating your App for Scoped Storage & Enterprise Persistence

Zebra Recommendations: Secure Storage Manager

Secure Storage Manager: Future development

- File Provider (as shared in my EMM talk)
- End-to-end encryption of Managed Configurations
- Other encryption options
 - Encrypt values prior to storage in your app
 - Decrypt values within secure storage manager
- More?

The screenshot shows a 'Create New Setting' form with the following fields and options:

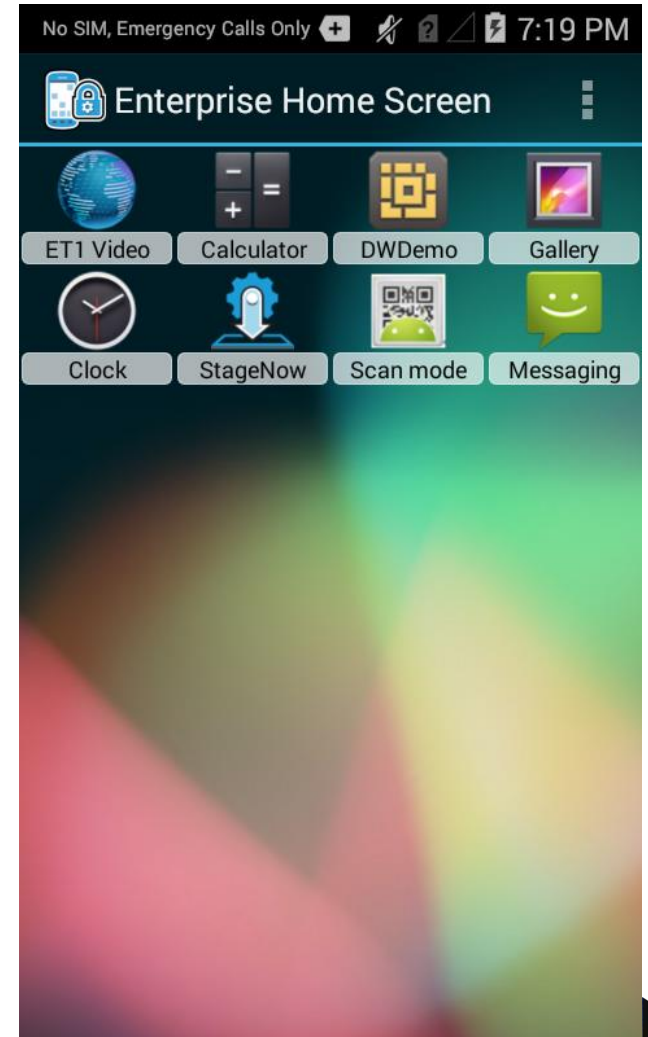
- Create New Setting** (Section Header)
- ☐ Save Setting for Re-use ?
- File Action:** ?
Deploy file for an application (dropdown menu)
- Target Application File Definition:** ?
com.symbol.datawedge/datawedge.db (text input with a blue checkmark icon)
- Target Application Signature:** ?
(empty text input with a blue checkmark icon)
- Persist The File:** ?
- Share File Among Profiles:** ?
- Source Access Method:** ?
- Source File URI:** ?
(empty text input with a blue checkmark icon)

Updating your App for Scoped Storage & Enterprise Persistence

Zebra Application: Enterprise Home Screen

Exporting your configuration:

- Extract file using adb from /enterprise/usr
- Use EHS configuration UI to export to EHS internal storage and then use adb to copy off device
 - /storage/emulated/0/Android/data/com.symbol.enterprisehomescreen/files
 - /storage/emulated/1/Android/data/com.symbol.enterprisehomescreen/files

