

# Rockchip Buildroot Weston Developer Guide

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## Preface

## Overview

This document presents the basic configuration methods of Buildroot SDK Weston display service.

## Product Version

| Chipset     | Kernel Version |
|-------------|----------------|
| All chipset | All            |

## Intended Audience

This document (this guide) is mainly intended for:

Technical support engineers

Software development engineers

## Revision History

| Version | Author     | Date       | Revision History                                       |
|---------|------------|------------|--|
| V1.0.0  | Jeffy Chen | 2019-11-27 | Initial version  |
| V1.0.1  | Ruby Zhang | 2020-07-23 | Update the company name and the format of the document |
| V1.1.0  | Jeffy Chen | 2020-08-04 | Update contents for the newest SDK                     |
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## Contents

### Rockchip Buildroot Weston Developer Guide

1. Introduction
  - 1.1 Overview
  - 1.2 Configuration Methods
2. Configuration
  - 2.1 Status Bar Configuration
  - 2.2 Background Configuration
  - 2.3 Idle Time and Lock Screen Configuration
  - 2.4 Color Format Configuration
  - 2.5 Display Orientation Configuration
  - 2.6 Resolution and Scale Configuration
  - 2.7 Freeze the Screen
  - 2.8 Screen Status Configuration
  - 2.9 Multi-screen Configuration
  - 2.10 Configuration of Input Devices
  - 2.11 Calibration of Input Devices
  - 2.12 Configuration on the Platform without GPU
  - 2.13 ARM AFBC modifier

# 1. Introduction

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## 1.1 Overview

Weston is the official implementation reference of Wayland open source display protocol, and Weston 9.0(or 8.0) drm back-end is used in Rockchip Buildroot SDK by default.

## 1.2 Configuration Methods

There are multiple ways to configure Rockchip Buildroot SDK Weston:

### a. Command line options

That is, the options of the command when starting Weston, such as `weston --tty=2`.

### b. weston.ini configuration file

It's located in `/etc/xdg/weston/weston.ini`, corresponding to the location of SDK code: `buildroot/board/rockchip/common/base/etc/xdg/weston/weston.ini`.

Please refer to: <https://fossies.org/linux/weston/man/weston.ini.man>.

### c. Special environment variables

Generally, these environment variables are set in these places:

1. The startup script of Weston, which is located in `/etc/init.d/S50launcher` of the SDK firmware, for example:

```
# /etc/init.d/S50launcher
start)
    ...
    export WESTON_DRM_MIRROR=1 # should be set before starting
Weston
    ...
    weston&
```

2. The environment script of Weston, which is located in `/etc/profile.d/weston.sh` of the SDK firmware, corresponding to the location of SDK code: `buildroot/package/weston/weston.sh`.

### d. Dynamic configuration file

For drm back-end, Buildroot SDK Weston provides some dynamic configuration support, such as dynamic display configuration files, the default path is `/tmp/.weston_drm.conf`, which can be specified by the environment variable `WESTON_DRM_CONFIG`.

### e. udev rules

Part of the configurations of input devices in Weston should be set by `udev rules`.

# 2. Configuration

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## 2.1 Status Bar Configuration

Weston supports setting the background color and position of status bar in the `shell` section of `weston.ini` configuration file, and setting the quick start program in the `launcher` section, for example:

```
# /etc/xdg/weston/weston.ini

[shell]
panel-color=0x90ff0000
# the color format is ARGB8888

panel-position=bottom
# top|bottom|left|right|none, none is disable

[launcher]
icon=/usr/share/icons/gnome/24x24/apps/utilities-terminal.png
# icon path

path=/usr/bin/gnome-terminal
# quick start command
```

Currently, Weston does not support setting the size of status bar. You have to modify in the code level when need some adjustments:

```
// weston/clients/desktop-shell.c

static void
panel_configure(void *data,
                struct weston_desktop_shell *desktop_shell,
                uint32_t edges, struct window *window,
                int32_t width, int32_t height)
{
    ...
    switch (desktop->panel_position) {
    case WESTON_DESKTOP_SHELL_PANEL_POSITION_TOP:
    case WESTON_DESKTOP_SHELL_PANEL_POSITION_BOTTOM:
        height = 32; # height
        break;
    case WESTON_DESKTOP_SHELL_PANEL_POSITION_LEFT:
    case WESTON_DESKTOP_SHELL_PANEL_POSITION_RIGHT:
        switch (desktop->clock_format) {
        case CLOCK_FORMAT_NONE:
            width = 32;
            break;
        case CLOCK_FORMAT_MINUTES:
            width = 150;
            break;
        case CLOCK_FORMAT_SECONDS:
            width = 170;
            break;
        }
        break;
    }
}
```

