Android 15 OS Update Instruction for Family of Products on 6690

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1. Introduction

Zebra uses Virtual AB mechanism for OS update on 6690 products.

The intent of this document is to advise Zebra customers and service about

1. Virtual A/B OS Update mechanism
2. How to apply OTA packages
3. Differences between Virtual A/B, A/B devices and legacy Non-A/B systems

List of supported devices:

6690 A15 – ET401, TC501, TC701, TC201, KC401

Symbols and Notes used in this document:

⚠	Context of the note	An important or critical note. Users should be aware of this change.
ⓘ	Context of the note	A note which serves as additional information to the reader.

2. Virtual A/B OS Update implementation

- Full OTA and Delta OTA (Patch) updates can occur while the **system is running**, without interrupting the user. This means users can continue to use their devices during an OTA upgrade. After the installation of OTA package is completed, the device reboots into the updated image.

- **Virtual A/B** updates done from Android mode can roll back to the previous OS in case of a failure during OS update even without having a physical backup slot so that the device remains usable.

- **Virtual A/B** devices in comparison to **A/B** devices take up lesser flash storage and provide a more flexible OS update mechanism to accommodate changes to partition size and layout.

- Updates can be streamed to devices supported by this document, removing the need to download the complete package before installing it.

Starting with A11

- Full OTA packages and Delta OTA packages of each LG release will be available on Zebra.com.

- Delta OTA packages can be streamed and installed on the device.

- AB updates can be streamed using LifeGuard Over the Air (OTA) 3.0 APIs.

- OTA Delta packages available on **Zebra.com** will be **sequential** in nature.

- For customers who are using Zebra LifeGuard Over the Air (OTA) solution, you can upgrade to the target OS LG software version in a single step with the help of a single OTA delta package. This OTA delta package is called **true delta package** which contains the exact delta required to install the target LG software version.

  This true delta OTA package will be serviced by LifeGuard Over the Air (OTA) solution and will not be available on zebra.com. You can find more details on LifeGuard Over the Air (OTA) solution at Zebra **TechDocs** portal.

- The size of OTA delta packages will be much smaller than Full OTA packages.

3. How A/B or Virtual A/B system is different to Non-A/B system

OS Update Use Case	Non-A/B	A/B Virtual A/B	Notes
Flashing Full OTA Package	Recovery Mode	Android A/B Mode	**AB:** Device shall apply Full OTA Package in background via Android AB mode when applied via EMM. Users can manually enter recovery mode to apply Full OTA package too. **Non-AB:** Device shall boot into recovery mode to apply any OTA package.
Flashing Delta OTA Package	Recovery Mode	Android A/B Mode	**AB:** Device will apply OTA delta package in background via Android AB mode. **Non-AB:** Device shall boot into recovery mode to apply any OTA package.
Flashing Reset Packages	Recovery Mode	Recovery Mode	**AB:** Device shall boot into recovery mode to apply Enterprise and Factory Reset packages **Non-AB:** Device shall boot into recovery mode to apply Enterprise and Factory Reset packages
Device downtime for OS Update	-	+	**AB:** Full and Delta OTA updates can occur while the **system is running**, without interrupting the user. At the end, the device reboots into the newly installed image. Rebooting to a new OS image is the only device downtime user will experience. **Non-AB:** Device reboots to recovery mode to install reset or special packages only. Users cannot use the device while installing OTA package.
Fault tolerance	-	+	**AB** devices are fault tolerant by providing a backup slot. If device fails to boot-up, then it will fall back to backup slot (reboot back into the old partition). **Non-AB:** If the device fails to bootup, then the device is bricked.
Patch upgrades	Y	Y	
Patch downgrades	Y	N	Starting A11, patch downgrades are not supported. Users have the option to use the Full OTA package of the specific patch to perform OS downgrade. All products supported in this document have **Version Binding** implementation which will cause **data reset** on downgrade to an older Google SPL or older Dessert version.
Hotfix patch support	Y	Y	
Patch Size	-	+	AB delta packages will be considerably smaller compared to Non-AB delta packages available for Zebra devices. Customers using LifeGuard Over the Air (OTA) APIs will be able to use a True Delta package.
Silent Update	-	Y	AB Full and Delta OTA updates is silent to user

4. OS Update from Zebra.com and LifeGuard Over the Air (OTA)

OS Update Use Case	Zebra.com	LifeGuard Over the Air (OTA) 3.0	Notes
Full OTA OS Upgrade	Y	Y	
Full OTA OS Downgrade	Y	N	**LifeGuard Over the Air (OTA) 3.0** does not support OS downgrade. EMM can downgrade to an older version by downloading a Full OTA package of an older version. **Zebra.com** customers can downgrade by pulling the Full OTA package of target OS version from zebra.com and pushing the OTA package to the device from their EMM console.
Delta OTA Upgrade	Y Sequential Delta	Y True Delta	**LifeGuard Over the Air (OTA)** - Delta OTA packages will be streamed for customers using LGE solution. **Zebra.com** - Delta upgrades are sequential and can be installed using StageNow/EMM.
Delta OTA Downgrade	N	N	Delta OTA packages cannot be used for Downgrade to an older software version.
Streaming Support	N	Y	**LifeGuard Over the Air (OTA)** solution will enable AB streaming of OTA Full and Delta packages. **Zebra.com** customers will have to manually download full OTA or delta packages to the device and install the same. OTA packages downloaded from zebra.com can be streamed to device, this requires customers to set up their AB streaming server and host the OTA package downloaded from zebra.com
Reset Packages or Special Packages	Y	N	**LifeGuard Over the Air (OTA) 3.0** APIs do not support flashing of Reset or Special packages. **Zebra.com** customers can download, and flash Reset packages or any special packages available to them.

5. Sequential nature of Delta OTA packages

To upgrade from Patch 1 (U01) to Patch 5 (U05), one must apply all intermediate delta packages too (i.e., U01, U02, U03, U04 and U05) in the same order.

Patch	Build ID (XXX – Platform code)	SPL
U01	13-16-17.00-TG-U01-STD-XXX-04	April 2023
U02	13-16-17.00-TG-U02-STD-XXX-04	May 2023
U03	13-16-17.00-TG-U03-STD-XXX-04	June 2023
U04	13-16-17.00-TG-U04-STD-XXX-04	July 2023
U05	13-16-17.00-TG-U05-STD-XXX-04	August 2023

To make things easier, users may skip applying delta packages sequentially and directly flash the Full OTA package of U05.

