

# Firmware Upgradation for Rpi with Xconf Server by using RDK Services System Service -Plugin via UpdateFirmware curl command

- [Introduction](#)
- [Yocto Build Steps](#)
- [Image Flash Procedure](#)
- [Firmware Upgrade Validation Procedure](#)
  - [TFTP Server Setup](#)
  - [XCONF Server Setup](#)
    - [XConf URL](#)
    - [Create Environments](#)
    - [Create Model](#)
    - [Create MAC List](#)
    - [Create Firmware config](#)
    - [Create Firmware Rule](#)
    - [Edit Download Location Round Robin Filter](#)
    - [Verify XConf server configuration](#)
  - [Activate the System Service Plugin in the Controller UI](#)
  - [Provide the UpdateFirmware Curl command in the Rpi board](#)
  - [RPI-Board](#)
- [Conclusion](#)

## Introduction

The Firmware upgrade will upgrade higher or lower version of the current image in RPI target with the help of Xconf server and Local TFTP server by using Rdk Services

System Services-Plugin via updateFirmware curl command .

## Yocto Build Steps

Refer below link to build rdkv image

[Yocto Build Instructions - RPi - RDK Video - 2020 - M12#196872666](#)

## Image Flash Procedure

### Image Flash step

```
$ sudo dd if="Image Name" of="Device Name" bs=4M
```

Example:

```
sudo dd if=rdk-generic-hybrid-wpe-image_default_20201221142654.rootfs.rpi-sdimg of=/dev/sdb bs=4M
```

## Firmware Upgrade Validation Procedure

### TFTP Server Setup

#### STEP 1:

Install xinetd and tftpd-hpa application in your local PC to setup tftp server by using below command

#### **TFTP Server Installation Step**

```
sudo apt-get install xinetd
sudo apt-get install tftpd-hpa
```

### **STEP 2:**

Create checksum file for your upgrading image.

#### **md5sum checksum creation**

```
md5sum "<imagefile_name>.rootfs.rpi-sdimg" > imagefile_name.txt

for Ex:
upgrading image file is rdk-generic-hybrid-wpe-image_default_20201221142654.rootfs.rpi-sdimg
md5sum "rdk-generic-hybrid-wpe-image_default_20201221142654.rootfs.rpi-sdimg" > rdk-generic-hybrid-wpe-
image_default_20201221142654.txt
```

### **STEP 3:**

Create new folder for example "tftphome" in your PC home directory to maintain checksum file and upgrading image file.

Keep upgrading image file and checksum file in your created folder.

For Ex:

Keep rdk-generic-camera-image\_default\_20200329074421.rootfs.rpi-sdimg and rdk-generic-camera-image\_default\_20200329074421.txt files in your tftphome folder.

### **STEP 4:**

Check tftp file is there or not in /etc/xinetd.d/ directory. if it is not there then create tftp file under this /etc/xinetd.d/ directory and add below content.

vi /etc/xinetd.d/tftp

#### **TFTP File Content**

```
service tftp
{
    protocol          = udp
    port              = 69
    socket_type       = dgram
    wait              = yes
    user               = nobody
    server             = /usr/sbin/in.tftpd
    server_args        = -c -v -s /home/xyz/tftphome ( Give upgrading file and checksum file maintained directory )
    disable            = no
}
```

### **STEP 5:**

Verify /etc/default/tftpd-hpa file content

vi /etc/default/tftpd-hpa

#### **tftp-hpa File Content**

```
# /etc/default/tftpd-hpa

TFTP_USERNAME="tftp"
TFTP_DIRECTORY="/home/xyz/tftphome" ( Give upgrading file and checksum file maintained directory )
TFTP_ADDRESS="0.0.0.0:69"
TFTP_OPTIONS="--secure"
```

### **STEP 6:**

Start tftp server and xinetd server

```
sudo service tftpd-hpa restart
sudo /etc/init.d/xinetd restart
```

## XCONF Server Setup

### XConf URL

Enter XConf server wiki page with below URL to create Environment, Model, Mac list, Firmware config, Firmware rule and Download Location Round Robin Filter.

