

RZ/G Verified Linux Package

Version 2.1.3

R01TU0269EJ0102

Rev. 1.02

Release Note

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Introduction

This release note describes the contents, the building procedures and the important points of the RZ/G Verified Linux Package (hereinafter referred to as “VLP”).

This document also describes the environment to build VLP without using “RZ/G Development Platform”. If additional information about the platform is required, please refer to “RZ/G Linux Platform Tools User’s Manual for the RZ/G Series”.

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1. Release Items

- **Name and version**

RZ/G Verified Linux Package Version 2.1.3

- **Distribution method**

Provided via the RZ/G Marketplace. Please visit the sites below and create an account to download the packages.

RZ/G Marketplace:

America: <https://mp.renesas.com/en-us/rzg/>

Europe: <https://mp.renesas.com/en-eu/rzg/>

Asia: <https://mp.renesas.com/en-sg/rzg/>

Japan: <https://mp.renesas.com/ja-jp/rzg/>

- **Target boards**

iWave RZ/G1H-PF Qseven Development Platform

iWave RZ/G1M-PF Qseven Development Platform

iWave RZ/G1N-PF Qseven Development Platform

iWave RZ/G1E-PF SODIMM Development Platform

iWave RZ/G1C-PF Pi SBC Development Platform

These boards are provided by iWave Systems Technologies Pvt. Ltd.

- **Verified functions**

Linux BSP

- Linux Kernel
- Linux Drivers
- Graphics Libraries

GUI Framework

- Qt (LGPL version)
- Gecko

- **File contents**

VLP is delivered by the files listed in **Table 1**.

Table 1. RZ/G Verified Linux Package

File	Explanation
rzg_bsp_eva_v213.tar.gz (Evaluation version, 100MB) rzg_bsp_pro_v213.tar.gz (Product version, 102MB)	Yocto recipe packages
oss_pkg.7z.001 (500MB) oss_pkg.7z.006 (500MB) oss_pkg.7z.002 (500MB) oss_pkg.7z.007 (500MB) oss_pkg.7z.003 (500MB) oss_pkg.7z.008 (500MB) oss_pkg.7z.004 (500MB) oss_pkg.7z.009 (500MB) oss_pkg.7z.005 (500MB) oss_pkg.7z.010 (490MB)	Open source packages (This contains all source codes of OSSs except for Linux kernel. These are the same versions of OSSs used when VLP was verified.)
r01tu0269ej0102-rz-g.pdf	This document
r01tu0270ej0102-rz-g.pdf	Component list
setup_env_script.py	Script for setting up a build environment

Optional files for updating from VLP 2.1.1

File	Explanation
r01tu0271ej0102-rz-g.pdf	Patch application guide for VLP 2.1.1 users
v211-to-v213.patch.tar.gz	Diff files of Yocto recipes compared with VLP 2.1.1
v211-to-v213.oss_packages.7z	Diff files of OSS packages compared with VLP 2.1.1

Note) Open source packages are not necessary to download, if the host PC is connected to the internet and permit to download all OSSs while building the BSP.

2. Build environment

Figure 1 shows an overall constitution of the recommended environment of VLP. This environment uses the equipment and the software listed in Table 2. Please refer to “RZ/G Verified Linux Package Start-Up Guide” for details about setting up the environment.

