android and bp3

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abp3 - Android and BP3 considerations

When moving to a BP3 enable part of a particular device, it is important to understand what changes need to happen at the android integration level. The changes necessary are listed below.

Devices Affected

The devices potentially affected by BP3 support are those running the following chipsets:

- 7268: dawson
- 7271: cypress
- 72604A0: elfin
- 7278: fundy - defaults to BP3 enabled

- 72604B0: grouse - defaults to BP3 enabled

Device Configuration

The following device configuration needs to be enabled when the device is meant to be targeted for a bp3 provisioning part|flow.

On a given device profile, this usually would be set in the device/broadcom/<device>/<device>.mk module configuration.

```
export ANDROID_DEVICE_SUPPORTS_BP3 := y
```

Hwcfg mode change

When migrating a device from non BP3 to BP3 aware part, the bulk of the device integration is not changed. However one aspect of the device is to be dealt with carefully, the hwcfg content.

hwcfg is the partition which contains the device keybox in particular. prior to BP3 provisioning, the keybox was always a one time read only programmable entity since it was not intended to be changed during the lifetime of the device. For that, we used a cramfs file system to store the device keybox.

When the device is built to target BP3 aware parts, this needs to change since we now need to allow the keybox to be updated by the provisioning mechanism. In this case, we change the hwcfg to be vfat file system (ext4 was considered as well, but it has too much overhead for the purpose). The new vfat based hwcfg needs to fit exactly in the hwcfg partition where the cramfs content used to be.

On a given device profile, this usually means the fstab for the device needs to change the entry for hwcfg from cramfs to vfat in the device/broadcom/<device>/fstab/<device-fstab>.

Migrating cramfs hwcfg to vfat hwcfg

If migrating a device from non-BP3 provisioning to BP3 aware provisioning, the following steps can be taken to produce a hwcfg that is compliant with the new expectations.

```
a) dd if=/dev/zero of=hwcfg.vfat bs=1k count=1024
   - creates a 1MB size vfat file system to match the hwcfg 1MB
     partition on the device (default layout size).

b) mkfs.vfat hwcfg.vfat
   - create a vfat file system associated with the hwcfg.vfat.

c) mkdir vfat && sudo mount -o loop hwcfg.vfat vfat
   - loop mount hwcfg.vfat to populate its content.

d) mkdir cramfs && sudo mount -o loop hwcfg.img cramfs
   - loop mount the existing hwcfg.img (cramfs) file system to
     copy its content into the hwcfg.vfat one.

e) sudo cp cramfs/* vfat/*
```

```
f) sudo umount vfat && sudo umount cramfs

g) fastboot flash hwcfg hwcfg.vfat
   - flash the new vfat partition to override the cramfs one.
```

Example configuration

To illustrate the changes necessary on a device profile to make a device BP3 aware from a device that is not, we look at the "elfin" device profile located in "device/broadcom/elfin". By default, "elfin" is not a BP3 device, the following changeset is however the minimum necessary to turn the basic profile into a "elfin bp3" aware device.

The change below implements the two aspects mentioned above.

```
diff --git a/elfin.mk b/elfin.mk
index fb08207..e3422a7 100644
--- a/elfin.mk
+++ b/elfin.mk
@@ -1,5 +1,6 @@
 export LOCAL_PRODUCT_OUT          := elfin
 export LOCAL_DEVICE_FULL_TREBLE   := y
+export ANDROID_DEVICE_SUPPORTS_BP3 := y

 ifeq ($(LOCAL_DEVICE_FORCED_NAB),y)
 export LOCAL_DEVICE_GPT           := device/broadcom/common/gpts/nab.o.conf


diff --git a/fstab/fstab.verity.ab-update.early b/fstab/fstab.verity.ab-
update.early
index 227b8e8..f9bbe0a 100644
--- a/fstab/fstab.verity.ab-update.early
+++ b/fstab/fstab.verity.ab-update.early
@@ -2,7 +2,7 @@
 */block/sd*                     auto            auto     defaults
voldmanaged=usb:auto,encryptable=userdata
 /dev/block/by-name/system       /               ext4     ro,barrier=1
wait,verify=/dev/block/platform/rdb/f0200200.sdhci/by-name/metadata,slotselect
 /dev/block/by-name/userdata     /data           ext4
noatime,nosuid,nodev,nomblk_io_submit,errors=panic wait,check,quota
-/dev/block/by-name/hwcfg        /dev/hwcfg      cramfs   ro,relatime,barrier=1
wait
+/dev/block/by-name/hwcfg        /dev/hwcfg      vfat     rw wait
 /dev/block/by-name/misc         /misc           emmc     defaults defaults
 /dev/block/by-name/eio          /eio            emmc     defaults defaults
 /dev/block/by-name/cache        /cache          ext4
noatime,nosuid,nodev,barrier=1,data=ordered,nomblk_io_submit,noauto_da_alloc,errors=panic
wait,check
```

Configuring BP3 licenses

This section describes how one can configure BP3 licenses on a device under android using the BP3 license portal. This assumes the user has access to the license portal, whether the portal is a production or development portal is out of the scope of this discussion, here we simply focus on explaining the steps required to allow proper device configuration and setup.