## 2.2 Background Configuration

Weston supports setting the background pattern and color in the `shell` section of the `weston.ini` configuration file, such as

```
# /etc/xdg/weston/weston.ini

[shell]
background-image=/usr/share/backgrounds/gnome/Aqua.jpg
# Background pattern (wallpaper) absolute path

background-type=tile
# scale|scale-crop|tile

background-color=0xff002244
# The color format is ARGB8888, effective when no background pattern is set
```

## 2.3 Idle Time and Lock Screen Configuration

The idle timeout of Weston can be configured in the command options or in the `core` section of `weston.ini`, such as:

```
# /etc/init.d/S50launcher
start)
    ...
    weston --idle-time=0& # 0 means idle mode is disabled, in
seconds
```

Or

```
# /etc/xdg/weston/weston.ini

[core]
idle-time=10
```

Lock screen of Weston can be configured in the `shell` section of `weston.ini`, such as:

```
# /etc/xdg/weston/weston.ini

[shell]
locking=false
# lock screen is disabled

lockscreen-icon=/usr/share/icons/gnome/256x256/actions/lock.png
# unlock button icon

lockscreen=/usr/share/backgrounds/gnome/Garden.jpg
# background of lock screen
```

## 2.4 Color Format Configuration

The default display format of Weston in the Buildroot SDK is ARGB8888. For some low-performance platforms, you can configure RGB565 in the `core` section in the `weston.ini`, such as:

```
# /etc/xdg/weston/weston.ini

[core]
gbm-format=rgb565
# xrgb8888|rgb565|xrgb2101010
```

You can also configure the display format of each screen individually in the `output` section of `weston.ini`, such as:

```
# /etc/xdg/weston/weston.ini

[output]
name=LVDS-1
# output name can be seen in the Weston startup log, such as: Output LVDS-1,
# (connector 71, crtc 60)

gbm-format=rgb565
# xrgb8888|rgb565|xrgb2101010
```

## 2.5 Display Orientation Configuration

Display orientation of screens can be configured in the `output` section of `weston.ini`, such as

```
# /etc/xdg/weston/weston.ini

[output]
name=LVDS-1

transform=90
# normal|90|180|270|flipped|flipped-90|flipped-180|flipped-270
```

If you want to configure the orientation dynamically, the dynamic configuration file can be used, such as:

```
echo "output:all:rotate90" > /tmp/.weston_drm.conf # All screens rotate 90
degrees
echo "output:eDP-1::rotate180" > /tmp/.weston_drm.conf # eDP-1 rotates 180
degrees
```

## 2.6 Resolution and Scale Configuration

Screen's resolution and scale of Weston can be configured in the `output` section of `weston.ini`, such as:

```
# /etc/xdg/weston/weston.ini

[output]
name=LVDS-1

mode=1280x800
# should be an effective resolution supported by the screen

scale=2
# value must be an integer, support application level scaling
```

If you want to scale to a specific resolution(without changing the physical resolution), you can configure it through WESTON\_DRM\_VIRTUAL\_SIZE environment variable, such as:

```
# /etc/profile.d/weston.sh
export WESTON_DRM_VIRTUAL_SIZE=1024x768
```

If you want to configure resolution and scaling dynamically, the dynamic configuration file can be used, for example:

```
echo "output:HDMI-A-1:mode=800x600" > /tmp/.weston_drm.conf # change the
resolution of HDMI-A-1 to 800x600
echo "output:eDP-1:rect=<10,20,410,620>" > /tmp/.weston_drm.conf # eDP-1
display to the position of (10,20), the size is scaled to 400x600
```

When the VOP hardware doesn't support scaling, these kinds of scale requires Rockchip's RGA 2D acceleration.

## 2.7 Freeze the Screen

When Weston is started, there will be a black screen that switches between boot logo and UI display temporarily. If you want to prevent this black screen, you can freeze the Weston screen content temporarily through the following ways:

Add --warm-up to Weston's command options

```
# /etc/init.d/S50launcher
start)
    ...
    weston --warm-up&
```

Or

```
# /etc/init.d/S50launcher
start)
    ...
    export WESTON_FREEZE_DISPLAY=/tmp/.weston_freeze # Set a
special configuration file path
    touch /tmp/.weston_freeze # Freeze the display
    weston&
    ...
    sleep 1 && rm /tmp/.weston_freeze& # unfreeze after 1 second
```



Or

```
# /etc/init.d/S50launcher
start)

    ...
    echo "output:all:freeze" > /tmp/.weston_drm.conf # Freeze the
display

    weston&
    ...
    sleep 1 && \
        echo "output:all:unfreeze" > /tmp/.weston_drm.conf& #
unfreeze after 1 second
```