6. Android A/B Mode for OS Update

Full and delta OTA packages will be installed via Android AB mode. As part of this:

a. Full and delta OTA package will be applied on the device silently in the background.
b. Users can continue using the device while OTA packages will be applied.
c. Post installation is complete, a device notification will be displayed confirming the installation is completed and device shall auto-reboot after 15 secs.
d. Device will auto-reboot to boot into newly installed OS image after the OTA package installation is completed successfully.
e. Customers can also configure the device to wait for Update clients (e.g., FOTA) or EMMs to notify device to reboot.
f. AB streaming mode will be used by default for customers using LifeGuard Over the Air (OTA) solution to update the device. The OTA package will not be completely downloaded and saved on device before starting the installation. Rather the OTA package contents will be streamed to the device and installed.
g. **StageNow** tool can be used to perform OS Update using an OTA package in manual mode (without the need to go into Recovery mode). Please search and click on *Power Manager* section in the link provided.

OTA package consists of following:

1. HLOS images (system, vendor, boot and dtbo)
2. Non-HLOS images (QCOM images)

7. Recovery Mode for OS Update

Reset packages and any special packages to update Zebra Device Management partitions will be installed via recovery mode.

As part of this:

a) The device will be automatically rebooted to recovery mode.
b) Reset packages or special packages will be applied using recovery mode.
c) Device will reboot back to home screen after installation is completed in recovery mode.
d) Customers can enter recovery mode using **key combinations** or using "**adb reboot recovery**" command.

8. Reset Packages and special recovery packages

Zebra devices support reset packages to erase userdata and enterprise partition. These packages will be applied via recovery mode.

Package	Information
Enterprise Reset	Erase userdata partition and persist enterprise partition
Factory Reset	Erase both userdata and enterprise partition
Special recovery packages	Packages used to modify Zebra Device Management partitions or packages to update WLAN region code, audio tuning files etc. can be applied via recovery mode.

All Devices	Reset operation can take more time if there are update snapshots to be merged before data reset operation.

9. OS Update Operations - Upgrade and Downgrade

Customer can upgrade the device to a newer OS dessert initial release OR to any latest LG software version within the same dessert OR on the higher dessert release if the Google security patch level of the OS image to be installed is higher than the Google security patch level on the device.

If the device is running on a higher Google security patch level compared to the OS image to be installed, then customer cannot upgrade to such an image. This behavior follows Google security requirements to protect devices from exploiting any known security vulnerabilities. User data is persisted on all OS Upgrade operations.

Customers can perform OS downgrade to an older OS dessert image or to LG software image having a lower Google security patch level compared to Google security patch level on device. If a customer performs **OS downgrade** operation, user data will be erased automatically.

All Devices	**Data persistence is NOT supported on OS Downgrade**.

For all products supported in this document, following is the experience related to OS Update:

1. Customers shall be able to perform OS Upgrade (move to a higher version** of OS Image) using Full OTA package.
2. Customers shall be able to perform OS Upgrade (move to a higher version** of OS Image) using delta OTA image.
3. Starting from A11, customers can downgrade (move to an older/lower version* of OS Image) operation using Full OTA packages only.
4. Separate interfaces are provided to perform OS Upgrade & OS downgrade operations.
5. All OS downgrade operations will result in an Enterprise Reset operation. i.e., user data is erased on OS downgrade operation.

** higher version → Following parameters will be considered to identify if an OS image to be installed is higher or lower compared to device OS version.

a. OS Google Security patch level (`ro.build.version.security_patch, ro.vendor.build.security_patch`)
b. OS software version (`ro.device.patch.version`)
c. OS Hotfix version
d. Custom OS version

10. OS Upgrade and Downgrade via EMMs

Kindly refer to MX tech docs present on Zebra **TechDocs** portal for more details on supported CSP interfaces for OS Upgrade and Downgrade.

https://techdocs.zebra.com/mx/powermgr/

OS Update via EMM	OS Upgrade	OS Downgrade
Reset Action	10 - OS Upgrade	11 - OS Downgrade
Allowed OTA Packages	Full OTA Package, OTA Patch image, UPL	Full OTA Package
Data persistence	YES	NO Auto data reset shall be performed
Allowed OS Update use case	**UPGRADE ONLY** Upgrade from current OS to a higher OS software version Upgrade from current OS to a higher SPL version Upgrade from current OS to a higher version of OS Upgrade from current OS to a higher Hotfix version Upgrade from Patch to a higher software version Upgrade from Patch to a higher SPL version Upgrade from Patch to a higher version of OS Upgrade from Patch to a higher Hotfix version Upgrade from Hotfix to a higher Hotfix version Upgrade from Hotfix to a higher SPL version Upgrade from Custom OS to a higher Custom version Upgrade from Custom OS to a higher Custom OS SPL version Upgrade from Custom OS to a higher Custom version of OS	**DOWNGRADE ONLY** Downgrade from current OS to a lower/older OS version Downgrade from current OS to a OS software version on lower/older OS version Downgrade from Patch to a lower/older OS version Downgrade from Patch to a lower/older Hotfix version Downgrade from Hotfix to a lower/older Hotfix version Downgrade from Hotfix to a lower/older SPL version Downgrade from Custom OS to a lower/older Custom software version Downgrade from Custom OS to a lower/older Custom OS SPL version Downgrade from Custom OS version to a lower/older Custom OS version Downgrade from Custom OS version to Custom OS software version on a lower/older Custom OS version

ⓘ	All Devices	Suppress reboot flag shall not be considered in case of OS downgrade.
⚠	**All Devices**	**Performing OS upgrade to higher dessert but having lower SPL will result in data reset.**

Recovery UI also has been modified for OS Upgrade and Downgrade. Separate OS Upgrade and Downgrade options have been enabled in recovery UI to perform OS Update operation.

Kindly visit below sections in this document for detailed explanation on recovery mode.

11. AB Streaming Update

An OTA package can reside on server and supported devices can stream the package from server directly to device without saving the OTA package on device. The OS update happens in background and a user notification shall be displayed to indicate that OS update operation is in progress.

OS Update package can be streamed to A/B devices, removing the need to download the OTA package to the device before installing it. With help of AB Streaming mode user can perform OS update operations even if disk space is low. The same OTA package can be used for both AB streaming and AB seamless updates.

AB streaming mode will be used by default for customers using LifeGuard Over the Air (OTA) solution to update the device.