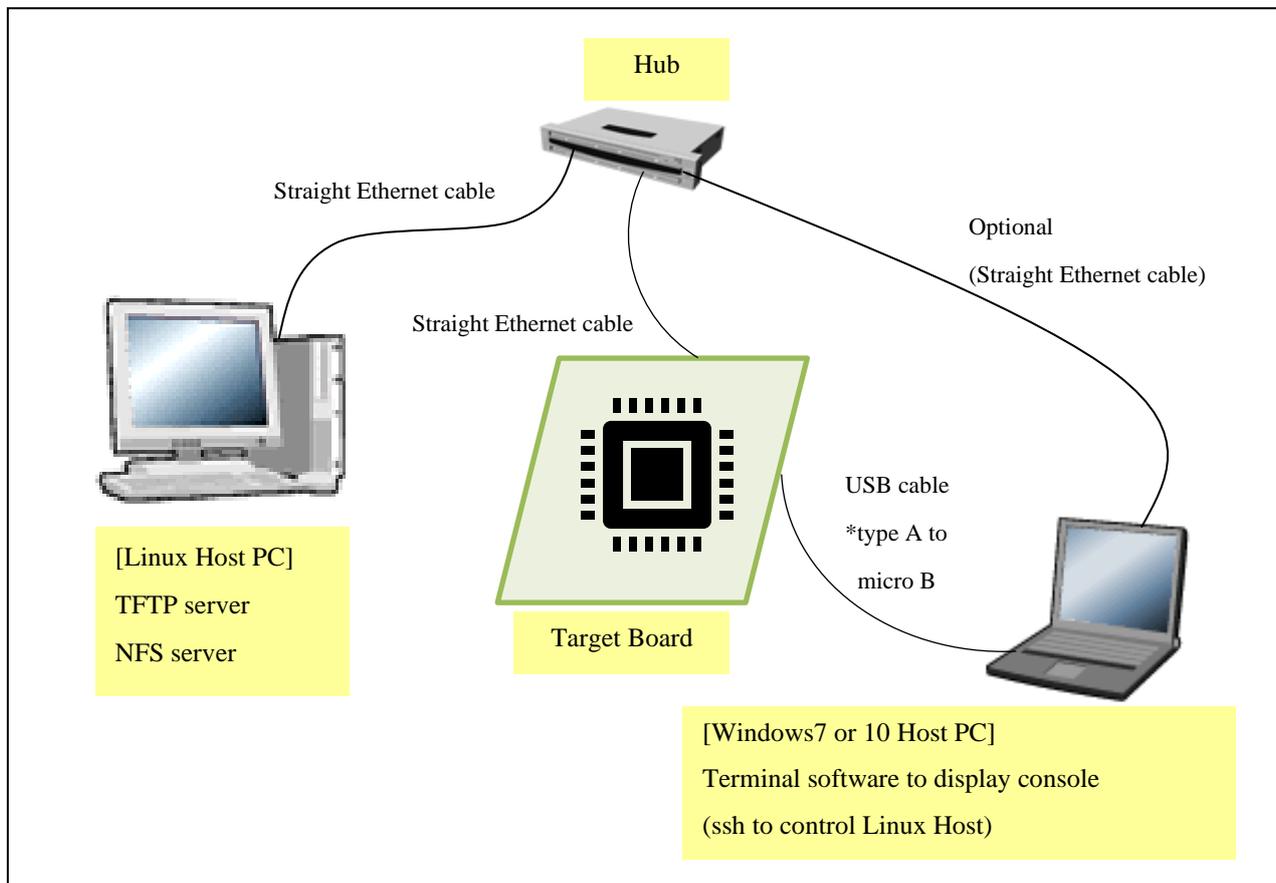


Figure 1. Recommended Environment

Table 2. Equipment and Software Necessary for Developing Environment of RZ/G Linux Platform

Equipment	Description
Linux Host PC	Used as build/debug environment Max 100GB free space on HDD is necessary
OS	Ubuntu 16.04 LTS is recommended 64 bit OS must be used.
TFTP server	Used for downloading the Linux kernel to the board
NFS server	Used for mounting rootfs via NFS
Windows Host PC	Used as debug environment, controlling with terminal software
OS	Windows 7 or 10 are recommended
Terminal software	Used for controlling serial console of the target board Tera Term (latest version) is recommended Available at https://tssh2.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. Building Instructions

This chapter describes the building instructions. There are two sections for building procedures (3.1 and 3.2). Please choose either one of them and run the commands from the chosen section. Section 3.1 describes the manual building method. Section 3.2 describes a method to use a script which automates the steps setting up the build environment and build the BSP. Section 3.2 runs automatically the same commands from section 3.1. Whichever the choice, the output will be the same.