## 2.8 Screen Status Configuration

The DRM framework supports setting force status for screens:

```
echo on > /sys/class/drm/card0-HDMI-A-1/status # Force HDMI-A-1 connected
#on|off|detect, detect means hot-plug
```

For more specific screen status configuration, the dynamic configuration file can be used, for example:

```
echo "output:DSI-1:off" >> /tmp/.weston_drm.conf # Turn off DSI
echo "output:eDP-1:on" >> /tmp/.weston_drm.conf # Turn on eDP
echo "compositor:state:off" >> /tmp/.weston_drm.conf # Turn off display
echo "compositor:state:sleep" >> /tmp/.weston_drm.conf # Turn off display and
touch to wake
echo "compositor:state:on" >> /tmp/.weston_drm.conf # Turn on display
```

## 2.9 Multi-screen Configuration

The Buildroot SDK Weston supports multi-screen with the same or different display and hot plug functions. You can distinction different screens based on the name of drm (obtained through Weston startup log or /sys/class/drm/card0-<name>). Some configurations can be set by environment variables, for example:

```
# /etc/profile.d/weston.sh
export WESTON_DRM_PRIMARY=HDMI-A-1 # Specify HDMI-A-1 as a main display
export WESTON_DRM_MIRROR=1 # In mirror mode (multi-screen with the same
display), without setting this environment variable will be with different
display
export WESTON_DRM_KEEP_RATIO=1 # In mirror mode, scaling maintains the aspect
ratio, without setting this variable will be full screen by force
export WESTON_DRM_PREFER_EXTERNAL=1 # Turn off the built-in monitor
automatically when an external monitor is connected
export WESTON_DRM_PREFER_EXTERNAL_DUAL=1 # When an external monitor is
connected, keep the first external monitor as the main display by default
```

When the VOP hardware doesn't support scaling, it would try to use Rockchip's RGA 2D acceleration.

It also supports disabling the specified screen individually in the `output` section of weston.ini:

```
# /etc/xdg/weston/weston.ini

[output]
name=LVDS-1

mode=off
# off|current|preferred|<WIDTHxHEIGHT@RATE>
```

## 2.10 Configuration of Input Devices

The Weston service requires at least one input device by default. If there is no input device, the special settings in the `core` section of `weston.ini` is needed:

```
# /etc/xdg/weston/weston.ini

[core]
require-input=false
```

If there are multiple screens in Weston, input devices should be bound to screens, you can configure it through the input device's udev rules's `WL_OUTPUT` env, such as:

```
# /lib/udev/rules.d/99-goodix-ts.rules
ATTRS{idVendor}=="dead", ATTRS{idProduct}=="beef", ENV{WL_OUTPUT}="HDMI-A-1"
```

Or `WL_SEAT` env, such as:

```
# /lib/udev/rules.d/99-goodix-ts.rules
ATTRS{idVendor}=="dead", ATTRS{idProduct}=="beef", ENV{WL_SEAT}="seat1"
```

```
# /etc/xdg/weston/weston.ini

[output]
name=LVDS-1

seat=seat1
```

## 2.11 Calibration of Input Devices

If you need to calibrate the touch screen, you can use `WESTON_TOUCH_CALIBRATION` environment, such as:

```
# /etc/profile.d/weston.sh
export WESTON_TOUCH_CALIBRATION="1.013788 0.0 -0.061495 0.0 1.332709
-0.276154"
```

The calibration parameters can be obtained by Weston calibration tool: `weston-calibrator`. After running this tool, a number of random points will be generated, and then click them in sequence to output the calibration parameters, such as: Final calibration values: 1.013788 0.0 -0.061495 0.0 1.332709 -0.276154

Or you can use the new Weston touch calibrator: weston-touch-calibrator, which needs:

```
# /etc/xdg/weston/weston.ini

[libinput]
touchscreen_calibrator=true
calibration_helper=/bin/weston-calibration-helper.sh
```

## 2.12 Configuration on the Platform without GPU

The Weston in the SDK uses GPU for render acceleration by default. For platforms without GPUs or GPU is not powerful enough, Rockchip RGA 2D acceleration can also be used instead.

The detailed configuration requires to enable BR2\_PACKAGE\_LINUX\_RGA and BR2\_PACKAGE\_WESTON\_DEFAULT\_PIXMAN in the Buildroot SDK.

## 2.13 ARM AFBC modifier

For chips which support AFBC, the Weston in the SDK support using GPU based ARM AFBC compressed format for displaying.

```
# /etc/profile.d/weston.sh
# export WESTON_DISABLE_ATOMIC=1
export WESTON_ALLOW_GBM_MODIFIERS=1
```