The delta OTA package will not be completely downloaded and saved on device before starting the installation. Rather the delta OTA package contents will be streamed to the device and installed. Similarly, AB streaming updates will be used if there is a need to install a Full OTA package from LifeGuard Over the Air (OTA) solution.

Customers who self-manage their devices will have to download the required OTA package from zebra.com and copy the same to the device. AB Streaming update will not be applicable for this use-case.

Table below depicts the arguments to be used for AB streaming update:

Operation	Reset Action	Details
UPGRADE	12 - OS Upgrade Streaming	Launches a full package/patch OS Upgrade via streaming server.
DOWNGRADE	13 - OS Downgrade Streaming	Launches a full-package OS Downgrade via streaming server.

While AB streaming update is in progress, a progress bar shall show the progress of the operation. After AB streaming update has completed, device shall show a notification that in 15 seconds device will auto-reboot. After 15 seconds, the device will auto-reboot into a new OS image. OS update status is made available via OEMInfo as well.

Device needs to authenticate with server before the OTA package residing on server can be streamed. EMM solution or FOTA solution who is initiating OS Update job will have to generate the authentication Id and share with device using Power Manager CSP.

The following Authentication modes are supported for AB streaming mode.

- Token Auth
- Username & Password (Basic Auth).
- No Authentication

Device supports the following protocols to perform AB streaming

- http
- https (**recommended for better security**)

Installing Full (upgrade/downgrade) and Delta OTA packages can be accomplished using AB streaming update. All other Enterprise use cases of Zebra cannot be supported by AB Streaming update.

- Installing multiple OTA packages using UPL is not supported by AB streaming update.

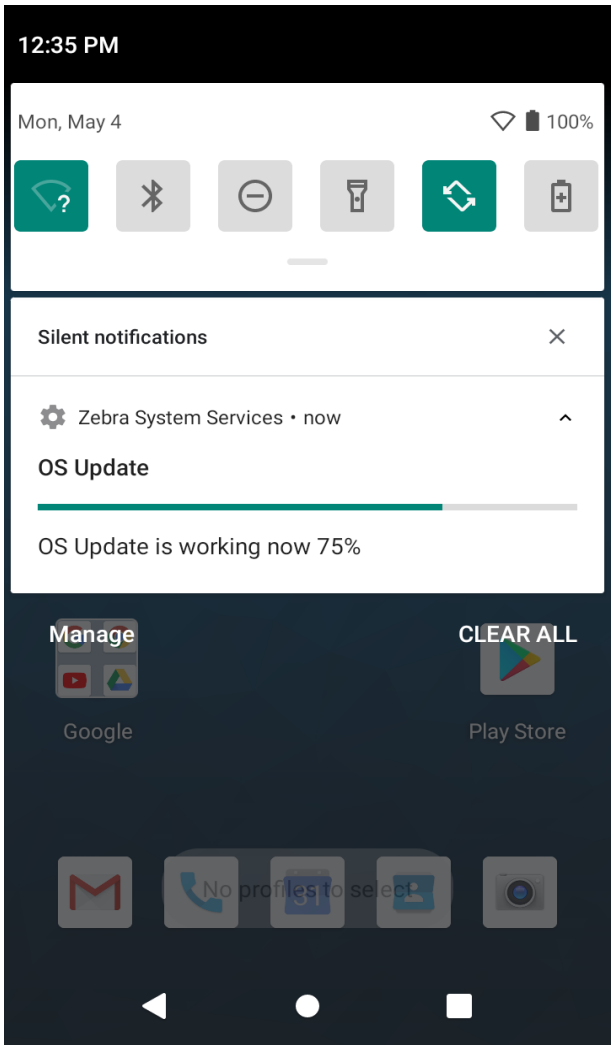
12. User Notification for Full OTA package Upgrade or Downgrade

Few of the features of user notifications during OS update:

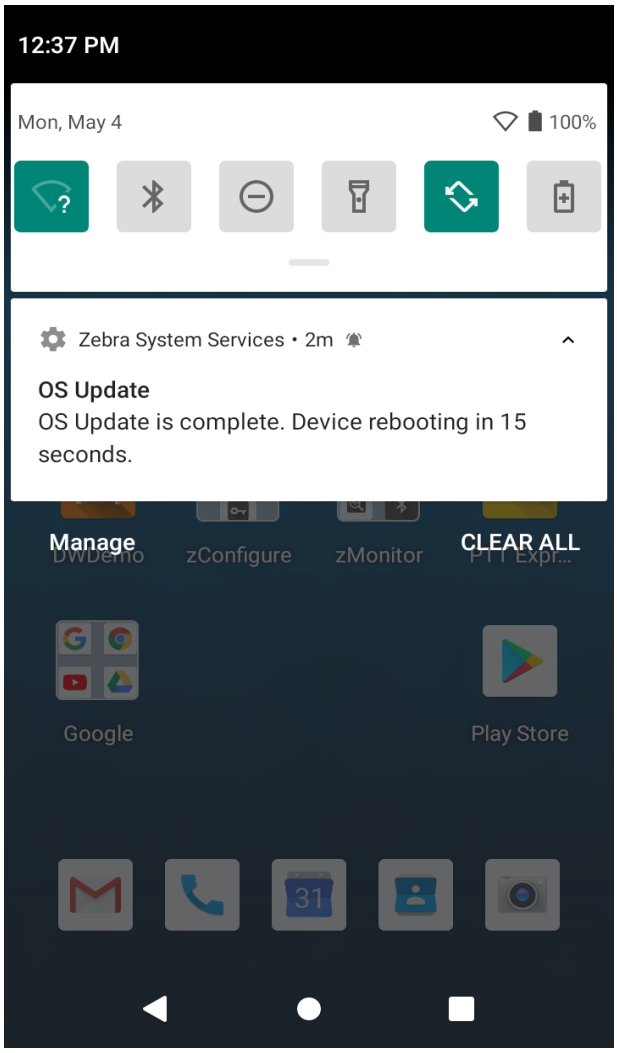
1. This is applicable for Full OTA package and OTA Patch image.
2. At the start of Full and Diff OTA package installation, an Icon (android system icon) will be displayed on the Status Bar.
3. On pulling down the notification drawer, a notification will be displayed informing that OS Update is in progress and device will Reboot automatically on completing the same.
4. User will have no control over this notification. i.e., User CANNOT
    a. Pause/Snooze the OS Update request
    b. Cancel OS Update request
    c. Prevent Reboot of device
5. Notification can be cleared by the User. Once the notification is removed, no new notification shall be displayed again.
6. If EMMs have selected “Suppress Reboot” option while installing a Full OTA package, then device will not auto-reboot. User Notification too indicates the same and waits for EMMs to reboot the device.
7. The notification will also display system interrupts blocking OS Update process. E.g., Low Battery, Media Eject etc.
8. Devices supporting Battery Warm Swap disables all notifications while Warm Swap is in progress.