Figure 2 shows a building outline of section 3.1 and 3.2. Once the building procedures are executed, some image files which names will depend on the target board name will be made. **Table 3** lists the names of the image files. Moreover, the GUI framework and the building procedures can be changed by a user’s choice. Because of that, please select a target board and a GUI framework, then run the commands from section 3.1 or 3.2.

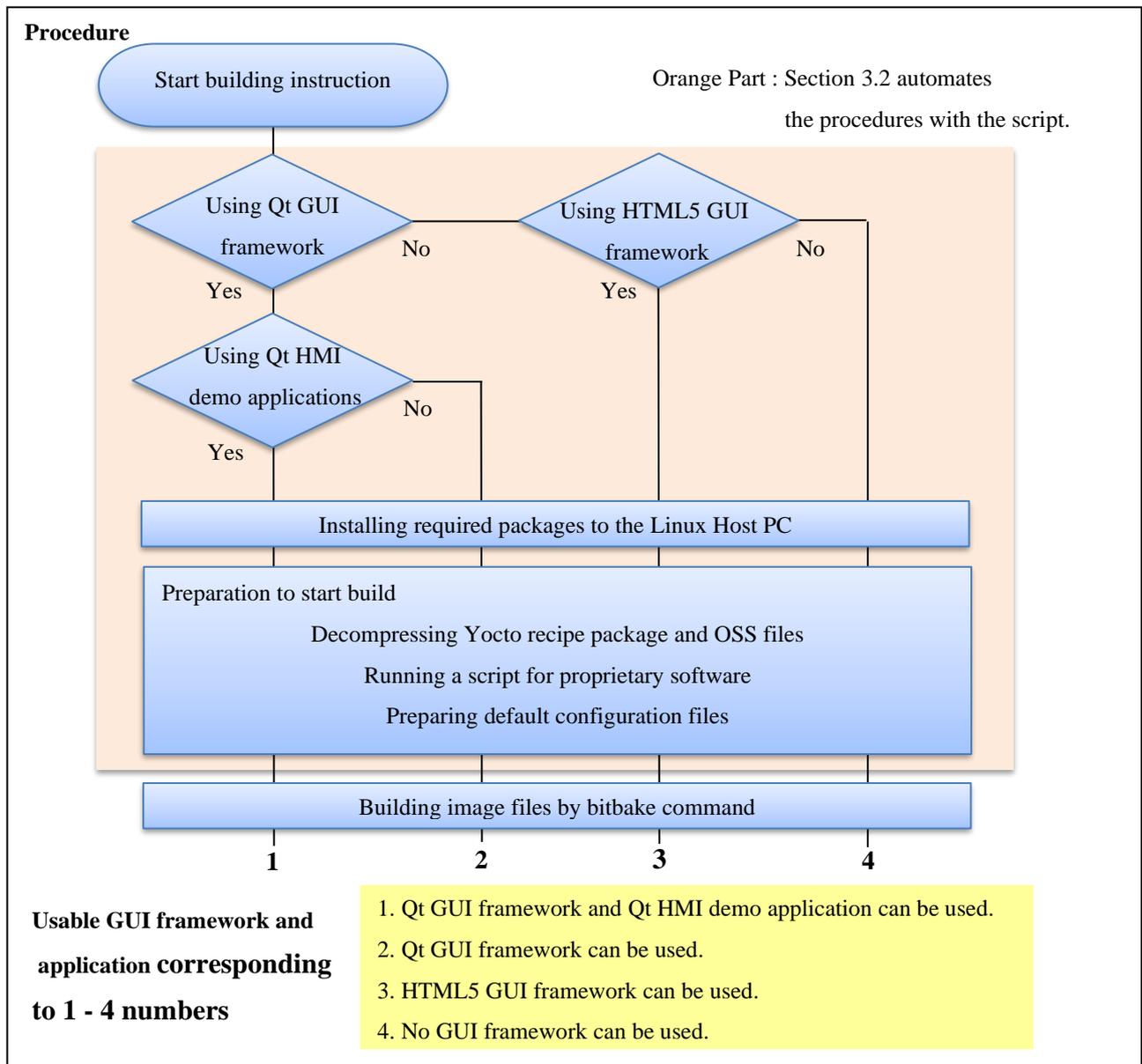


Figure 2. Building Outline

Note) There are two GUI frameworks available, Qt and HTML5. One of them or none can be selected. In case Qt GUI framework is selected, please choose whether Qt HMI demo applications are required or not.

Table 3 Image files

	Linux kernel	Device tree file	root filesystem	Kernel modules	u-boot
RZ/G1H	ulmage-iwg21m.bin	ulmage-r8a7742-iwg21m.dtb	core-image-weston-iwg21m.tar.bz2	modules-iwg21m.tgz	u-boot-iwg21m.bin
RZ/G1M	ulmage-iwg20m-g1m.bin	ulmage-r8a7743-iwg20d-q7-dbcm-ca.dtb	core-image-weston-iwg20m-g1m.tar.bz2	modules-iwg20m-g1m.tgz	u-boot-iwg20m-g1m.bin
RZ/G1N	ulmage-iwg20m-g1n.bin	ulmage-r8a7744-iwg20m.dtb	core-image-weston-iwg20m-g1n.tar.bz2	modules-iwg20m-g1n.tgz	u-boot-iwg20m-g1m.bin
RZ/G1E	ulmage-iwg22m.bin	ulmage-r8a7745-iwg22d-sodimm.dtb	core-image-weston-iwg22m.tar.bz2	modules-iwg22m.tgz	u-boot-iwg22m.bin
RZ/G1C	ulmage-iwg23s.bin	ulmage-r8a77470-iwg23s-sbc.dtb	core-image-weston-iwg23s.tar.bz2	modules-iwg23s.tgz	u-boot-iwg23s.bin

