RZ/G2L Group Board Support Package
Version 1.4

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Release Note for HTML5 (Gecko)

Introduction

This release note describes the contents, building procedures and important points of the RZ/G2L Group Board Support Package (hereinafter referred to as "BSP").

Contents

1.   Release Items

- **Name and version**
  RZ/G2L Group Board Support Package
  Version 1.4 (hereinafter referred to as "BSP v1.4")

- **Distribution method**
  Please visit the site below and create an account to download the packages. Basic packages of BSP v1.4 which are listed in **Table 1** can be downloaded.

  RZ/G2L product page:
  https://www.renesas.com/RZG2L

  RZ/G2L Group Board Support Package:
  https://www.renesas.com/products/microcontrollers-microprocessors/rz-arm-based-high-end-32-64-bit-mpus/rzg2l-board-support-package-419-cip

- **Target board**
  RZ/G2L Evaluation Board Kit PMIC version (*1):
  o   RZ/G2L SMARC Module Board v2.1
  o   RZ SMARC Series Carrier Board v4.0

  (*1)   "RZ/G2L Evaluation Board Kit" and "RZG2L Evaluation Board Kit PMIC version" includes the RZ/G2L SMARC Module Board and the RZ SMARC Series Carrier Board.

- **Functions**
  Linux BSP
  - Linux Kernel
  - Device Drivers

- **File contents**
  BSP v1.4 is delivered by the files listed in **Table 1**.

Table 1. RZ/G2L Board Support Package
Basic packages

File	Description
RTK0EF0045Z0019AZJ-v1.4.zip	RZ/G2L Group Board Support Package. This file includes the **Yocto recipe packages** and the necessary documents.
rzg2l_bsp_v1.4.tar.gz	**Yocto recipe packages**.
r01us0471ej0109-rz-g.pdf	Release Note for building BSP without HTML5 (Gecko)
r01us0596ej0100-rz-g(Release Note HTML5).pdf	This document
r01us0472ej0105-rz-g.pdf	Component list
r01tu0338ej0106-rz-g.pdf	Documents describing booting method and the required settings of bootloader
RTK0EF0045Z13001ZJ-v0.81_JP.zip RTK0EF0045Z13001ZJ-v0.81_EN.zip	RZ/G2L Mali Graphics Library Evaluation Version V0.81. This is the graphics package which corresponds to BSP v1.4.
RTK0EF0045Z15001ZJ-v0.55_JP.zip RTK0EF0045Z15001ZJ-v0.55_EN.zip	RZ/G2L Codec Library Evaluation. This is the codec package which corresponds to BSP v1.4.

Basic files of BSP v1.4 for HTML5 (Gecko)

File	Description
RTK0EF0045Z41001ZJ_v1.0.zip	Board Support Package for HTML5 (Gecko). This file includes the **Yocto recipe packages** for HTML5 (Gecko) and the necessary documents.
rzg_bsp_gecko_v1.0.tar.gz	**Yocto recipe packages**
r01us0596ej0100-rz-g(Release Note HTML5).pdf	This document
r01us0597ej0100-rz-g(Component List HTML5).pdf	Component List of HTML5

The BSP is provided "AS IS" with no warranty and the license which is described in the source code. Please check the contents of the license carefully.

2. Build environment

The environment for building the BSP is listed in **Table 2**. Please refer to "RZ/G2L and RZ/G2LC SMARC EVK Start-up Guide" for details about setting up the environment.

A Linux PC is required for building the software.

A Windows PC can be used as the serial terminal interface with software such as TeraTerm.

Table 2. Equipment and Software Necessary for Developing Environments

Equipment		Description
Linux Host PC		Used as build/debug environment
	OS	Ubuntu 20.04 LTS (recommended) 64 bit OS must be used.
	NFS server	(Optional) Used for mounting rootfs via NFS
Windows Host PC		Used for controlling the board with terminal software
	OS	Windows 10
	Terminal software	Used for controling serial console of the target board Tera Term (latest version) is recommended Available at https://ttssh2.osdn.jp/index.html.en
	VCP Driver	Virtual COM Port driver which enables to communicate Windows Host PC and the target board via USB which is virtually used as serial port. Available at: ● http://www.ftdichip.com/Drivers/VCP.htm