13. OS Update - Screenshots

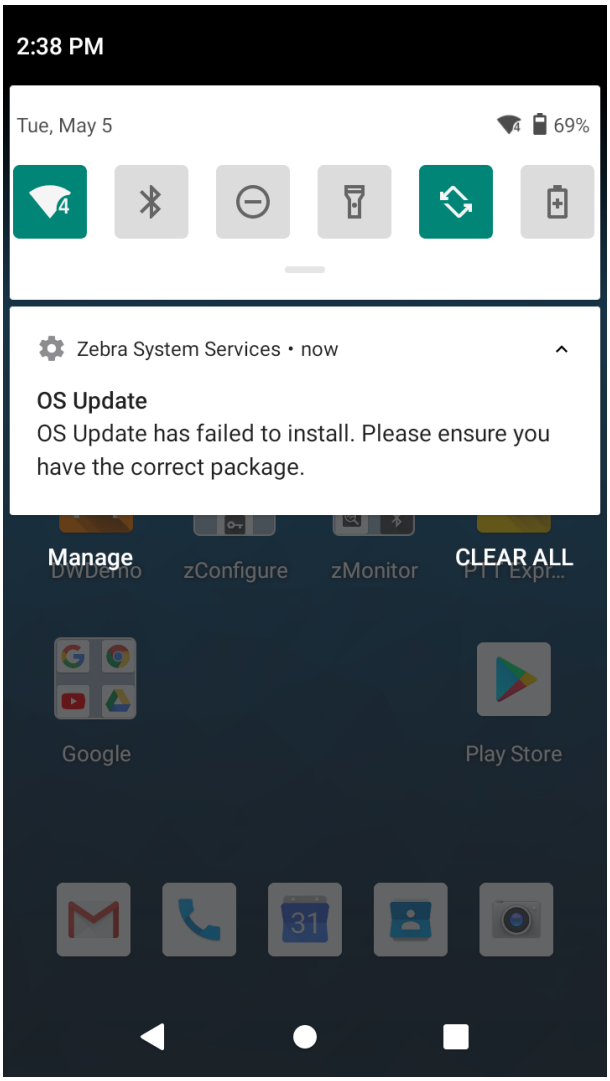
A Full OTA package installation has started



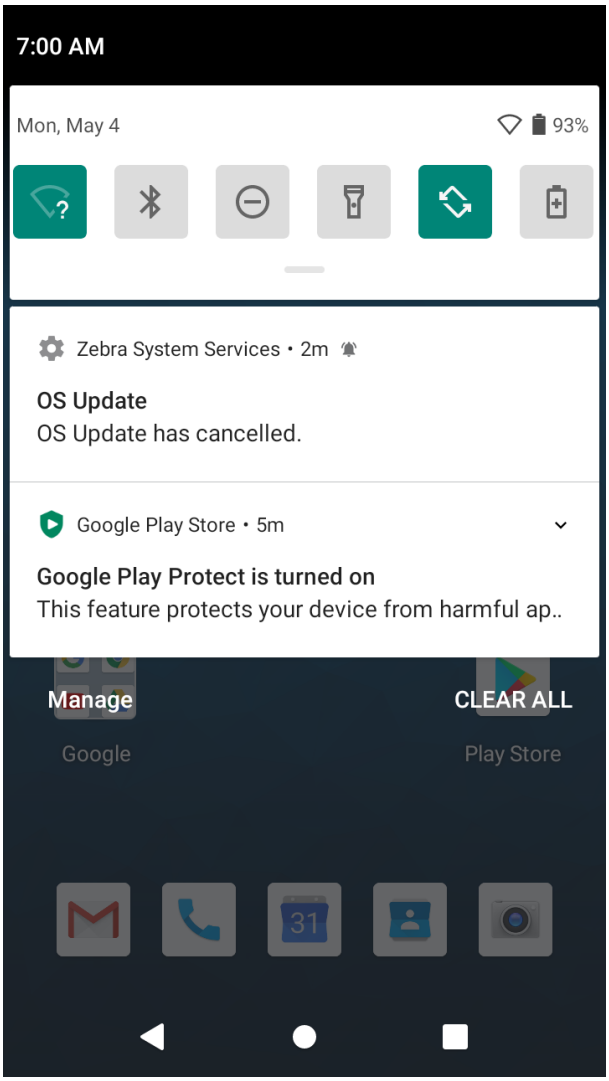
Installation of Full OTA package completed



A Full OTA package installation has failed to apply



Notification for Cancelling an OS Update job



14. Recovery Mode

From recovery UI customers can install Full OTA packages and Reset packages.

For products supported in this document, Recovery UI provides the following options to perform various operations in recovery mode and apply different packages:

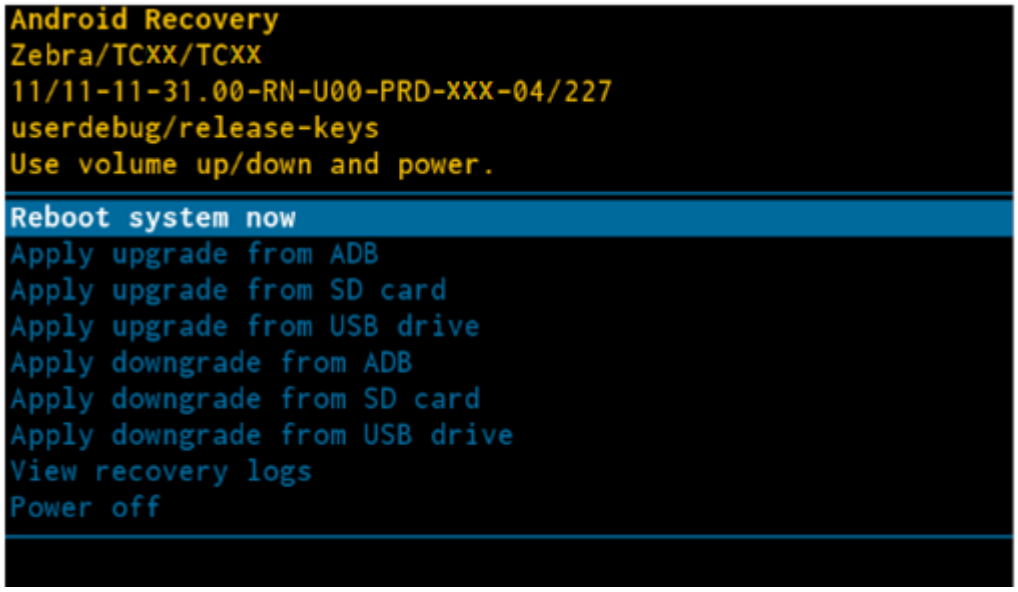
- Reboot system now
- Apply upgrade from ADB
- Apply upgrade from SD card
- Apply upgrade from USB drive
- Apply downgrade from ADB
- Apply downgrade from SD card
- Apply downgrade from USB drive
- View recovery logs
- Power off

Different UI options within Recovery mode and their functionalities are explained below in detail.