3.1 Building instructions all manually

This section describes the manual building method. VLP supports two GUI frameworks: Qt and HTML5 (Gecko). But these cannot be used at the same time. Please run the commands depending on the GUI framework which will be used.

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

```
$ sudo apt-get install gawk wget git-core diffstat unzip texinfo gcc-multilib \
build-essential chrpath socat cpio python python3 python3-pip python3-pexpect \
xz-utils debianutils iputils-ping libstd1.2-dev xterm p7zip-full
```

Please refer to the URL below for detailed information:

- <https://www.yoctoproject.org/docs/2.4.2/yocto-project-qs/yocto-project-qs.html>

In addition, run the command below to install packages used for building Gecko.

```
$ sudo apt-get install autoconf2.13
$ sudo apt install clang llvm clang-3.9 llvm-3.9
```

(1) Set the shell variable

```
$ export WORK=[user's working directory]
```

Please enter an absolute path of the working directory.

(2) Create the working directory, and decompress Yocto recipe package

```
$ mkdir -p $WORK
$ cd $WORK
$ tar xvzf ./rzg_bsp_<type>_v213.tar.gz -C ./user_work
```

Please replace “*type*” by “*pro*” or “*eva*”. Copy the compressed Yocto recipe package files (rzg_bsp_<pro>_v213.tar.gz for product version, rzg_bsp_<eva>_v213.tar.gz for evaluation version) into the current directory prior to this step.

