

Inforce 6301™

Debian Linux Software Release Note V2.1

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1. INTRODUCTION

This document describes the feature set supported on Debian Linux Software Release Version 2.1 running Debian BUSTER 10 on Inforce 6301 Development platform from Inforce Computing. The Inforce 6301 is a micro SOM based on the 64-bit Qualcomm® Snapdragon™ 410E processor (APQ8016E SoC). The development kit is comprised of the Inforce 6301 micro SoM which is mounted onto an ACC-1C10 carrier board.

Test Configuration used for Validation

- Micro SOM – IFC6301-00-P2
- Carrier Board – ACC-1C10-00-P2

Memory Platform Information

The following has been validated in this release:

- eMMC 8GB
- LPDDR3 1GB

There are dedicated partitions in the on-board eMMC. **It is not recommended to erase or modify any of these partitions except for the partition-labeled boot and (userdata) rootfs.** Modifying may cause the board to no longer boot. If the eMMC partitions have been erased or partition table has been corrupted, the system can be recovered by using the instructions provided in the application note called **Inforce_6301_AppNote_Recovery_of_Bricked_Boards_Using_SD_Card_Rev_A** available on Inforce Techweb.

Partition	Size	Label
mmcblk0p2	512K	sbl1
mmcblk0p3	512K	rpm
mmcblk0p4	1M	tz
mmcblk0p7	1M	aboot
mmcblk0p8	64M	boot
mmcblk0p10	7.1G	(Userdata) rootfs

Android and Debian Linux images are inter-changeable on this platform. From fastboot mode, use the scripts available in the Android release package to flash the prebuilt android binaries.

2. SOFTWARE RELEASE INFORMATION

The following instructions assume that you are working from an Ubuntu 14.04 (or later) system. The steps for other systems will be similar, and should be easily discerned from what follows.

2.1 BUILD AND RUN IMAGES

A. Package Description

The binaries and source directories are packaged into the tarball called:

IFC6301_Debian_Linux_BSP_880502_V2.1

Meta-Binaries Directory:

This package contains the meta-binaries which are required to boot the board.

Source Directory:

This package also contains the kernel sources/patches with the necessary tools to build kernel and to customize the Debian rootfs image.

Binaries directory:

This package contains the below pre-built binaries:

- Kernel boot image that includes prebuilt kernel with Inforce's patches applied on 4.14.96 based kernel from Linaro.
- alip rootfs image that includes a minimal desktop environment GUI using LXQt.

These binaries can be flashed directly onto your Inforce 6301 platform using the commands in **Section F**.

B. Fetch Kernel Sources

To build the kernel image, follow the steps listed below from your Ubuntu host machine:

The kernel sources are available within the source folder:

IFC6301_Debian_Linux_BSP_880502_V2.1 package.

```
$cd IFC6301_Debian_Linux_BSP_880502_V2.1/source/
```

```
$tar -xvf gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-gnu.tar.gz
```

The scripts required to setup, compile, and package the kernel are bundled into a toolbox called skales.

```
$unzip skales.zip
```

```
$sudo apt-get update
```

```
$sudo apt-get install device-tree-compiler
```

```
$sudo apt-get install libfdt-dev
```

android-tools-fsutils contains the source to pack/unpack the image files.

```
$sudo dpkg -i --force-all android-tools-fsutils_4.2.2+git20130218-
3ubuntu41+linaro1_amd64.deb
```

Kernel source can be fetched using either of the below two methods.

Method 1:

```
$git clone debian-19.01-ifc6301_v2.1.bundle -b debian-19.01-ifc6301_v2.1
```

Then follow **Section D** to perform build and **Section F** to modify rootfs (userdata) if needed.



NOTE

This procedure doesn't require an internet connection since the bundle is part of the release package.

Method 2:

```
$git clone -n http://git.linaro.org/landing-teams/working/qualcomm/kernel.git
$cd kernel
$git checkout -b kernel-19.01 debian-qcom-dragonboard410c-19.01
$git am IFC6301_Debian_Linux_BSP_880502_V2.1/source/kernel-patches/*.patch
```

Then follow **Section D** to perform build and **Section F** to modify rootfs (userdata) if needed.