⚠	**All Devices Delta OTA (Patch) images are not supported in Recovery mode.**
ⓘ	All Devices Please ignore Device Name and Build Fingerprint displayed on the screenshots.

- **Reboot system now**

When this UI option is selected by the user, device will boot to OS.



- **Apply upgrade from ADB**

Upgrade packages via adb will be applied when we select this option. User can only perform OS Upgrade operation and not downgrade operation using this option.

```
Android Recovery
Zebra/TCXX/TCXX
11/11-11-31.00-RN-U00-PRD-XXX-04/227
userdebug/release-keys
Use volume up/down and power.
Reboot system now
Apply upgrade from ADB
Apply upgrade from SD card
Apply upgrade from USB drive
Apply downgrade from ADB
Apply downgrade from SD card
Apply downgrade from USB drive
View recovery logs
Power off
```

User should enter the package name via adb sideload interface.

```
Supported API : 3
Stopping adbd . . .

Now send the package you want to apply
to the device with "adb sideload <filename>". . .
```

- **Apply upgrade from SD card**

Upgrade packages via External SD card will be applied when we select this option. Users can only perform OS Upgrade operation and not downgrade operation using this option.

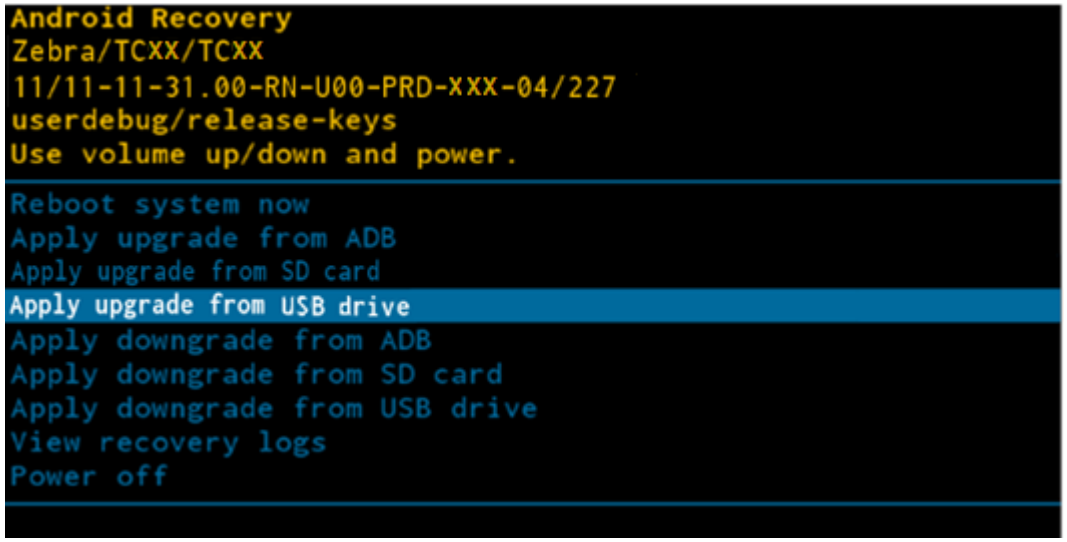
```
Android Recovery
Zebra/TCXX/TCXX
11/11-11-31.00-RN-U00-PRD-XXX-04/227
userdebug/release-keys
Use volume up/down and power.
Reboot system now
Apply upgrade from ADB
Apply upgrade from SD card
Apply upgrade from USB drive
Apply downgrade from ADB
Apply downgrade from SD card
Apply downgrade from USB drive
View recovery logs
Power off
```

Using this option, customers can perform OS Upgrade using Full OTA packages and install Reset Packages from SD card.

```
Android Recovery
Zebra/TCXX/TCXX
11/11-11-31.00-RN-U00-PRD-XXX-04/227
userdebug/release-keys
Use volume up/down and power.
Choose a package to install:
/sdcard
../
Downgrade.upl
HE_DELTA_UPDATE_11-12-12.00-RN-U00_TO_11-12-13.00-RN-U01_OS
HE_FULL_UPDATE_11-12-13.00-RN-U00-STD-HEL-04.zip
Releasekey_Android11_EnterpriseReset_V10.zip
Upgrade.upl
Alarms/
Android/
Audiobooks/
DCIM/
Documents/
Download/
LOST.DIR/
Movies/
Music/
Notifications/
Pictures/
Podcasts/
Ringtones/
RxLogger/
System Volume Information/
```

- **Apply upgrade from USB drive**

  Upgrade packages via USB drive will be applied when we select this option. Users can only perform OS Upgrade operation and not downgrade operation using this option.

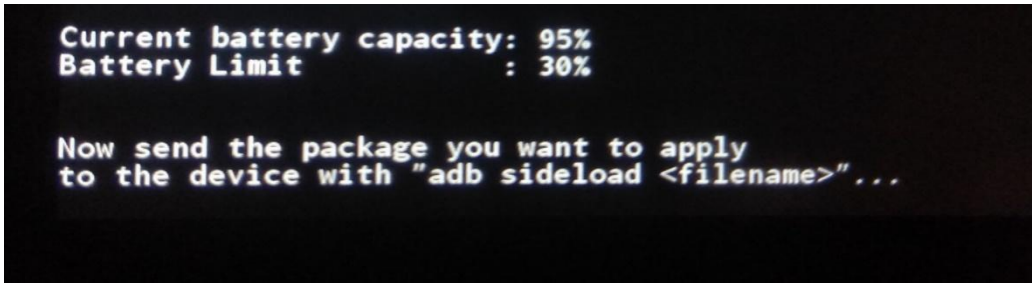


  Using this option, customers can perform OS Upgrade using Full OTA packages and install Reset Packages from USB drive.