(3) Execute the copy scripts for proprietary software

```
$ cd $WORK/meta-renesas/meta-rzg1
$ ./copy_mm_software_lcb.sh ../../MMP
$ ./copy_gfx_software_rzg1x.sh ../../MMP (*1)
```

(*1) Run the script corresponding to the target board

“copy_gfx_software_rzgh.sh”	RZ/G1H	“copy_gfx_software_rzgle.sh”	RZ/G1E
“copy_gfx_software_rzglm.sh”	RZ/G1M	“copy_gfx_software_rzglc.sh”	RZ/G1C
“copy_gfx_software_rzgln.sh”	RZ/G1N		

(4) Setup the build environment

```
$ cd $WORK
$ source poky/oe-init-build-env
```

Environment to build are set by the source command.

(5) Prepare the default configuration files for the target board

```
$ cd $WORK/build
$ cp ../meta-renesas/meta-rzg1/templates/<board>/*.conf ./conf
```

Fill the directory name corresponding to the target board to <board>

iwg21m:	iWave board for RZ/G1H	iwg22m:	iWave board for RZ/G1E
iwg20m-g1m:	iWave board for RZ/G1M	iwg23s:	iWave board for RZ/G1C
iwg20m-g1n:	iWave board for RZ/G1N		

Note) If Qt HMI demo applications are required, please copy the file as below instead of the command above.

```
$ cp ../meta-rzg-demos/meta-rzg1/qt-hmi-demo/template/<board>/*.conf ./conf
```

Note) If Qt GUI framework is not required, please disable it by modifying the line in the local.conf as below:

Qt enabled:

```
ENABLE_QT_FRAMEWORK = "1"
```

Qt disable:

```
ENABLE_QT_FRAMEWORK = "0"
```

(6) Decompress OSS files to “build” directory

```
$ cd $WORK/build
$ 7z x ./oss_pkg.7z.001 (*2)
```

Copy the compressed Yocto recipe package files (oss_pkg.7z.001 - oss_pkg.7z.010) into the “build” directory prior to this step. All OSS packages will be decompressed at the step marked “*2”. 7zipped files are not able to decompress individually. All oss_pkg.7z files must be placed at the same directory before running 7z command.

(7) Download Linux kernel source code

```
$ cd $WORK/build
$ bitbake linux-renesas -c fetch
```

Once this step is finished, the Linux Host PC can be disconnected from the network. If you want to prevent network access, please change the line in the \${WORK}/build/conf/local.conf as below:

```
BB_NO_NETWORK = "1"
```

To change BB_NO_NETWORK from “0” to “1”.

Note) The source code of the linux kernel is not included in oss_packages.7z from this release. This step obtains the source code from CIP’s Git repository.

(8) Start the build (Build base packages in case of HTML5 GUI framework)

```
$ cd $WORK/build
$ bitbake core-image-weston
```

Note) Please connect the Linux Host PC to the network if Qt HMI demo applications are required.

Building an image can take up to a few hours depending on the user’s host system performance.

After the build is successfully completed, a similar output will be seen:

```
NOTE: Tasks Summary: Attempted 4945 tasks of which 16 didn't need to be rerun and all 1 succeeded.
```

and the command prompt will return.

Note) If the error message below is displayed and the build fails, please set the user's name and email address according to the message and try again the build from step (8).

```
*** Please tell me who you are.

Run

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

to set your account's default identity.
Omit --global to set the identity only in this repository.

fatal: unable to auto-detect email address (got 'renesas@rzg.(none)')
```

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

Steps (9) – (11) are required to be run in case HTML5 GUI framework (Gecko) is selected. Please do not run these steps in case Qt GUI framework is selected.

(9) Download recipe files

```
$ cd $WORK
$ git clone -b firefox-60esr https://github.com/webdino/meta-browser.git
$ git clone -b jethro-14.0.1_rust_1.24.1 https://github.com/webdino/meta-rust.git
```

Connect the Linux Host PC to the network to download the required files to build Gecko.

