Splash

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Release note: this document can be shared with customers.

Splash - Bootloader Splash Integration

Splash integration for android follows the base splash support with some additional changes for providing feedback about the android base states of the device, including: booting, being in fastboot mode, having failed to boot.

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Boot Flow Feedback

The following boot flow can be expected when using the default splash setup.

Standard Boot

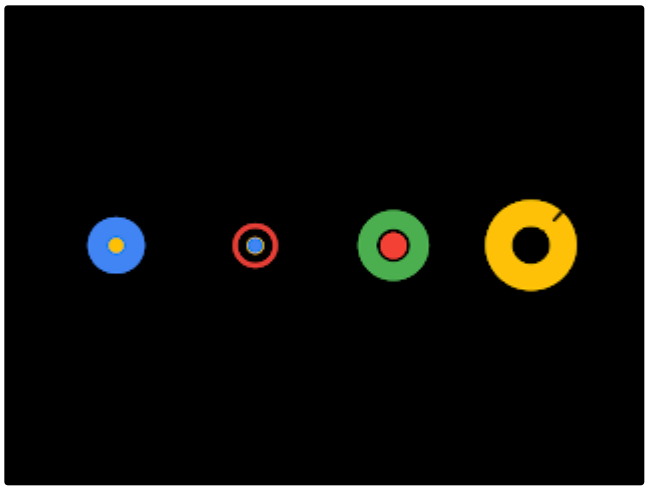
The initial boot should come up with the default screen letting the user know that the device is booting. At this point we are into second bootloader, so we can be confident some of the device is setup properly already...

no action required

... as the device boots out of bootloader mode and into android, there will be a transition screen as the splash is not seamless due to the need to re-init the display pipeline hardware as control is passed on to nexus.

no action required

... finally, the device boots into android and the android animation starts. this is the end of the splash boot scope.

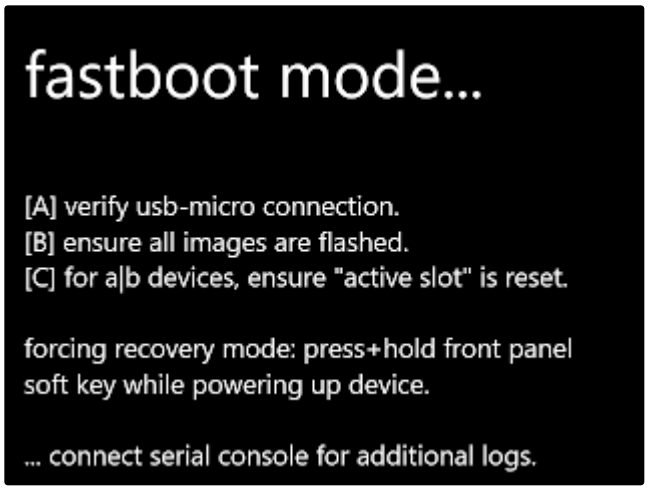


Fastboot Mode

Fastboot mode may be entered for a variety of reasons, but in general it is because one of the following main reasons:

- User requested a reboot into fastboot to allow flashing of user images.
- The system was unable to boot and reverted into a 'recovery' mode, allowing the user to flash images or change the device configuration available under bootloader control.

Action Required: typically when in this mode, an action is expected from the user, the fastboot mode splash give some hints about possible way forward.



Boot Failure Mode

The boot failure mode can be entered typically as the result of any boot that does not result in a boot to android or a boot into fastboot mode, as example, a failed attempt to get into fastboot mode will cause a boot failure (e.g. trying to enter fastboot mode without connected usb)...

Action Required: some action is required to get out of this mode, depending on how you ended up in this mode, the action to be taken may be different, the splash gives a few options.

Integration

Generate the Splash Register Data

The first step in integrating splash is to make sure the splash register data is properly generated for the platform of interest. Generating the data is done following the steps described in this document:

BSEAV/app/splash/readme.txt

Because the generated splash configuration contains initialization pinmux data for the device, it is important to make sure your final intended device configuration is properly reflected in the configuration of the application which generates the splash register data.

The key things from this are as follows:

1. Setup the configuration for the device we need to generate the splash register for:
    - BSEAV/app/splash/splashgen/<platform>/bsplash_board.h.
    - **change the SPLASH_DISP0_FMT to be BFMT_VideoFmt_e1080p**.
    - using 1080p matches the default android configuration.
2. Build the splashgen application.
3. Run the splashgen application:
    - boot the generic vmlinux (no need to be android, besides "splashgen" only works in nexus-user mode).
    - run the splashgen with hdmi connected and powered up, you should see a splash screen pop up.
4. Find the output result (located in the same location as the splashgen executable): **splash_vdc_rul.c**

Plug In the Generated Register Data File

The second step in integrating splash is to enable the support at the bootloader interface:

1. Copy the generated **splash_vdc_rul.c** from the prior step into the bolt configuration for the platform
    - splash/BSEAV/app/splash/splashrun/**<platform>**/splash_vdc_rul_**def**.c
    - note the "**_def**" suffix addition.
2. Enable the SPLASH configuration for the device .cfg
    - add this line: "**config SPLASH on**"

Android Splash Filesystem

Splash Assets

The last step in integrating the splash is to make sure you have a proper splash file content.

- all devices partition layout should have a "splash" partition as part of their default layout.
- this is the partition to flash the splash filesystem image to.
- the bootloader code would look for a splash data from this location.
    - changing this knowledge in the bootloader code may require changing the partition as well.

The splash filesystem for android contains the following assets:

- all assets are bmp's
- RGB-565
- 480p (640x480)

This format is selected to optimize the size allocation and provide the needed feedback to the user.

The default assets are black background with white lettering, nothing too fancy and scales up well to larger displays without too much aliasing.

1. a bmp for the standard boot, to inform the user the device is booting,
2. a bmp for the fastboot mode, this bmp is displayed when the device has successfully entered fastboot mode.
3. a bmp for boot failure, this bmp is displayed either when the device has failed to boot android or has failed to boot into fastboot mode when it was supposed to.
    - when the device is in this state, it is generally needed to follow the serial log to know why this situation happened.

A default set of asset is provided here: **vendor/broadcom/bcm_platform/tools/splash**.

Splash File Creation

To create the splash file which contains the assets described, the splash create application has been updated in the android realm

```
Usage: splash_create_flash_file [option] | [option] <file>...
Options: [hz], [bpto] <file>
  -h         Help (this text)
  -z         Compress output file
  -b <file>  BMP image to be displayed during bootup.
  -p <file>  PCM audio to be played during bootup
  -t <file>  BMP image to be displayed during overtemp.
  -f <file>  BMP image to be displayed when in fastboot mode.
  -r <file>  BMP image to be displayed when boot failed.
  -o <file>  Output filename
```

The "default" splash file is created using those parameters:

- -z: compressed.
- -b: boot asset (default)
- -f: fastboot mode asset.
- -r: boot failure asset.

All raw assests are provided in the **vendor/broadcom/bcm_platform/tools/splash**.