

Inforce 6320

Debian Linux Software Release Note V1.1

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**Inforce Computing Inc.
48820 Kato Road, # 600B
Fremont, CA 94538
U.S.A.**

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1. INTRODUCTION

This document describes the feature set supported on Debian Linux Software Release Version 1.1 running Debian BUSTER 10 on Inforce 6320 Application Ready Platform from Inforce Computing. The Inforce 6320 is an SBC that is powered by the 64 bit Qualcomm® Snapdragon™ 410E (APQ8016E) processor.

Test Configuration used for Validation

- SBC – SYS6320-11-P1

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 board would have to be sent back to Inforce through RMA.

2. SOFTWARE RELEASE INFORMATION

The following instructions assume that you are working from an Ubuntu 12.04 (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:

IOT6320_Debian_Linux_BSP_880602_V1.1

Meta-Binaries Directory:

This package contains the meta-binaries from Linaro's 18.01 release.

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:

- LK apps boot-loader image.
- Kernel boot image that includes prebuilt kernel with Inforce's patches applied on 4.14.0 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 6320 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:

IOT6320_Debian_Linux_BSP_880602_V1.1 package.

```
$cd IOT6320_Debian_Linux_BSP_880602_V1.1/source/  
$tar -xvf gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-gnu.tar.xz
```

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-18.01-iot6320_v1.1.bundle -b debian-18.01-iot6320_v1.1
```

Then follow **Section C** to perform build and **Section E** 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 http://git.linaro.org/landing-teams/working/qualcomm/kernel.git
$git checkout -b debian-18.01-iot6320_v1.1 debian-qcom-dragonboard410c-18.01
$git am debian_18_01/patches/*.patch
```

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

C. Perform Kernel Build

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



NOTE

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

```
$alias kmake64='make CROSS_COMPILE=../gcc-linaro-6.3.1-2017.02-x86_64_aarch64-linux-gnu/bin/aarch64-linux-gnu- ARCH=arm64 -j32'
$kmake64 defconfig distro.config
$kmake64 -j32 Image.gz dtbs KERNELRELEASE=4.14.0-qcom-ipc6320-arm64
$../skales/dtbTool -o dt.img -s 2048 arch/arm64/boot/dts/qcom
$cat arch/arm64/boot/Image.gz arch/arm64/boot/dts/qcom/apq8016-sbc.dtb
> Image.gz+dtb
$kmake64 -j32 modules KERNELRELEASE=4.14.0-qcom-ipc6320-arm64
$kmake64 KERNELRELEASE=4.14.0-qcom-ipc6320-arm64 modules_install
INSTALL_MOD_PATH=../
```

D. Pack the Kernel Boot Image

```
$tar -cvf ../lib/modules/4.14.0-qcom-ifc6320-arm64.tar ../lib/modules/
4.14.0-qcom-ifc6320-arm64
$../skales/mkbootimg --kernel Image.gz+dtb \
    --ramdisk ../initrd.img \
    --output boot-iot6320-1801-v1.1.img \
    --pagesize 2048 \
    --base 0x80000000 \
    --cmdline "root=/dev/disk/by-partlabel/rootfs rw rootwait
console=ttyMSM0,115200n8"
```

E. Userdata Modification

Adding Modules

```
$cd IOT6320_Debian_Linux_BSP_880602_V1.1/binaries/
$gunzip linaro-buster-alip-dragonboard-410c-359.img.gz
$simg2img linaro-buster-alip-dragonboard-410c-359.img linaro-buster-
alip-dragonboard-410c-359.img.raw
$sudo su
$mkdir rootfs
$mount -o loop linaro-buster-alip-dragonboard-410c-359.img.raw rootfs/
$tar -xf ../lib/modules/4.14.0-qcom-ifc6320-arm64.tar -C rootfs
$make_ext4fs -o -L rootfs -l 5G -s linaro-buster-alip-dragonboard-410c-
359.img rootfs/
$umount rootfs
```

F. Flashing the Images

From fastboot mode, enter the following commands:

```
$cd IOT6320_Debian_Linux_BSP_880602_V1.1/meta-binaries
$sudo ./flashall
$cd IOT6320_Debian_Linux_BSP_880602_V1.1/binaries/
$sudo fastboot flash about emmc_appsboot.mbn
$sudo fastboot flash boot boot-iot6320-1801-v1.1.img
$sudo fastboot flash rootfs linaro-buster-alip-dragonboard-410c-359.img
```