At the present time, for android devices that are bp3 enabled parts, you still are required to request license via drm binary for hdcp, widevine, playready ... which means, you still are required to provide a "drm.bin" and a "drm_hdcpt1x.bin".

Additionally, you need to follow the steps below to enable proper decoder support as well as additional feature such as dolby audio.

Register and|or log into the license portal

The official portal for bp3 is located (https://bp3.broadcom.com/).

- For Broadcom users, a development portal is located (http://bbs.dhcp.broadcom.net:1800/); use the development portal for setting up test devices.

If you are a new user, scroll to the end of the page displayed on the portal and "register" as a new user to gain access. You will receive an email confirming your registration before you can log into the portal.

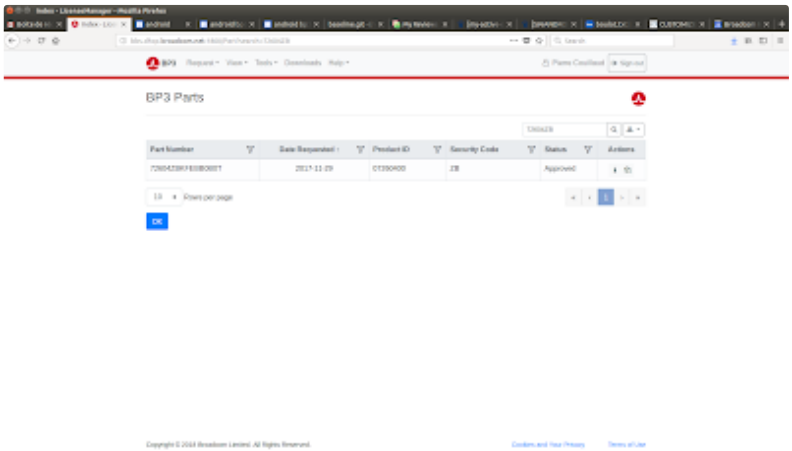
- for Broadcom users, use your okta credentials.
- follow the instructions to register proper okta user identifier.

Identify which license you need for a given part

The next step is really to know which part you are using and which licenses are available for the part. The part is typically located on a sticker on the device, in case you are not sure of which exact part number you are using.

Find the part of interest

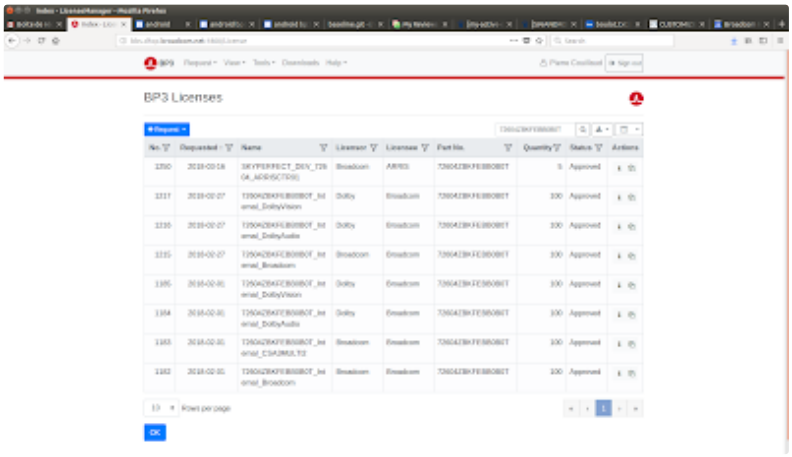
In the portal, follow "View -> Parts", then search for your part of interest.



... in this example, we searched for 72604ZB device and we see that one part exists on the portal: 72604ZBKFEBB0B0T

Find the license(s) associated with the part

Next, follow "View -> Licenses", then search for the part you selected in the step above, it will display all the available licenses for the part.



... in this example, we see there are 8 licenses associated with the part. you may go through all of them to see what exactly they contain, the classic one we would need for android baseline integration are (in this example): **1182 (default bcm)** and **1184 (dolby audio)**.

Program the license on the device

For the time being, the programming of licenses on android device happens from command line interface, using the "bp3" binary. For devices which are enabled for BP3 support in their device profile, the BP3 executable is automatically packaged with the image.

Step 1: check the status of the device licenses

Simply see what the device is currently configured to enable, running the "**bp3 status**" command.

In the example below, we highlight the licenses we are going to enable, which are the one we looked up in the prior step of this tutorial.