- **Apply downgrade from ADB**

  Downgrade packages via adb will be applied when we select this option. Users can only perform OS Downgrade operation and not upgrade operation using this option.

  Once selecting this option user should enter the package name via adb side load interface.



- **Apply downgrade from SD card**

  Downgrade packages via External SD card will be applied when we select this option. User can only perform OS Downgrade operation and not upgrade operation using this option.

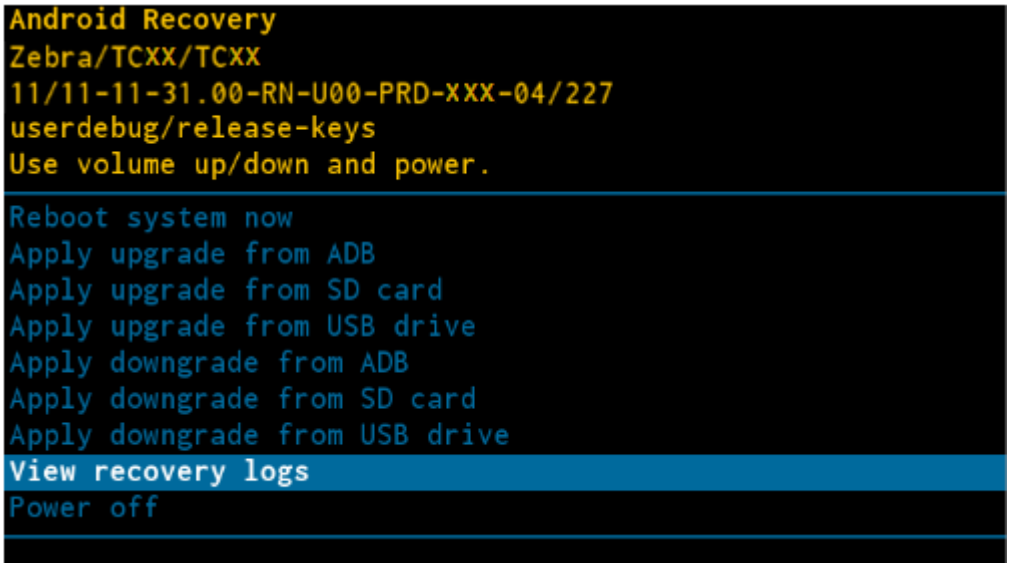
  Using this option, customers can perform OS downgrade using Full OTA packages and install Reset Packages from SD card.

- **Apply downgrade from USB drive**

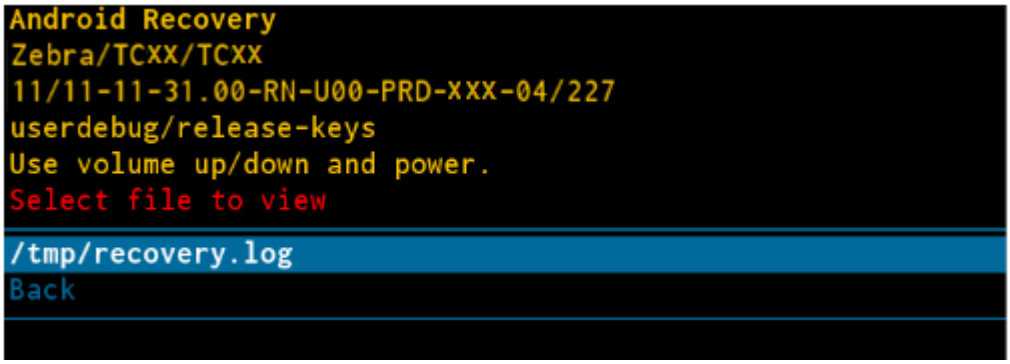
  Downgrade packages via USB drive will be applied when we select this option. Using this option, customers can perform OS Upgrade using Full OTA packages and install Reset Packages from USB drive.
  User can only perform OS Downgrade operation and not upgrade operation using this option.

- **View recovery logs**

By selecting this option user can view recovery logs.



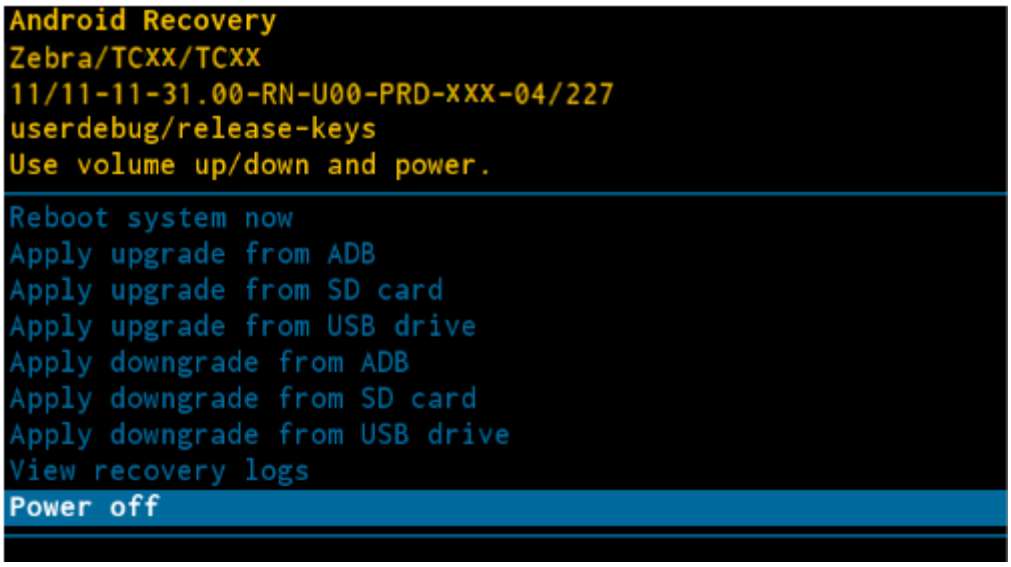
Recovery logs will be available in `/tmp/recovery.log`



By selecting **Back**, we can return to main menu.