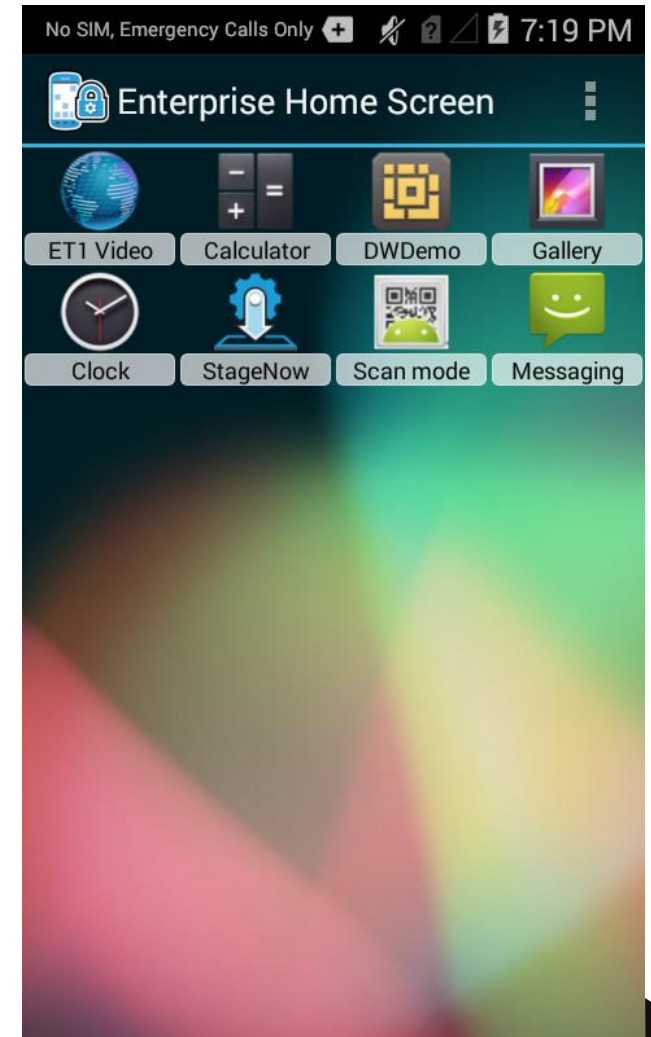


Updating your App for Scoped Storage & Enterprise Persistence

Zebra Application: Enterprise Home Screen

Importing your configuration:

- Push the file using adb to /enterprise/usr
- Push the file using adb to the app internal storage and then use EHS Administrator Settings UI to import files
- Use File Manager via StageNow or OEMConfig (to come)

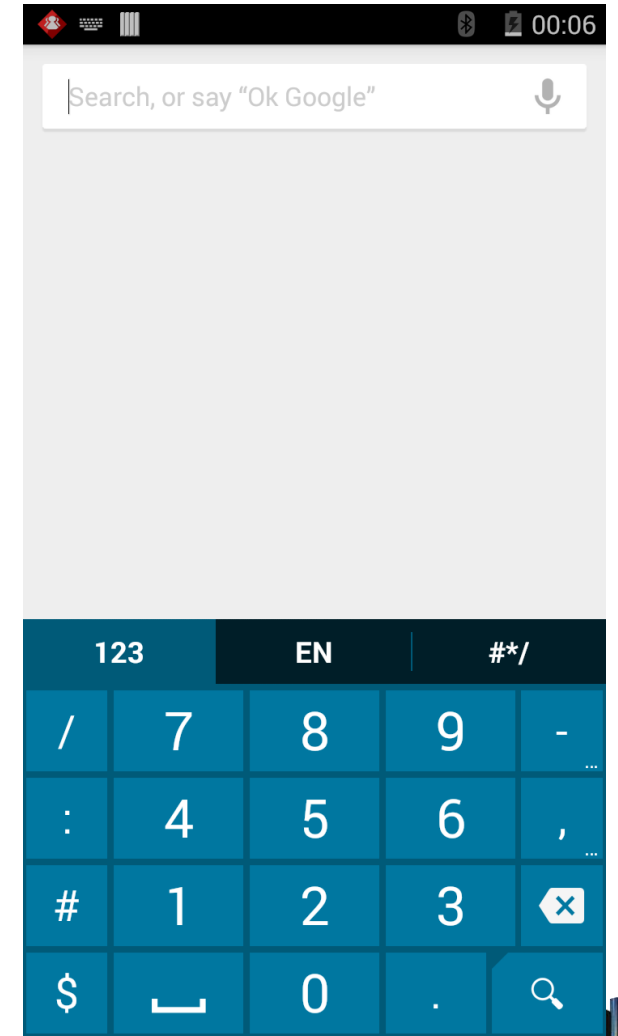


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Zebra Application: Enterprise Keyboard