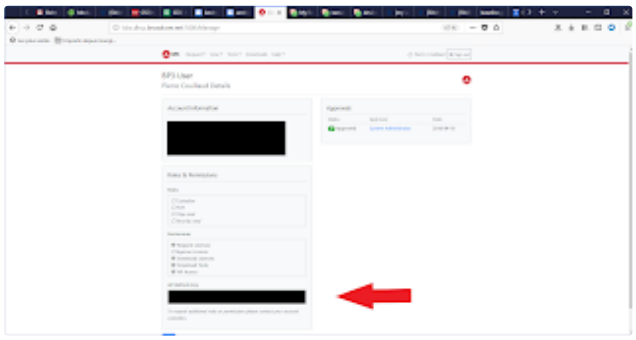
```
grouse:/ # bp3 status
UId = 0xd78e7ea54885c189

Broadcom - H265 (HEVC) [Disabled]
Broadcom - Dolby Vision HDR Activation ($) [Disabled]
Broadcom - Technicolor HDR Activation ($) [Disabled]
Broadcom - Technicolor ITM Activation ($) [Disabled]
Broadcom - QAM Activation ($) [Disabled]
Broadcom - CA Multi2 [Disabled]
```

```
Broadcom - CA DVB-CSA3 [Disabled]
Dolby - Post Proc: DAP [Disabled]
Dolby - Decode Dolby Digital [Disabled]
Dolby - Decode Dolby Digital Plus [Disabled]
Dolby - Decode AC4 [Disabled]
Dolby - Decode TrueHD [Disabled]
Dolby - MS10/11 [Disabled]
Dolby - MS12 v1 [Disabled]
Dolby - MS12 v2 [Disabled]
Dolby - Decode Dolby Vision [Disabled]
Rovi - (ACP) Macrovision [Disabled]
Technicolor - Prime [Disabled]
Technicolor - ITM [Disabled]
DTS - DTS TruVolume [Disabled]
DTS - DTS Digital Surround [Disabled]
DTS - DTS-HD (M6) [Disabled]
DTS - DTS-HDMA (M8) [Disabled]
DTS - DTS Headphone:X [Disabled]
DTS - DTS Virtual:X [Disabled]
DTS - DTS:X [Disabled]
```

Step 2: Apply provisioning

Using the "**bp3 provision**" command, apply provisioning of the license of interest. The option to pass to the command are:

- portal: the portal to reach for provisioning, which is the same portal mentioned in the prior steps you would be looking up licenses on.
- key: this is the user key identifier, this information is found on the portal and is uniquely associated with your user identifier, you will find the key by selecting your user name on the top right corner of the portal main page which will bring up the information associated with the user on the portal. example below.



- license: this a comma separated list of license(s) to enable.
    - note: at least one of the license(s) must be a bcm license initially.
    - note: in this example, we use the licenses identified in the prior step.

```
bp3 provision -portal http://bbs.dhcp.broadcom.net:1800 -key <user-key-
identifier> -license 1182,1184
UId = 0xd78e7ea54885c189
Provision succeeded
```

Upon successful provisioning, a "bp3.bin" module will appear (if first time), or may be updated in your "hwcfg" partition on the device.

Step 3: Verify the licensing configuration

Finally, verify the status of the provisioning, this assumes the command in the above step returned successfully.

In our example, we can verify the licenses state associated with the decoder firmware and the dolby audio have changed and those are now enabled for the device.

```
grouse:/ # bp3 status
UId = 0xd78e7ea54885c189

Broadcom - H265 (HEVC) [Enabled]
Broadcom - Dolby Vision HDR Activation ($) [Disabled]
Broadcom - Technicolor HDR Activation ($) [Disabled]
Broadcom - Technicolor ITM Activation ($) [Disabled]
Broadcom - QAM Activation ($) [Disabled]
Broadcom - CA Multi2 [Disabled]
Broadcom - CA DVB-CSA3 [Disabled]
Dolby - Post Proc: DAP [Enabled]
Dolby - Decode Dolby Digital [Enabled]
Dolby - Decode Dolby Digital Plus [Enabled]
Dolby - Decode AC4 [Enabled]
Dolby - Decode TrueHD [Enabled]
Dolby - MS10/11 [Enabled]
Dolby - MS12 v1 [Enabled]
Dolby - MS12 v2 [Enabled]
Dolby - Decode Dolby Vision [Disabled]
Rovi - (ACP) Macrovision [Disabled]
Technicolor - Prime [Disabled]
Technicolor - ITM [Disabled]
DTS - DTS TruVolume [Disabled]
DTS - DTS Digital Surround [Disabled]
DTS - DTS-HD (M6) [Disabled]
DTS - DTS-HDMA (M8) [Disabled]
DTS - DTS Headphone:X [Disabled]
DTS - DTS Virtual:X [Disabled]
DTS - DTS:X [Disabled]
```