3.　BSP Build Instructions

3.1　Building images to run on the board

This section describes how to build the BSP. Before starting the build, run the command below on the Linux Host PC to install the packages used for building the BSP.

```
$ sudo apt-get update
$ sudo apt-get install gawk wget git-core diffstat unzip texinfo gcc-multilib \
build-essential chrpath socat cpio python3 python3-pip python3-pexpect xz-utils \
debianutils iputils-ping python3-git python3-jinja2 libegl1-mesa libsdl1.2-dev \
pylint3 xterm
```

Please refer to the URL below for detailed information:

- https://docs.yoctoproject.org/3.1.5/brief-yoctoprojectqs/brief-yoctoprojectqs.html

Run the command**s** below and set the username and email address before starting the build procedure. ⚠ **Without this setting, an error occurs when the building procedure runs git commands to apply patch files.**

```
$ git config --global user.email "you@example.com"
$ git config --global user.name "Your Name"
```

(1)　Create a working directory (rzg2l_bsp_v1.4) in your home directory, and decompress the Yocto recipe package

Run the commands below. Please copy the compressed package files (RTK0EF0045Z0019AZJ-v1.4.zip, RTK0EF0045Z41001ZJ_v1.0.zip) into your home directory prior to this step.

```
$ mkdir ~/rzg2l_bsp_v1.4
$ cd ~/rzg2l_bsp_v1.4
$ unzip ~/RTK0EF0045Z0019AZJ-v1.4.zip
$ tar zxvf ./RTK0EF0045Z0019AZJ-v1.4/rzg2l_bsp_v1.4.tar.gz
$ unzip ~/RTK0EF0045Z41001ZJ_v1.0.zip
$ tar zxvf ./RTK0EF0045Z41001ZJ_v1.0/rzg_bsp_gecko_v1.0.tar.gz
$ cd meta-rzg2/classes
$ touch distutils.bbclass pythonnative.bbclass setuptools.bbclass
```

⚠ Note) If you have a board with the early silicon version, please refer to the Section 6 Notes - (3) and apply the patch files during this step. Please also confirm how to check which version you use.

(2)　Enable GPU and Video Codec

Please copy the Graphics package (RTK0EF0045Z13001ZJ-v0.81_EN.zip or RTK0EF0045Z13001ZJ-v0.81_JP.zip) to working directory and run the commands below.

```
$ cd ~/rzg2l_bsp_v1.4
$ unzip ~/RTK0EF0045Z13001ZJ-v0.81_EN.zip
$ tar zxvf ./RTK0EF0045Z13001ZJ-v0.81_EN/meta-rz-features.tar.gz
$ cd ~/rzg2l_bsp_v1.4/poky
$ git cherry-pick e256885889fdea215be100f204277f675f7b5c2d
```

Please copy the video codec package (RTK0EF0045Z15001ZJ-v0.55_EN.zip or RTK0EF0045Z15001ZJ-v0.55_JP.zip) to working directory and run the commands below.

```
$ cd ~/rzg2l_bsp_v1.4
$ unzip ~/RTK0EF0045Z15001ZJ-v0.55_EN.zip
$ tar zxvf ./RTK0EF0045Z15001ZJ-v0.55_EN/meta-rz-features.tar.gz
```

🚧Note) The Graphics package and the video codec package are under development. These are released ASIS with no warranty.

(3)　Setup a build environment

Run the commands below. The environment to build is set by the source command.

```
$ cd ~/rzg2l_bsp_v1.4
$ source poky/oe-init-build-env
```

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(4) **Prepare the default configuration files for the target board**

Run the commands below.

```
$ cd ~/rzg2l_bsp_v1.4/build
$ cp ../meta-rzg2/docs/template/conf/smarc-rzg2l/*.conf ./conf/
```

After that, please follow the following instructions to edit the configuration files.

- Add the below lines to "`~/rzg2l_bsp_v1.4/build/conf/local.conf`".

```
IMAGE_INSTALL_append = " firefox "

IMAGE_INSTALL_append = " ttf-sazanami-gothic ttf-sazanami-mincho "

IMAGE_INSTALL_append = " pulseaudio-server "

IMAGE_INSTALL_append = " adwaita-icon-theme adwaita-icon-theme-cursors "

PACKAGECONFIG_append_pn-firefox = " openmax "

PACKAGECONFIG_append_pn-firefox = " webgl "

PACKAGECONFIG_append_pn-firefox = " gpu "

TARGET_CXXFLAGS_remove_toolchain-clang = " --stdlib=libc++"

TUNE_CCARGS_remove_toolchain-clang = " --rtlib=compiler-rt --unwindlib=libunwind --stdlib=libc++"

TUNE_FEATURES_remove_toolchain-clang = "cortexa57-cortexa53"

DISTRO_FEATURES_append = " x11"

PACKAGECONFIG_remove = " libedit "

PACKAGECONFIG_remove_pn-xserver-xorg = " dri3 glamor "

IMAGE_INSTALL_remove = " matchbox-terminal "
```