Exporting your configuration:

- Fixed layouts:
 - Not applicable: EKB configuration is done via CSP and can not be exported
- Custom layouts:
 - Not applicable: Custom layouts are created with custom Enterprise Keyboard designer tool.

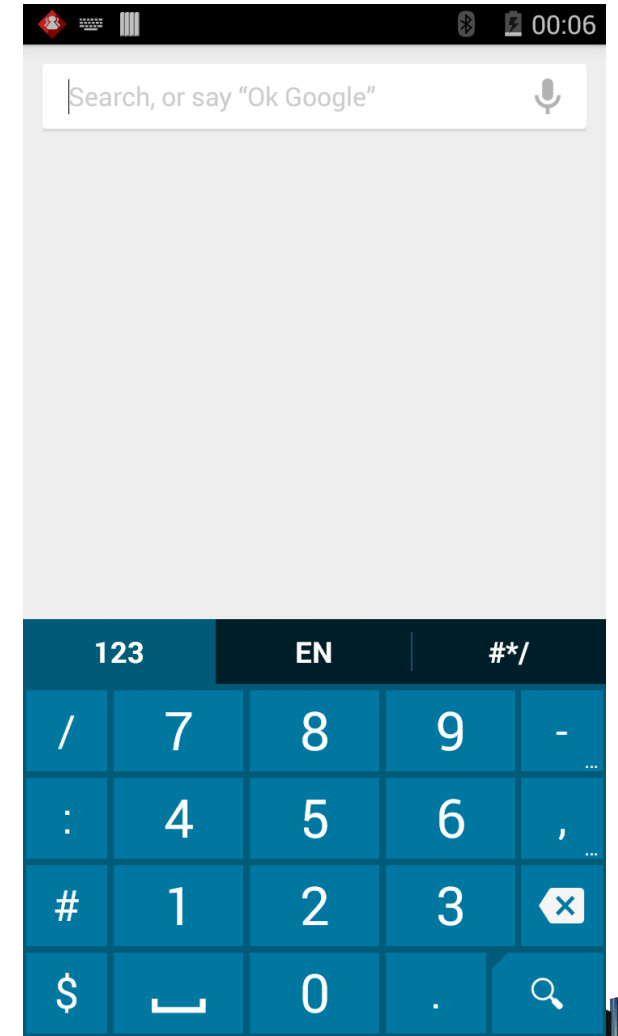


Updating your App for Scoped Storage & Enterprise Persistence

Zebra Application: Enterprise Keyboard

Importing your configuration:

- Fixed layouts:
 - No change.
 - Use EKB Settings UI or API on the device to configure EKB fixed layouts
 - Use [EKB MX features](#) through StageNow or OEMConfig
- Custom layouts:
 - No change.
 - Use adb to copy EKD layout configuration file to `/enterprise/device/settings/ekb/config/`
 - Use Keyboard Designer tool to deploy EKB layout file
 - Future: Use FileManager to copy EKB layout configuration to specified location or via file provider