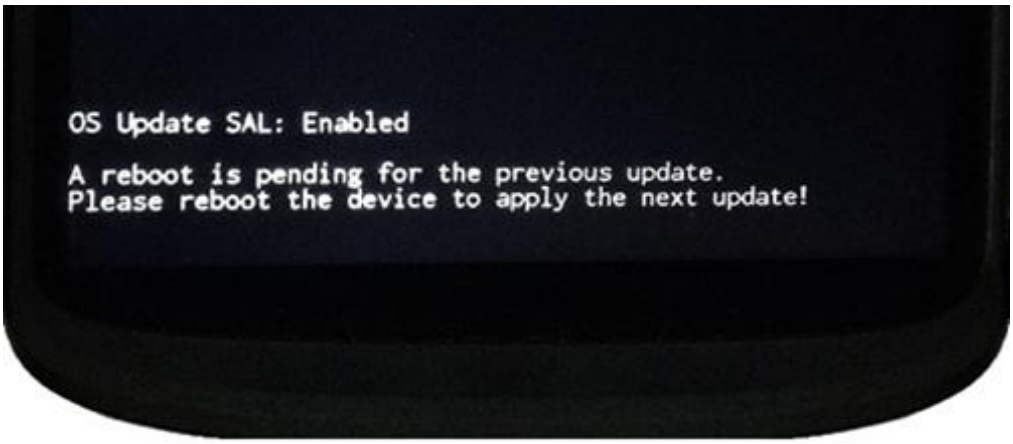
- **Power off**

By selecting this option user can power off device.



Other Recovery UI Screens

OTA update is already applied, and the device is not yet rebooted



	User must reboot the device to 'Home Screen' and make sure OS is upgraded successfully to perform another OS update from recovery mode.
⚠ All Devices	You may need to wait for up to 1 minute. The device is usable during this time. It is advisable not to reboot or perform Factory Reset operations as soon as the device boots up after OS update.

15. Installation from Recovery Mode

All Devices	Preferred method for regular OS Update is using LifeGuard Over the Air (OTA) 3.0 APIs or StageNow/MDM solution. Recovery mode OS updates are to be used for device recovery operations.

If you wish to perform system upgrade from an upgrade file downloaded from the Zebra.com support page there are two options. Both methods are summarized below:

a) For a single upgrade the upgrade file can be loaded onto a removable memory device and inserted into the device to be upgraded.
b) For multiple devices to upgrade it may be easier to use the ADB command method. (ADB or Android Debug Bridge is a tool used to communicate with Android devices from a host computer. Information can be found here: https://developer.android.com/studio/command-line/adb)

a) Performing a System Update Using SD Card or USB Drive

1. Select appropriate upgrade file from Zebra support web page.
2. Download the upgrade file to a host computer.
3. Copy Upgrade file to the removable memory (either SD card or USB drive) root directory using the host computer.
4. Remove the memory device from the host computer (be sure it is properly ejected first) and install into the device being upgraded.
5. Make sure the device battery level is at least 30%. Invoke recovery mode on device. To restart the device press and hold the power button and select restart from on screen menu.
6. Customers can enter Recovery mode using the following **key combinations.** While the device is powered off, press and hold the indicated buttons until the Zebra screen appears. If the device was restarted in the preceding step, there's no need to press the Power Button again.

ET401	Vol Up + Power Button
TC501, TC701	PTT + Power Button
KC401	Hold Button 2 and Plug in Power

All Devices	Please refer to product specific documentation for additional details.

OR
using "**adb reboot recovery**" command.

7. From the on-screen menu using volume keys scroll to "Apply upgrade from SD Card" or "Apply upgrade from USB Drive". When the selection is highlighted press the power key to select.
8. When the install is complete select the reboot option and press the power button to reboot the device.

b) Performing a System Update Using ADB Commands from Host Computer

All Devices	Delta OTA package are not supported in recovery mode, please use corresponding Full OTA package. Delta OTA packages should be used with LifeGuard Over the Air (OTA) APIs or StageNow/MDM solution.

1. Select appropriate upgrade file from Zebra support web page.
2. Download the upgrade file to a host computer.
3. Ensure that the ADB drivers are installed on the host computer.
4. Connect the device to the host computer with the proper USB cable. Make sure the device has at least 30% battery level before starting the upgrade process.
5. Go to the **Settings** application on the device and enable **Developer options** by following this link: https://developer.android.com/studio/debug/dev-options
6. Select on the **Settings** application: **System > Advanced > Developer options**.
7. Slide the switch for Developer Options to the **ON** position.
8. Slide the switch for **USB Debugging** to the **ON** position. The **Allow USB debugging?** dialog box appears.
9. Touch **OK**. This allows the host computer and the device to communicate via USB.
10. On the host computer, open a command prompt window and use the adb command:
    adb devices

```
C:\Users\All Users>adb devices
List of devices attached
XXXXXXXXXXXXXXX device
```

(XXXXXXXXXXXXXXX is the device number)

All Devices	If device number does not appear, ensure that ADB drivers are installed properly.

11. Type the following command and press **Enter**:
    adb reboot recovery
12. The System Recovery screen appears on the device.
13. Press the Volume Up and Volume Down buttons on the device to navigate to **Apply upgrade from ADB**.
14. Press the Power button to select this option.
15. On the host computer command prompt window type:
    adb sideload <file>
    where: <file> = the path and filename of the zip file.
16. Press **Enter** on Host PC at the prompt. The System Update starts installing (progress appears as percentage in the Command Prompt window) and then the System Recovery screen shows update progress information on the device.
17. When the update is complete select the reboot option and press the Power button to reboot the device.

c) Verifying System Update Installation

1. Go to **Settings**.
2. Touch **About phone.**
3. Scroll down to **Build number.**
4. Ensure that the build number matches the new system update package file number.

16. UPL (Update Package List) mechanism

UPL allows user to perform anyone of the below use-cases in a single step for device administrator

- Apply multiple firmware OTA packages along with an OS OTA package
- Apply any configuration OTA packages along with an OS OTA package
- Apply reset packages after installing an OS image
- Perform device reset using commands instead of packages

An UPL file can consist combinations of the following package types:

- Full OTA package
- Delta OTA package
- Reset packages
- Reset commands
- Firmware update packages
- Configuration packages

⚠	All Devices	Starting Android 11, an UPL file cannot consist of both Full OTA and Delta OTA package.
ⓘ	All Devices	Customers can directly install the Full OTA package of the required LG OS version.

The Full OTA package can be downloaded from zebra.com. If a customer is using the LifeGuard Over the Air (OTA) solution, then the device can be directly updated to the target LG software version using a delta OTA package provided by LifeGuard Over the Air (OTA).

