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## Buildroot Toolchain Installation for the 400AP

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### Overview

The following document describes the process of installing the Buildroot toolchain for use with the 400AP. The Buildroot toolchain creates the Linux Kernel and filesystem images used to run the Linux OS on the 400AP.

The following instructions are based on the current stable release of the Buildroot toolchain at the release date of this document.

The Buildroot toolchain requires a computer running a Linux OS.

### Download 400AP Buildroot Toolchain:

The Buildroot website should be referenced for all toolchain documentation.

<http://buildroot.uclibc.org/>

Note: The following instructions require you to be a normal Linux user (not root). All files will be placed in your user home directory (~/).

**Step 1. Browse to the Janus-RC website and download the 400AP Buildroot archive into your user home directory.**

[http://www.janus-rc.com/Documentation/400ap\\_buildroot-2013.08\\_11052013.tar.bz2](http://www.janus-rc.com/Documentation/400ap_buildroot-2013.08_11052013.tar.bz2)

**Step 2. Change directory to your user home directory.**

```
cd ~/
```

**Step 3. Extract archive into your user home directory with at least 5GB of storage space available.**

```
tar -xjvf 400ap_buildroot-2013.08_11052013.tar.bz2
```

## Installing Buildroot Toolchain:

The following instructions will configure and compile the Buildroot toolchain for use with the 400AP. These instructions will create a base system with just the required tools and drivers to boot Linux on the 400AP. After the make process finishes a Linux Kernel and UBI filesystem will be created for use on the 400AP.

*Note: The following instructions require you to be a normal Linux user (not root). All files will be placed in your user home directory (~/).*

**Step 1. Change directory to your user home directory.**

```
cd ~/
```

**Step 2. Extract the Buildroot toolchain into your user home directory.**

```
tar -xjvf buildroot-2013.08.tar.bz2
```

**Step 3. Change directory to the Buildroot working directory.**

```
cd ~/buildroot-2013.08
```

**Step 4. Apply 400AP Buildroot patch**

```
patch -p1 < ../400ap-buildroot-2013.08.patch
```

**Step 5. Apply 400AP configuration to Buildroot.**

```
make janus_400ap_defconfig
```

**Step 6. Compile Buildroot toolchain.**

```
make
```

- Note:*
- 1.) This step takes some time to complete. The time will depend on the speed of your PC and Internet connection. If your Linux PC is missing any required package dependencies the make process will fail and report the missing package. Install missing packages and re-issue the make command.
  - 2.) The Kernel and filesystem created will be a base system build. This base build will not contain all packages and Kernel options contained in the factory image supplied with the 400AP. To create the Kernel and filesystem as supplied with the 400AP you will need to follow the instructions in the following section (Configure Production Build).

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## Configure Production Build:

The 400AP ships from the factory with a default Kernel and filesystem pre-loaded in NAND flash. To recreate the latest default production build as supplied by the factory follow these instructions.

**Step 1. Change directory to the Buildroot working directory.**

```
cd ~/buildroot-2013.08
```

**Step 2. Extract 400AP production build files over the Buildroot working directory**

```
tar -xjvf ../400ap_v2.1_br2013.08_k3.10.11_pb_11052013.tar.bz2
```

**Step 3. Force Kernel to rebuild.**

```
rm -fr output/build/linux-3.10.11
```

**Step 4. Apply 400AP production build configuration to Buildroot**

```
make janus_400ap_pb_defconfig
```

**Step 5. Compile Buildroot toolchain**

```
make
```

*Note: 1.) This step takes some time to complete. The time will depend on the speed of your PC and Internet connection. If your Linux PC is missing any required package dependencies the make process will fail and report the missing package. Install missing packages and re-issue the make command.*

## Linux Distribution Notes:

The following section contains notes for installing 400AP Buildroot toolchain on various Linux distributions. Depending on if you have added more packages or Kernel options you might need to install more tools on your development PC. If the make process fails you will need to read through the error messages to determine what packages your development PC is missing.

### Ubuntu Desktop:

The following packages are required to compile the Buildroot toolchain as configured for the 400AP.

```
sudo apt-get install bison flex subversion texinfo g++ gettext
```

```
sudo apt-get install ncurses-dev antlr gcj-jdk make git
```

### SUSE Desktop:

The following packages are required to compile the Buildroot toolchain as configured for the 400AP.

```
sudo zypper install gcc-c++ bison flex subversion make texinfo patch
```

```
sudo zypper install ncurses-devel glibc-devel-32bit gcc-java antlr
```

## Configuring Toolchain:

Once the toolchain has been installed, you might need to add packages or driver support into the toolchain or Linux Kernel. The following instruction should be used to modify the Buildroot toolchain.

To configure the Buildroot toolchain:

```
#make menuconfig
```

To configure the Linux Kernel:

```
#make linux26-menuconfig
```

To configure busybox:

```
#make busybox-menuconfig
```

After making configuration changes, you will need to issue 'make' in order to generate new Kernel and filesystem images.

## Linux Kernel and UBI Filesystem:

After the make process has completed a Linux Kernel and UBI filesystem image will need to be uploaded to the 400AP.

Kernel and filesystem image location:

```
~/buildroot-2013.08/output/images
```

To upload the Linux Kernel and UBI filesystem images into NAND flash of the 400AP you will need to follow the instructions in the following application note.

***Uploading Firmware Images to NAND Flash***