



# **CV180x/CV181x U-boot Porting Development Guide**

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## Revision History

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0.0.0.1	2022/06/01	Initial

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## FUNCTION OVERVIEW

### 2.1 Purpose

cv180x/cv181x uses U-boot-2021.10 as Bootloader on the its EVB. When different peripheral chips are configured (i.e. the development version and the public version are different), you need to modify the U-boot related codes, mainly including registers, configuration files and drivers.

### 2.2 U-boot Directory Structure

The following table lists the common modification directories and files:

Directory	Description
arch	CPU chip development related code
arch/arm/dts or arch/riscv/dts	<p>Linux/uboot shared DTS configuration file.</p> <p>The actual DTS file path (not inside the u-boot folder) is  <code>sdk_source/build/boards/\$(CHIP_ARCH)/\$(BOARD)/dts_riscv(riscv)/\$(BOARD).dts</code> (for cv180x)</p> <p>ex. cv180x/cv181x chip series EVB board named cv1800b_wevb_0008a_spinor  <code>sdk_source/build/boards/cv180x/cv1800b_wevb_0008a_spinor/dts_arm/\$(BOARD).dts</code></p>
configs	<p>uboot config configuration file.</p> <p>The actual file path for configs is  <code>sdk_source/build/boards/\$(CHIP_ARCH)/\$(BOARD)/u-boot/cvitek_\$(BOARD)_defconfig</code></p> <p>defconfig: uboot native or new configuration  ex. cv180x/cv181x chip series EVB board named cv1800b_wevb_0008a_spinor  <code>sdk_source/build/boards/cv180x/cv1800b_wevb_0008a_spinor/u-boot/cvitek_cv1800b_wevb_0008a_spinor_defconfig</code></p>
Board	<p>Relevant codes of various SOC chip manufacturers, board-side settings that need to be configured after the EVB is powered on.  cvitek.h : set GPIO definition and different EVB differences  cvi_board_init.c: control EVB board segment I/O, PINMUX peripheral chip settings</p> <p>The actual file path for board.c/cvitek.h is  <code>sdk_source/build/boards/\$(CHIP_ARCH)/\$(BOARD)/u-boot/cvi_board_init.c</code>  <code>sdk_source/build/boards/\$(CHIP_ARCH)/\$(BOARD)/u-boot/cvitek.h</code></p> <p>ex. cv180x/cv181x chip series EVB board named cv1800b_wevb_0008a_spinor  <code>sdk_source/build/boards/cv180x/cv1800b_wevb_0008a_spinor/u-boot/cvi_board_init.c</code>  <code>sdk_source/build/boards/cv180x/cv1800b_wevb_0008a_spinor/u-boot/cvitek.h</code></p>
Include	Header files
Include/configs	cv180x-asic.h/cv181x-asic.h set boot command/configuration.
cmd	Uboot console command function codes
drivers	Ethernet, usb, storage and other related drivers.

## U-BOOT TRANSPLANT

### 3.1 U-boot Hardware Environment

The peripheral chips on cv180x/cv181x EVB include DDR, eMMC, SPI NAND Flash and SPI NOR Flash. Please refer to *CV181x/CV180xB/C Hardware Design User Guide V1.0* for all models.

### 3.2 Pin Configuration (Pinmux)

For different EVBs and different peripherals, the initialization settings can be done in `cvi_board_init.c`.

```
$ cat build/boards/cv180x/cv1800b_wevb_0008a_spinor/u-boot/cvi_board_init.c
int cvi_board_init(void)
{
    PINMUX_CONFIG(PAD_MIPIRX1P, IIC1_SDA);
    PINMUX_CONFIG(PAD_MIPIRX0N, IIC1_SCL);
    PINMUX_CONFIG(PAD_MIPIRX1N, XGPIOC_8);
    PINMUX_CONFIG(PAD_MIPIRX0P, CAM_MCLK0);
    return 0;
}
```

### 3.3 Compile U-boot

The operation of compiling U-boot is as follows:

- Read compilation environment variables (take cv1800b\_wevb\_0008a\_spinor as an example)

```
$ source build/cvisetup.sh
-----
Usage:
(1) menuconfig - Use menu to configure your board.
    ex: $ menuconfig

(2) defconfig $CHIP_ARCH - List EVB boards($BOARD) by CHIP_ARCH.
    ** cv183x ** -> ['cv1829', 'cv1832', 'cv1835', 'cv1838', 'cv9520', 'cv7581']
    ** cv182x ** -> ['cv1820', 'cv1821', 'cv1822', 'cv1823', 'cv1825', 'cv1826',
    ↪ 'cv7327', 'cv7357']
    ** cv181x ** -> ['cv181x', 'cv1823a', 'cv1821a', 'cv1820a', 'cv1811h',
    ↪ 'cv1811c', 'cv1810c', 'cv1812h']
    ** cv180x ** -> ['cv180x', 'cv1800b', 'cv1800c', 'cv1801b', 'cv1801c']
    ex: $ defconfig cv183x
```

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```
(3) defconfig $BOARD - Choose EVB board settings.
    ex: $ defconfig cv1835_wevb_0002a
    ex: $ defconfig cv1826_wevb_0005a_spinand
    ex: $ defconfig cv181x_fpga_c906
-----
```

- Select EVB cv1800b\_wevb\_0008a\_spinor

```
$ defconfig cv1800b_wevb_0008a_spinor
Run defconfig function
Loaded configuration '/workspace/build/boards/cv180x/cv1800b_wevb_0008a_spinor/
↪cv1800b_wevb_0008a_spinor_defconfig'
No change to configuration in '.config'
Loaded configuration '.config'
===== Environment Variables =====
PROJECT: cv1800b_wevb_0008a_spinor, DDR_CFG=ddr2_1333_x16
CHIP_ARCH: cv180x, DEBUG=0
SDK VERSION: musl_riscv64, RPC=0
ATF options: ATF_KEY_SEL=default, BL32=1
Linux source folder: linux_5.10, Uboot source folder: u-boot-2021.10
CROSS_COMPILE_PREFIX: riscv64-unknown-linux-musl-
ENABLE_BOOTLOGO: 0
Flash layout xml: /workspace/build/boards/cv180x/ cv1800b_wevb_0008a_spinor/
↪partition/partition_spinor.xml
Sensor tuning bin: gcore_gc4653
Output path: /workspace/master/install/ soc_cv1800b_wevb_0008a_spinor
```

- Compile U-boot

```
$ build_uboot
[TARGET] u-boot-dts
.....
[TARGET] u-boot-build
.....
```

- Get fip.bin (with bootloader+uboot inside)

```
$ ls install/cv1800b_wevb_0008a_spinor/fip.bin
install/cv1800b_wevb_0008a_spinor/fip.bin
```

Since the native u-boot compiled u-boot.bin cannot be burned directly into FLASH, we adopt the Firmware Image Package (FIP) method in ARM Trusted Firmware Design to encapsulate uboot.bin in FIP.bin



## U-BOOT BURN UPDATE

### 4.1 Overview

U-boot burn update will need to burn the entire fip.bin (bootloader + uboot), while the bootloader comes with different DDR initialization parameters, which can be configured via SDK menuconfig when EVB is selected.

Please refer to the `SDK_Compilation_and_Usage_Guide - 1.4.2.2.docx`

### 4.2 U-boot Through Bootrom

Please refer to `Cvitek Bare and Non-Bare Chip Burning Upgrade Operation Guide_v1.2.1.docx`

### 4.3 Flash U-boot Burn Update

#### 4.3.1 SPI NOR Flash Burn Update

Please refer to `Cvitek Bare and Non-Bare Chip Burning Upgrade Operation Guide_v1.2.1.docx`

#### 4.3.2 SPI NAND Flash Burn Update

Please refer to `Cvitek Bare and Non-Bare Chip Burning Upgrade Operation Guide_v1.2.1.docx`

#### 4.3.3 eMMC Burn Update

Please refer to `Cvitek Bare and Non-Bare Chip Burning Upgrade Operation Guide_v1.2.1.docx`