- Comment out the below line in "`~/rzg2l_bsp_v1.4/build/conf/local.conf`".

```
#DISTRO_FEATURES_remove = " x11"
```

- Run the commands below to edit "`~/rzg2l_bsp_v1.4/build/conf/bblayers.conf`".

```
$ cd ~/rzg2l_bsp_v1.4/build
$ bitbake-layers -F add-layer $(pwd)/../meta-rust
$ bitbake-layers -F add-layer $(pwd)/../meta-clang
$ bitbake-layers -F add-layer $(pwd)/../meta-browser
```

Note) By default, **GPLv3 packages** are not permitted to be included in the BSP build. If you want to use GPLv3 packages in your system, please refer to the Section 6 Notes - (4).

(5) **Start a build**

Run the commands below to start a build. The Linux Host PC requires an internet connection when building. Building an image can take up to a few hours depending on the user's host system performance and internet speed.

```
$ bitbake core-image-weston
```

After the build is successfully completed, a similar output will be seen, and the command prompt will return.

```
NOTE: Tasks Summary: Attempted 7427 tasks of which 16 didn't need to be rerun and all succeeded.
```

All necessary files listed in **Table 3** will be generated by the bitbake command and will be in the
`build/tmp/deploy/images` directory.

Please choose the correct files for your board using the table below.

Table 3. Image files

RZ/G2L	Linux kernel	Image-smarc-rzg2l.bin
	Device tree file	r9a07g044l2-smarc.dtb
	root filesystem	core-image-weston-smarc-rzg2l.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2l.srec
		・fip-smarc-rzg2l.srec
	Flash Writer	Flash_Writer_SCIF_RZG2L_SMARC_DDR4_2GB.mot
RZ/G2L PMIC ver	Linux kernel	Image-smarc-rzg2l.bin
	Device tree file	r9a07g044l2-smarc.dtb
	root filesystem	core-image-weston-smarc-rzg2l.tar.bz2
	Boot loader	・bl2_bp-smarc-rzg2l_pmic.srec
		・fip-smarc-rzg2l_pmic.srec
	Flash Writer	Flash_Writer_SCIF_RZG2L_SMARC_PMIC_DDR4_2GB_1PCS.mot

For the booting method and the required settings, please refer to the "RZ/G2L Group and RZ/V2L SMARC EVK Start-up Guide".

3.2   Building SDK

The SDK build is the limitation in this release.

The SDK allows you to build custom applications which are written without HTML5, for example the C language. The build can be run outside of the Yocto environment, even on a completely different PC.

Please note that GUI contents which are written in HTML5 (HTML, CSS, JavaScript) don't require the SDK.

4. Components

The components which are commonly used in this release are listed in Table 4. Please also refer to the "Component list" for details.

Table 4. Versions of commonly used components

Components	BSP v1.1	BSP v1.3-update2	BSP v1.4
Linux kernel	4.19.140-cip33	4.19.140-cip41	4.19.140-cip54
GCC	8.3.0 (Arm GCC 8.3-2019.03)	8.3.0 (Arm GCC 8.3-2019.03)	8.3.0 (Arm GCC 8.3-2019.03)
glibc	2.28	2.28	2.28
busybox	1.31.1	1.31.1	1.31.1
openssl	1.1.1d	1.1.1d	1.1.1d
Gecko	-	-	91

5. Restrictions

(1) Driver

In this release the below drivers can be used but are not fully tested:

- CPG
- GPIO
- MIPI DSI
- Interrupt Controller
- Direct Memory Access Controller
- MTU3a
- GTM
- WDT
- SPI
- SPI Multi I/O Bus Controller
- I²C
- A/D Converter
- USB
- LCDC

(2) Building SDK

The SDK build is a limitation in this release.