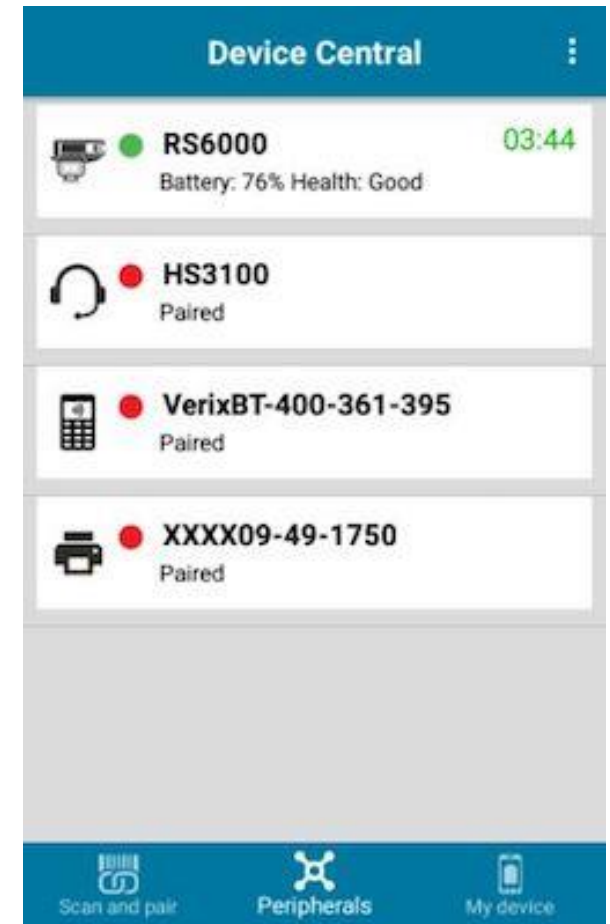


Updating your App for Scoped Storage & Enterprise Persistence

Zebra Application: Device Central

Firmware Update:

- Old location cannot be used due to scoped storage
- Use Device Central Firmware update UI and select the file from either:
 - /storage/emulated/0/Android/com.zebra.devicecentral/files (application internal storage)
 - /storage/emulated/0/download

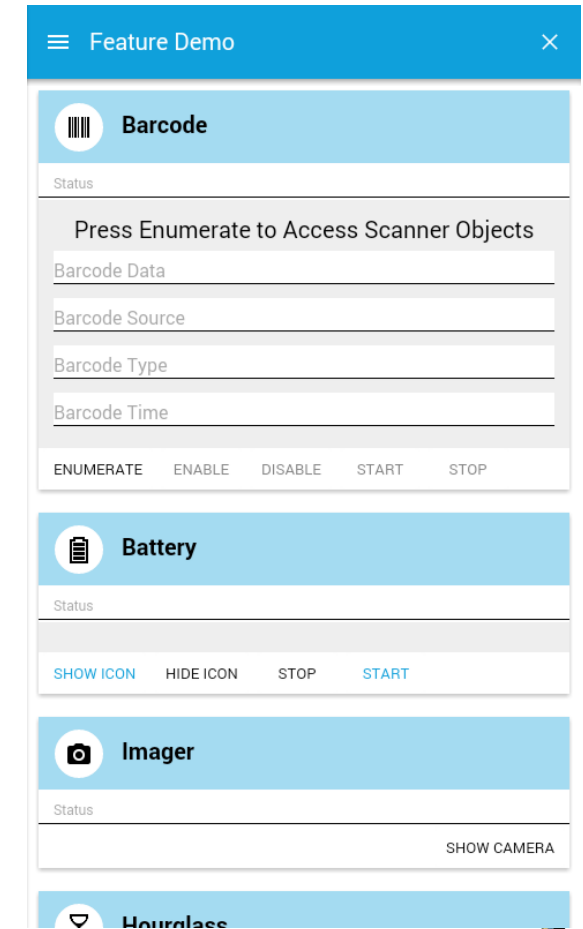


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Zebra Application: Enterprise Browser

Import and Export:

- No change in A11
- Likely change in A12
- Current method is to copy files via adb or use a desktop tool
- /enterprise is also used for mass deployment
- Multiple config files: config.xml, shortcuts, customscripts.xml etc.



Updating your App for Scoped Storage & Enterprise Persistence

Resources

- Scoped Storage documentation: See techdocs

Updating your App for Scoped Storage & Enterprise Persistence

Questions?



<https://developer.zebra.com>



Zebra Developers Community – LinkedIn Group



@ZebraDevs



<https://github.com/ZebraDevs>

Thank You



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