### XConf URL

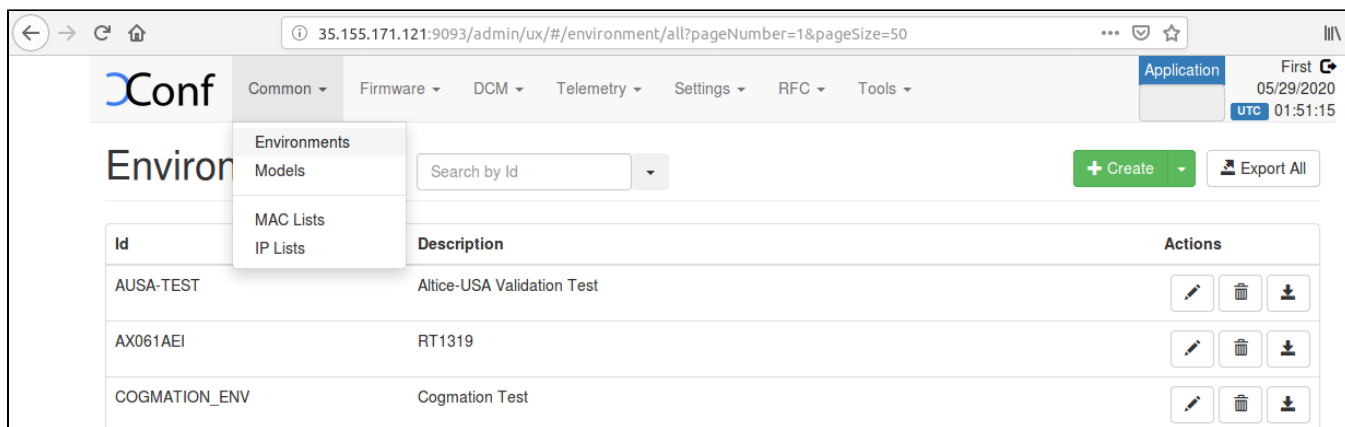
`http://35.155.171.121:9093/admin/ux`

### Create Environments

#### STEP 1:

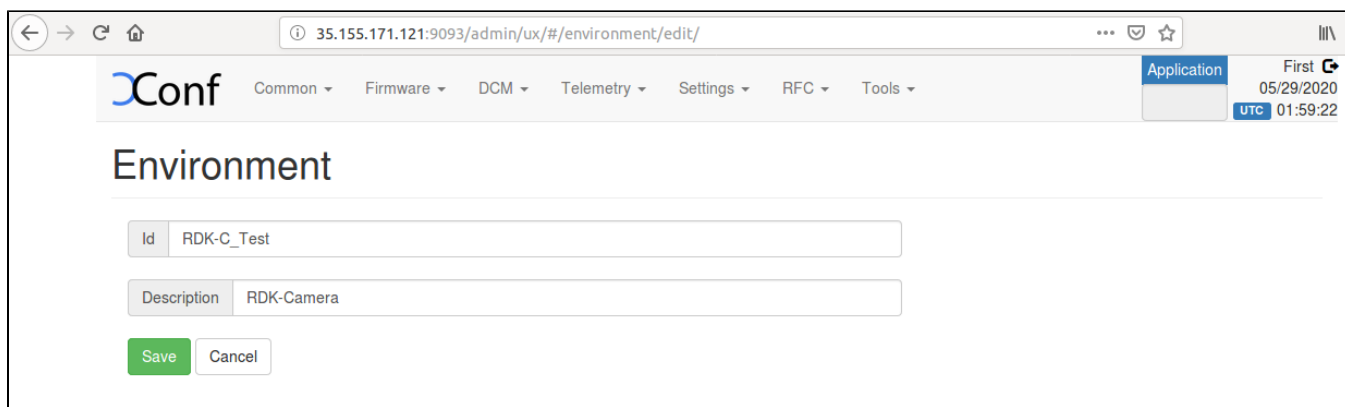
Select Environments option within common list to enter Environments page.

After entered Environments page press create button to add your device environment detail.



#### STEP 2:

Give ID and Description to setup Environment for your device and save that details in xconf server..



### Create Model

#### STEP 1:

Select Models option within common list to enter Models page.

After entered Models page press create button to add your device model detail.

The screenshot shows the XConf web interface. The 'Common' menu is open, and 'Models' is selected. The main table displays the following data:

| Id            | Description               | Actions                    |
|---------------|---------------------------|----------------------------|
| AUSA-TEST     | Alice-USA Validation Test | [Edit] [Delete] [Download] |
| AX061AEI      | RT1319                    | [Edit] [Delete] [Download] |
| COGMATION_ENV | Cogmation Test            | [Edit] [Delete] [Download] |

## STEP 2:

Give ID and Description to setup Model for your device and save that details in xconf server..