6. Notes

(1) Launch the browser application on the evaluation board

After the build is successfully completed, please refer to "RZ/G2L and RZ/G2LC SMARC EVK Start-up Guide" and boot the RZ/G2L evaluation board. After that, please run the command below on the Weston terminal. "https://~~~" means any website, so please enter the URL of the site you want to open.

```
$ GDK_BACKEND=wayland MOZ_OMX_RZG2L=1 firefox --width 250 --height 250
```

Or

```
$ GDK_BACKEND=wayland MOZ_OMX_RZG2L=1 firefox --width 250 --height 250 https://~~~
```

Note) The browser application "Firefox" can be used on the RZ/G2L evaluation board as "reference". Please note that it cannot be used on your own products to be launched in the market.

(2) Sample browser application "Web Viewer"

Web Viewer is a sample browser application and is developed on OSS. (https://github.com/webdino/amethyst) You can customize it as you want and can use on your own products to be launched in the market according to the OSS license. When you want to evaluate it, please edit "`~/rzg2l_bsp_v1.4/build/conf/local.conf`" after the step (4) in the section 3.1:

From:

```
IMAGE_INSTALL_append = " firefox "
PACKAGECONFIG_append_pn-firefox = " openmax "
PACKAGECONFIG_append_pn-firefox = " webgl "
PACKAGECONFIG_append_pn-firefox = " gpu "
```

To:

```
IMAGE_INSTALL_append = " webviewer "
PACKAGECONFIG_append_pn-webviewer = " openmax "
PACKAGECONFIG_append_pn-webviewer = " webgl "
PACKAGECONFIG_append_pn-webviewer = " gpu "
```

After that, please build BSP with the step (5) in the section 3.1.

After the build is successfully completed, please refer to "RZ/G2L and RZ/G2LC SMARC EVK Start-up Guide" and boot the RZ/G2L evaluation board. After that, please run the command below on the Weston terminal. "https://~~~" means any website, so please enter the URL of the site you want to open.

```
$ GDK_BACKEND=wayland MOZ_OMX_RZG2L=1 webviewer --width 250 --height 250
```

Or

```
$ GDK_BACKEND=wayland MOZ_OMX_RZG2L=1 webviewer --width 250 --height 250 https://~~~
```

(3)   Early version of RZ/G2L Evaluation Board Kit

When you use the **early** version of the RZ/G2L LSI, please run the commands below to apply the patch files after step (1) in the section 3.1.

```
$ cd ~/rzg2l_bsp_v1.4/meta-rzg2
$ patch -p1 < ../extra/0001-trusted-firmware-a-add-rd-wr-64-bit-reg-workaround\
.patch
$ patch -p1 < ../extra/0002-linux-renesas-add-workaround-patch-for-gicv3.patch
```

Note)   If you want to know which version of the RZ/G2L LSI you use, please check the LSI on the board. When "2050KC002" is printed on the LSI, you use the early version.

(4)   GPLv3 packages

In this release, the GPLv3 packages are disabled as default in *build/conf/local.conf*:

```
INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

If you want to use GPLv3, just hide this line:

```
#INCOMPATIBLE_LICENSE = "GPLv3 GPLv3+"
```

(5)   Disable libraries of GPU and video codec

When you want to disable the functions of the video codec, please add lines in *build/conf/local.conf*:

- Disable OpenGL ES library in the graphics package (*1)

```
USE_RENESAS_GLES = "0"
```

- Disable OpenCL library in the graphics package (*1)

```
USE_RENESAS_OPENCL = "0"
```

- Disable OpenMAX library for decode in the video codec package (*2)

```
USE_CODEC_DEC = "0"
```

- Disable OpenMAX library for encode in the video codec package (*2)

```
USE_CODEC_ENC = "0"
```

(*1) This library is included in RTK0EF0045Z13001ZJ-v0.81_EN.zip and RTK0EF0045Z13001ZJ-v0.81_JP.zip
(*2) This library is included in RTK0EF0045Z15001ZJ-v0.55_EN.zip and RTK0EF0045Z15001ZJ-v0.55_JP.zip

(6)   Docker

When you want to enable the function of Docker, please run the commands below and add a line in *build/conf/local.conf*.

```
$ cd ~/rzg2l_bsp_v1.4
$ git clone https://git.yoctoproject.org/git/meta-virtualization -b dunfell
$ cd meta-virtualization
$ git checkout 9e9868ef3d6e5da7f0ecd0680fcd69324593842b
```

Add a line in *build/conf/local.conf*:

```
DOCKER_ENABLE = "1"
```

Website and Support

Renesas Electronics Website
　http://www.renesas.com/

Inquiries
　http://www.renesas.com/contact/

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