(10) Modify recipe files

Enable the meta-browser and the meta-rust by adding the line in the `/${WORK}/build/conf/bblayers.conf` as below:

```
BBLAYERS += " ${TOPDIR}/../meta-browser "
BBLAYERS += " ${TOPDIR}/../meta-rust "
```

Enable the browser application by adding the line in the `/${WORK}/build/conf/local.conf` as below:

```
IMAGE_INSTALL_append = " firefox "  
IMAGE_INSTALL_append = " ttf-sazanami-gothic ttf-sazanami-mincho "  
IMAGE_INSTALL_remove = " weston-xwayland "  
IMAGE_INSTALL_remove = " packagegroup-qt5-examples "  
PACKAGECONFIG_remove_pn-weston = " xwayland "  
PACKAGECONFIG_append_pn-firefox = " egl "  
PACKAGECONFIG_append_pn-firefox = " openmax "  
PACKAGECONFIG_append_pn-firefox = " webgl "  
PACKAGECONFIG_append_pn-firefox = " canvas-gpu "  
HOSTTOOLS += "autoconf2.13 llvm-config-3.9"
```

Note) If additional functions (egl, openmax, webgl, canvas-gpu) are not required, these lines are not required to be added.

Enable the browser application by changing the line in the `${WORK}/build/conf/local.conf` as below:

To change `BB_NO_NETWORK` from “1” to “0”.

```
BB_NO_NETWORK = "0"
```

To change `x11` status from “remove” to “append”

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

To available “`openssl_debian`”.

```
BBMASK .= "|openssl_debian"
```

(11) Start the build

```
$ cd $WORK/build  
$ bitbake core-image-weston
```

Please connect the Linux Host PC to the network to build Gecko.

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

3.2 Building instructions with script

This section describes the script building method. Note that the script automates the steps to setup the build environment. There are additional commands to run manually once the script finished running. Please make a directory (hereinafter called “[*user’s working directory*]”) somewhere in the Linux Host PC and copy the following files into the directory in advance. These files can be downloaded from RZ/G Marketplace.

- The Yocto recipe package (Either “rzg_bsp_eva_v213.tar.gz” or “rzg_bsp_pro_v213.tar.gz”)
- The Open Source packages (“oss_pkg.7z.001” - “oss_pkg.7z.010”)
- The script (“setup_env_script.py”)

After that, please run the following commands.

Note) Python3 is required to run the script. This script is experimental and provided AS IS.

(1) Set a shell variable

```
$ export WORK=[user’s working directory]
```

Please enter an absolute path.

(2) Run the script

```
$ cd $WORK  
$ ./setup_env_script.py
```

The following message will be displayed. Please enter the number corresponding to the target board and the GUI framework that will be used. A sudo command to update a package list will then run, hence enter the password.

Note) The VLP supports two GUI frameworks: Qt and HTML5 (Gecko). But these cannot be used at the same time.

```
What is your target board?  
Please enter one of the following numbers corresponding to the target board.  
[1] RZ/G1H, [2] RZ/G1M, [3] RZ/G1N, [4] RZ/G1E, [5] RZ/G1C  
  
Please Enter Number:  
  
Which GUI framework do you want to use?  
Please enter one of the following numbers corresponding to the GUI framework.  
[1] Qt, [2] HTML5, [3] None* (*Does not use Qt and HTML5.)  
  
Please Enter Number:
```

The following message will be displayed once the script’s sequence is completed. Then run manually the next commands from this section.

Once the script finishes, a directory named “user_work” and a file named “vlp213_script.log” will be made in the [*user’s working directory*]. In case the script fails to setup or is interrupted by the user, please delete the “user_work” directory in the [*user’s working directory*], and then try it again from step (2).

```
** The sequence of this script was successfully completed. **  
** Please refer to the manual and execute the next procedures. **
```

Please enter “y” in case the Qt HMI demo applications are required.

```
Do you want to include the Qt HMI demo applications? (y/n):
```

The script will search packages in the user’s Linux Host PC. The following confirmation message will be displayed if the required packages are not installed. If “y” is chosen, a command to install the packages will run. If “n” is chosen, the script will stop.

```
It is necessary to install the following packages to your Linux Host PC.  
Packages = [the required packages]  
  
Is it OK to install the packages? (y/n) :
```

[*the required packages*] will change depending on the chosen GUI framework.