NOTE

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

```
$gunzip linaro-buster-alip-dragonboard-410c-359.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 v1.1

1. **Operating System:** This release is based on Linaro's 18.01 Debian based Build that provides developers with a desktop like environment using Debian and the LXQt desktop.
 - **Linux Kernel:** 4.14.0
 - **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.
3. **CPU Frequency:** This release supports 1.2GHz on all cores.
4. **USB :** This release is validated for the below USB classes.
 - **USB 2.0:** Inforce 6320 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 6320 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. **Gigabit Ethernet:** This release supports Gigabit Ethernet.



NOTE

The platform provides dual Ethernet ports on USB2.0 to GbE controllers. To test both Ethernet ports, a bridge script is necessary. Please follow the steps listed below:

```
$sudo apt-get install bridge-utils
```

- Create **eth_bridge.sh** file and add the same file to **/etc/rc.local**

```
$vim /home/linaro/eth_bridge.sh
```

```
brctl addbr br0
```

```

ifconfig <eth0> 0.0.0.0 down
ifconfig <eth1> 0.0.0.0 down
brctl addif br0 <eth0>
brctl addif br0 <eth1>
ifconfig <eth0> up
ifconfig <eth1> up
ifconfig br0 up
dhclient br0

```

**NOTE**

Change the eth0 and eth1 according to what is seen on your Ethernet port.

```
$vim /etc/rc.local
```

Add this line **sh /home/linaro/eth_bridge.sh** above exit0 and save the rc.local file.

```
$reboot
```

6. **PoE:** This release supports Power Over Ethernet (PoE) with 802.3at compliance PD/PSE configuration.

7. **Ethernet MAC Address programming:** This release supports ethernet MAC address programming.

- To perform the MAC address programming, open a terminal as shown below:
Open terminal (Start->System Tools->QTerminal)
- Issue the following commands on the terminal:

```

$sudo su
#cd /lib/firmware
#mkdir smsc75xx/
#vim smsc75xx/ethmacaddr0
xx:xx:xx:xx:xx:xx
#vim smsc75xx/ethmacaddr1
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 using the below command:

```
$sudo ifconfig
```

8. **Wi-Fi:** This release is validated for Wi-Fi 2.4GHz client functionality.
9. **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
#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
```

10. **Bluetooth:** This release is validated for Bluetooth functionality. To test Bluetooth open the terminal and enter `bluedevil-wizard` followed by `bluedevil-sendfile`.



NOTE

External Antenna should be connected.

11. **Fastboot Support:** This release supports fastboot. To go to fastboot mode press Vol- button and powercycle the board.

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

LABEL	LED	Source	GPIO	Activity/Behavior
D27	CPU_RESET	APQ	RESOUT_N	POWER IN (RED)
D29	BT LED	PMIC	MPP_03	(rfkill0) (GREEN)
D28	WLAN LED	PMIC	MPP_02	(rfkill1) (GREEN)
D29	LED1	PMIC	GPIO_02	(default-on) (GREEN)
D28	LED2	PMIC	GPIO_01	(mmc0) (GREEN)
D30	LED3	APQ	GPIO_95	(heartbeat) (RED)
D30	LED4	APQ	GPIO_120	(mmc1) (GREEN)

3.1 NEW FEATURES/BUG FIXES IN THIS RELEASE

1. Minor bug fixes

4. LIMITATIONS/BUGS

1. HDMI hot plug is not working.
2. Bluetooth mac programming is not supported.
3. Shut Down option is not displayed if Power button is long pressed.
4. The board does not go to suspend state if Power button is short pressed.
5. At times reboot initiated from the terminal takes longer than a reboot initiated from the HDMI display.
6. HDMI video playback from memory does not work for resolutions above 480p.

5. CONTACT INFORMATION

USA (Corporate Headquarters)

Inforce Computing, Inc.

48820 Kato Road, # 600B

Fremont, California 94538 USA.

Phone: +1 510 683 9999

Fax: +1 510 683 9909

For technical assistance refer: <https://www.inforcecomputing.com/techweb>

For technical support contact: techsupport@inforcecomputing.com

For sales contact: sales@inforcecomputing.com

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