Rules to build an UPL. On A11 and above, UPL can consist of the following combinations:

- Full OTA package + Reset/Special package
- Full OTA package + Reset command
- Delta OTA package (e.g., LG software version) + Reset/Special package
- Delta OTA package (e.g., LG software version) + Reset command

Device can be reset using following UPL commands and are supported on A10 and above. This avoids the need to push a reset package while using UPL.

- EnterpriseReset
- FactoryReset

UPL files should **NOT** be configured as below:

- Combination of Full OTA packages or Delta OTA packages (e.g., LG software version)
- New lines present after the last line in UPL file
- Trailing tab spaces present after each line in UPL file
- Unwanted characters present after each line in UPL file
- Contains only UPL commands

Few valid examples of UPL files are as below:

UPL with Reset Packages	UPL with Reset Commands
Sample1.upl	**Sample2.upl**
package:Full_OTA_Package.zip package:FactoryReset.zip	package:Full_OTA_Package.zip command:FactoryReset
Sample3.upl	**Sample4.upl**
package:Patch_OS_Package.zip package:FactoryReset.zip	package:Patch_OS_Package.zip command:FactoryReset
Sample5.upl	**Sample6.upl**
package:Baseline_Delta_Package.zip package:FactoryReset.zip	package:Baseline_Delta_Package.zip command:FactoryReset

To install an UPL, copy UPL file and its corresponding OTA packages to the same location on the device. Select UPL filename to install the packages and not any individual OTA package names.

If UPL and OTA packages were copied to internal memory (`/sdcard` or `/data/tmp/public`) then these files should not be re-used.

⚠	All Devices	UPL files and OTA packages residing in internal memory of device should be deleted after they have been applied. **Do not re-use the same packages or UPL files.**
⚠	All Devices	UPL file cannot be installed using adb sideload mode.
ⓘ	All Devices	Device will reboot after applying an OTA package if Reset is included in UPL

If UPL consists of a Full or Diff OTA package and a special package:

- Full OTA package shall get installed in Android AB mode (background update)
- Special packages will be installed in recovery mode.
- Device will auto reboot to recovery mode after Full OTA package installation has completed.
- Suppress reboot flag shall not be considered in UPL update.

17. Status messages to EMMs

OS Update status is sent as an intent. Data Analytics captures the same and stores it in OEMInfo content provider. EMMs can read OEMInfo content provider to fetch the exact status of OS Update operation. Device does not display any kind of UI notification when an OS Update is in progress/applied/failed.

OS Update State	What does it mean	Next Job request	Comments
IN_PROGRESS	AB OTA Update has started and is in progress.	✗	Device CANNOT accept new OS Update request.
WAITING_FOR_REBOOT	AB OTA Update is installed and Waiting for device to reboot to boot into new OS.	✗	Device CANNOT accept new OS Update request.
IN_SUSPEND	AB OTA Update is in suspend state(e.g Low battery). BSP will resume it once we recover from Low Battery situation.	✗	Device CANNOT accept new OS Update request.
CANCELLED	Media Eject, Device enters critical suspend state will cancel the ongoing job	✓	Device CAN accept new OS Update request
PASSED	OS Update request was success and device was able to boot into new OS image	✓	Device CAN accept new OS Update request
FAILED	AB OTA Update Failed (e.g Package error, Signature error etc).	✓	Device CAN accept new OS Update request

18. Possible device interruptions during an OTA package update

While a Full OTA Package is installed via AB mode in background, users of the device will be able to use the device. Thus, devices might be put to various states which can interrupt the ongoing OS Update. Device states which can interrupt the OS Update are:

1. Low Battery condition. If Battery falls below 30% capacity, ongoing OS Update will be interrupted and resumed only after connecting to a battery source.
2. Performing Battery Warm Swap or Hot Swap while OS update is in progress will cancel the update.
3. Device can be shutdown, enter critical battery state, media ejected (external SD Card), or low storage in userdata partition (approximately 100MB). In all the above scenarios, the ongoing OS Update will be cancelled.
4. If device is rebooted in middle of an OS Update operation, the ongoing job will be suspended for seamless update and cancelled for steaming update. On reboot of device, OS Update job will be resumed and completed only in case of a seamless update.
5. LifeGuard Over the Air (OTA) has the capability to cancel an on-going OS update.

19. AB Fallback mechanism

In Android AB system if an OTA fails to apply (for example, because of a bad flash), the user will not be affected. The user will continue to run the old OS (existing OS image), and the customer can re-attempt the update.

If an OTA update is applied but fails to boot, the device will reboot back (fallback) into the old/existing OS image and device remains usable. This allows our customer to re-attempt the update.

20. Rescue Party Mode

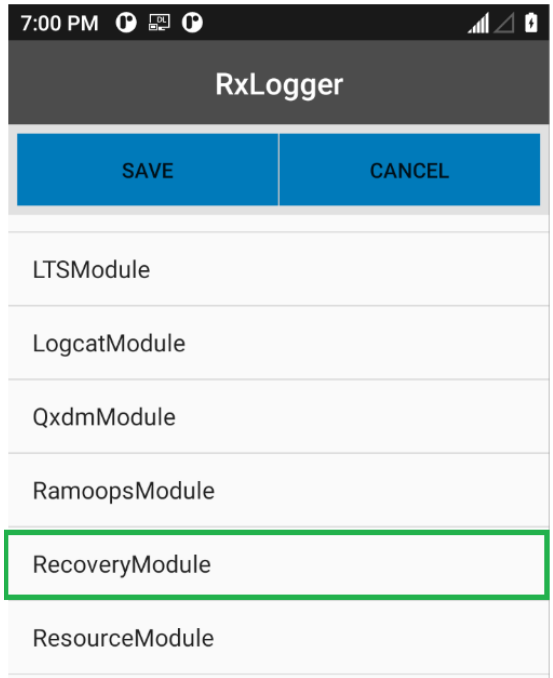
Sometimes devices can end up in reboot loops, which cause customers to file support tickets or warranty inquiries. This process is frustrating for customers and expensive.

Android includes a feature that sends out a "rescue party" when it notices core system components are stuck in crash loops. Rescue Party then escalates through a series of actions to recover the device. As a last resort, Rescue Party reboots the device into recovery mode and prompts the user to perform a factory reset.

Rescue party logs can be collected using RxLogger. One must enable RxLogger plugin for recovery mode to collect rescue party logs.

21. Recovery logs

Users can fetch recovery logs using RxLogger. One must enable RxLogger plugin for recovery mode to collect recovery logs.



User will not be able to pull recovery logs from `/data/tmp/public/recovery` path.

Last 10 Recovery logs are saved under this folder for debug purposes.