C. Perform Kernel Build and create boot image

To generate the image, dtb, and modules, issue the following commands:



NOTE

Before performing the build ensure that you are in the kernel directory.

```
$export ARCH=arm64
$export CROSS_COMPILE=../gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-
gnu/bin/aarch64-linux-gnu-
$make defconfig distro.config
$make -j4 Image.gz dtbs KERNELRELEASE=4.14.96-qcomlt-arm64
$make -j4 modules KERNELRELEASE=4.14.96-qcomlt-arm64
$make modules_install KERNELRELEASE=4.14.96-qcomlt-arm64 INSTALL_MOD_STRIP=1
INSTALL_MOD_PATH=../
$cat arch/arm64/boot/Image.gz arch/arm64/boot/dts/qcom/apq8016-sbc.dtb >
Image.gz+dtb
```

D. Pack the Kernel Boot Image

```
$tar -cvf ../lib/modules/4.14.96-qcomlt-arm64.tar ../lib/modules/4.14.96-
qcomlt-arm64
$../skales/mkbootimg --kernel Image.gz+dtb \
--ramdisk ../initrd.img \
--output boot-ifc6301-1901-v2.1.img \
--pagesize 4096 \
--base 0x80000000 \
```

```
--cmdline "root=/dev/disk/by-partlabel/rootfs rw rootwait  
console=ttyMSM0,115200n8 log_buf_len=4M"
```

E. Userdata Modification

Adding Modules

```
$cd IFC6301_Debian_Linux_BSP_880502_V2.1/binaries/  
$gunzip linaro-buster-alip-dragonboard-410c-528.img.gz  
$simg2img linaro-buster-alip-dragonboard-410c-528.img linaro-buster-alip-  
dragonboard-410c-528.img.raw  
$sudo su  
$mkdir rootfs  
$mount -o loop linaro-buster-alip-dragonboard-410c-528.img.raw rootfs/  
$tar -xf ../lib/modules/4.14.96-qcom-ifc6301-arm64.tar -C rootfs  
$make_ext4fs -o -L rootfs -l 5G -s linaro-buster-alip-dragonboard-410c-  
528.img rootfs/  
$umount rootfs
```

F. Flashing the Images

From fastboot mode, enter the following commands:

```
$cd IFC6301_Debian_Linux_BSP_880502_V2.1/meta-binaries  
$sudo ./flashall  
$cd IFC6301_Debian_Linux_BSP_880502_V2.1/binaries/  
$sudo fastboot flash about emmc_appsboot.mbn  
$sudo fastboot flash boot boot-ifc6301-1901-v2.1.img  
$sudo fastboot flash rootfs linaro-buster-alip-dragonboard-410c-528.img
```



NOTE

If the rootfs is from default binaries folder then ensure to extract before flashing.

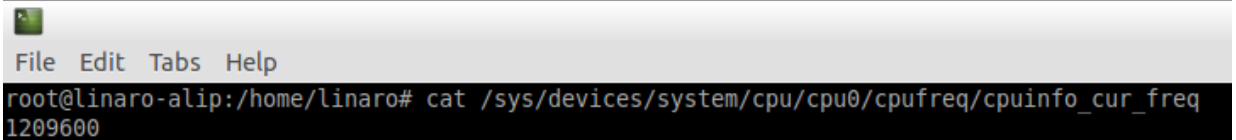
```
$gunzip linaro-buster-alip-dragonboard-410c-528.img.gz  
$sudo fastboot reboot
```

The platform shall reboot into Linaro. The LXQt-based image is expected to provide a desktop-like experience, as such it is recommended to use an HDMI monitor, USB, Keyboard, and Mouse.