Please refer to the URL below for detailed information:

- <https://www.yoctoproject.org/docs/2.4.2/yocto-project-qs/yocto-project-qs.html>

This script requires network connection. If the Linux Host PC is not connected to the network, the following message will be displayed. Please connect the Linux Host PC to the network and press enter. Please press “Ctrl + C” to stop the script in case the network is not available.

```
WARNING: Linux Host PC is not connected to the network.  
Please connect to the network.  
Process wait until it is online.  
Will you try again? (Yes : [enter], No : [Ctrl + C]):
```

Note) If there are no Yocto recipe package or Open Source packages inside the [*user’s working directory*], the following messages will be displayed and the script will stop.

```
ERROR: There are no Yocto recipe package(rzg_bsp_***_v213.tar.gz) or Open Source  
packages(oss_pkg.7z.***) in your working directory.  
Please copy the files to the directory and try again to run this script.
```

Note) If the script fails to run the setup command, the following messages will be displayed and the script will stop. Please then delete the “user_work” directory in the [*user’s working directory*] and try it again from step (2).

```
ERROR: Command = [the executed command] failed.  
This script will stop.
```

(3) Setup the environment to use bitbake command

```
$ cd $WORK/user_work  
$ source poky/oe-init-build-env
```

(4) Start the build

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

Building an image can take up to a few hours depending on the user’s host system performance.

After the build is successfully completed, a similar output will be seen:

```
NOTE: Tasks Summary: Attempted 4945 tasks of which 16 didn't need to be rerun and all
1 succeeded.
```

and the command prompt will return.

Note) If the error message below is shown and the build fails, please set the user's name and email address according to the message's instructions and try again the build from step (4).

```
*** Please tell me who you are.

Run

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

to set your account's default identity.
Omit --global to set the identity only in this repository.

fatal: unable to auto-detect email address (got 'renesas@rzg.(none)')
```

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

4. Changes from previous version

The Linux kernel has been replaced to newer one. Version information of all components are available at “Component list of VLP”. Almost all components are same as VLP 2.1.1.

Table 4. Versions of commonly used components

Components	VLP 2.1.1	VLP 2.1.3
Linux kernel	4.4.166-cip29	4.4.185-cip35
GCC	7.2.1 (Linaro GCC 7.2-2017.11)	7.2.1 (Linaro GCC 7.2-2017.11)
Glibc	2.19 (CIP)	2.19 (CIP)
Binutils	2.28-5 (CIP)	2.28-5 (CIP)
Busybox	1.22.0 (CIP)	1.22.0 (CIP)
Openssl	1.0.1t (CIP)	1.0.1t (CIP)
gstreamer1.0	1.12.2	1.12.2
Wayland	1.13.0	1.13.0
Weston	2.0.0	2.0.0
python2	2.7.17	2.7.17
python3	3.5.3	3.5.3
Qt (LGPL version)	5.6.3	5.6.3
Gecko	60	60

A compile option has been changed from this release to enable Arm VFPv4 feature of CPUs. If it is not suitable for your product, please refer to the section **6. Note** to disable it.

We recommend switching to Ubuntu 16.04 from 14.04, which was used for previous version of VLP. Support for Ubuntu 14.04 LTS will expire in Apr. 2019.

The booting method and the required settings are not changed from the previous version. Please refer to “RZ/G Verified Linux Package Start-Up Guide”.

5. Restrictions

(1) SDK

When installing SDK to a directory other than default value (`/opt/poky/2.4.2`), error messages are shown when Qt is not enabled in `local.conf`.