3. FEATURES OF THE RELEASE

This section describes the features and capabilities of Linux BSP Software Release Version v2.1

1. **Operating System:** This release is based on Linaro's 19.01 Debian based Build that provides developers with a desktop like environment using Debian and the LXQt desktop.
 - **Linux Kernel:** 4.14.96
 - **Debian Linux:** 10 (BUSTER)
2. **HDMI :** This release supports HDMI out interface.
 - **Display:** This release supports HDMI display up to and including 1080@60 fps full-screen resolution.
 - **Audio:** This release has been validated for HDMI audio.
 - Select HDMI audio output source
 - Menu → Sound and Video → Pulse Audio Volume Control-> Configuration-> HDMI output
3. **CPU Frequency:** This release supports 1.2GHz on all cores.



```
File Edit Tabs Help
root@linaro-alip:/home/linaro# cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq
1209600
```

4. **USB :** This release is validated for the below USB classes.
 - **USB 2.0:** Inforce 6301 will work either in USB host mode or device mode. If the device micro USB cable is connected, it will work in the device mode (for fastboot).
 - **HID:** This release is validated for USB based input devices (i.e keyboard, mouse).
 - **Mass Storage:** This release is validated for USB pen drive (Auto mount).
 - **USB Camera:** This release is validated for Microsoft LifeCam HD 5000 i.e <https://www.microsoft.com/accessories/en-in/d/lifecam-hd-5000>
 - Use the following commands to test the USB camera:

```
$sudo apt-get update
```

```
$sudo apt-get install cheese
```
 - Connect the Microsoft HD camera to the USB port of the Inforce 6301 development kit.
 - Launch the camera using cheese application by issuing the following command:

```
$cheese &
```
 - The camera captured frames are displayed on the HDMI display.
5. **Wi-Fi:** This release is validated for Wi-Fi 2.4GHz client functionality.
6. **Wi-Fi MAC Address Programming:** This release supports Wi-Fi MAC address

programming.

- To perform the MAC address programming, open a terminal as shown below:
Menu → Other → Lx Terminal
- Issue the following commands on the terminal:

```
$sudo su
#cd /lib/firmware
#vim wlan/macaddr0
xx:xx:xx:xx:xx:xx
```



NOTE

<mac address pasted on the board (G) xx:xx:xx:xx:xx:xx>

- Then reboot the board.
 - Hard reset the board.
- Verify the programmed mac address by issuing the below command:

```
$sudo ifconfig wlan0
```

7. **Bluetooth:** This release is validated for Bluetooth functionality. To test Bluetooth open the terminal and enter **bluedevil-wizard** followed by **bluedevil-sendfile**, only A2DP is validated.
8. **µSD Card Interface:** This release supports µSD card storage media with a maximum validated storage size of 64GB.
9. **Fastboot Support:** This release supports fastboot. To go to fastboot mode press Vol- button and powercycle the board.
10. **Serial UART:** This release supports serial UART.
11. **Hardware Accelerated Video Encoder and Decoder:** This feature is tested on gstreamer using video test input (videotestsrc).

1. Issue the following commands to install the gstreamer packages:

```
$sudo apt-get update
$sudo apt-get install v4l-utils
$sudo apt-get install gstreamer1.0-plugins
```

2. Issue the following command to test the pipeline using gstreamer's video test source

```
$gst-launch-1.0 videotestsrc ! video/x-raw,format=NV12,width=1280,height=720,framerate=30/1,profile=high ! v4l2h264enc ! queue ! filesink location=/home/linaro/enc.h264
```

test.mp4 encoded file will be successfully created.

3. To decode the encoded test.mp4 file run the following command:

```
$gst-launch-1.0 playbin uri=file:///home/linaro/enc.h264
```

12. **User LEDs:** This release supports the following User LEDs:

Label	LED	Source	GPIO	Activity/Behavior
-------	-----	--------	------	-------------------

DS2	WLAN LED	PMIC	MPP_02	WI-FI
DS3	BT LED	PMIC	MPP_03	BT

13. **Low-speed Peripherals Programming:** This release is validated for Low-speed Peripherals Programming.

14. **GPS :** This release validate for GPS. Issue the below commands

```
$sudo apt-get update
$sudo apt-get upgrade
$sudo systemctl start gpsd
$sudo /usr/sbin/gpsdctl add pds://any
$cgps
```

4. LIMITATIONS/BUGS

1. HDMI hot plug is not supported.
2. Bluetooth mac programming is not supported.
3. At times reboot initiated from the terminal takes longer than a reboot initiated from the HDMI display.
4. HDMI video playback from memory does not work for resolutions above 480p.
5. HDMI Display doesn't come up after suspend and resume.

5. CONTACT INFORMATION

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