Workaround: Please enable Qt in `local.conf` (this is the default setting in templates), or install SDK to the default location (`/opt/poky/2.4.2`).

Affect: All processors.

(2) Gecko

Gecko cannot be built offline as normal.

Workaround: Please connect your host PC to the internet when building images.

Affect: All processors.

(3) Weston

Weston may stop working after being restarted manually (by executing `/etc/init.d/weston restart` command).

Workaround 1: Restart the whole system to bring Weston back to work.

Workaround 2: Apply the patch included in this release as below before building BSP.

```
$ cd $WORK/meta-renesas
$ patch -p1 < ../extra/0001-linux-renesas-vsp1-Add-mutex-to-prevent-Weston-from-.patch
```

Note) This patch is experimental and distributed “AS IS” with no warranty.

Affect: RZ/G1E boards.

6. Note

(1) GStreamer

In section 3.1, OSS module “gststreamer1.0-plugins-bad” and “gststreamer1.0-omx” cannot build offline using the default settings of them. If it is required to build whole BSP without connecting network, please follow the steps below.

1. Prepare build environment according to the section 3.1 (1) – (7)
2. Unpack the module

```
$ cd $WORK/build
$ bitbake -c unpack gststreamer1.0-plugins-bad
$ bitbake -c unpack gststreamer1.0-omx
```

3. Move to the directory which contains the file to be modified

```
$ cd tmp/work/<arch>-poky-linux-gnueabi/gststreamer1.0-plugins-bad/1.12.2-r0/git
```

Note) <arch> will be “cortexa15hf-neon” or “cortexa7hf-neon”

4. Modify the address for acquiring a submodule

```
$ vi .gitmodules
```

Before:

```
[submodule "common"]
    path = common
    url = https://anongit.freedesktop.org/git/gstreamer/common.git
```

After:

```
[submodule "common"]
    path = common
    url = file:///home/user/work/build/oss_packages/git.anongit.freedesktop.org.
git.gstreamer/common/
```

Note) Please set the user’s working directory using absolute path.
All necessary files are included in the OSS package file of VLP.

5. Apply the change

```
$ git submodule init
$ git submodule update
```

6. Move to the other directory which contains the file to be modified

```
$ cd $WORK/build/tmp/work/<arch>-poky-linux-gnueabi/gststreamer1.0-omx/1.12.2-r0/git
```

7. Modify the address and apply the change as same as step 4 and 5.
8. Build BSP according to the section 3.1 (8)

(2) Weston

Due to the specification of opensource software (Weston 2.0.0), it is not recommended to resize application windows. Please consider designing the application to use fixed sized windows.

(3) Arm VFPv4

A compile option to enable Arm VFPv4 is enabled in the default settings of VLP.

If you want to disable it, change the DEFAULTTUNE setting in the machine configurations as below.

RZ/G1H: \$WORK/meta-renesas/meta-rzg1/conf/machine/iwg21m.conf

RZ/G1M: \$WORK/meta-renesas/meta-rzg1/conf/machine/iwg20m-g1m.conf

RZ/G1N: \$WORK/meta-renesas/meta-rzg1/conf/machine/iwg20m-g1n.conf

Enable

```
DEFAULTTUNE ?= "cortexa15hf-neon-vfpv4"
```

Disable

```
DEFAULTTUNE ?= "cortexa15hf-neon"
```

RZ/G1E: \$WORK/meta-renesas/meta-rzg1/conf/machine/iwg22m.conf

RZ/G1C: \$WORK/meta-renesas/meta-rzg1/conf/machine/iwg23s.conf

Enable

```
DEFAULTTUNE ?= "cortexa7hf-neon-vfpv4"
```

Disable

```
DEFAULTTUNE ?= "cortexa7hf-neon"
```

Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Inquiries

<http://www.renesas.com/contact/>

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