The screenshot shows the 'Model' edit form in the XConf web interface. The 'Id' field is set to 'RDK-C\_Test' and the 'Description' field is set to 'RPI0'. The 'Save' button is highlighted.

## Create MAC List

### STEP 1:

Select MAC Lists option within common list to enter MAC Lists page.

After entered MAC Lists page press create button to add your device MAC detail.

The screenshot shows the XConf web interface. The 'Common' menu is open, and 'MAC Lists' is selected. The main table displays the following data:

| Id           | Description        | Actions                    |
|--------------|--------------------|----------------------------|
| AX061AEI     | rt1319             | [Edit] [Delete] [Download] |
| COGMATION_BB | Cogmation_BB_model | [Edit] [Delete] [Download] |
| EMULATOR     | RDKB Emu           | [Edit] [Delete] [Download] |

### STEP 2:

Give Name and Data to set MAC detail for your device and save that details in xconf server..

The screenshot shows the 'Add MAC List' form in the XConf web interface. The browser address bar shows the URL: 35.155.171.121:9093/admin/ux/#/namespacedlist/edit//CREATE/MAC\_LIST. The XConf logo is in the top left, and navigation tabs include Common, Firmware, DCM, Telemetry, Settings, RFC, and Tools. On the right, there's a user profile for 'Application' with 'First' login on 05/29/2020 at 02:07:13 UTC. The form has a 'Name' field containing 'RDK-C\_Test' and a 'Data' field with a placeholder 'Please enter item' and a '+' button. Below the data field, a MAC address 'B8:27:EB:2E:72:2B' is shown with a delete icon. At the bottom are 'Save' and 'Cancel' buttons.

### Create Firmware config

Ensure application type is stb. If the application type is xhome then change application into stb.

#### **STEP 1:**

Select Firmware Configs option within common list to enter Firmware Configs page.

After entered Firmware Configs page press create button to add your device firmware configuration detail.

The screenshot shows the 'Mac Lists' page in the XConf web interface. The browser address bar shows the URL: 35.155.171.121:9093/admin/ux/#/namespacedlist/MAC\_LIST?pageNumber=1&pageSize=50. The XConf logo is in the top left, and navigation tabs include Common, Firmware, DCM, Telemetry, Settings, RFC, and Tools. On the right, there's a user profile for 'Application' with 'First' login on 05/29/2020 at 02:07:34 UTC. The 'Firmware' tab is selected, and its dropdown menu is open, showing options: Firmware Configs, Firmware Rules, Firmware Templates, Download Location Filter, Percent Filter, Logs, Report page, and Test page. The 'Firmware Configs' option is highlighted. Below the dropdown, there's a table with columns 'Name' and '1'. The table contains four rows: AUSA-Test, AX061AEI, Cogmation\_MAC, and EMU-MAC. Each row has a delete icon and a download icon. At the top right of the table area are '+ Create' and 'Export All' buttons.

#### **STEP 2:**

Give Description,File name ( Upgrading image name ),Version( Upgrading image name without .rootfs.rpi.sdimg) and select your model name and save the details in xconf server.

← → ↻ 🏠 35.155.171.121:9093/admin/ux/#/firmwareconfig/edit/ ... 📶 ⭐

**XConf** Common ▾ Firmware ▾ DCM ▾ Telemetry ▾ Settings ▾ RFC ▾ Tools ▾

Application: stb First: 05/29/2020 UTC 02:15:59

## Firmware config

Description: RDK-C\_Test

File name: rdk-generic-camera-image\_default\_20200329074421.rootfs.rpi-sdimg

Version: rdk-generic-camera-image\_default\_20200329074421

**Models:**

AX061AEI COGMATION\_BB EMULATOR EMULATOR1 MOCKRT1319\_TEST TEST **RDK-C\_TEST** RDKB-TECHSUMMIT RDKB\_RPI RPI RPI0 RPI\_BB TESTCPE

Save Cancel

## Create Firmware Rule

### STEP 1:

Select Firmware Rule option within common list to enter Firmware Rule page.

After entered Firmware Rule page press create button to add your device firmware Rule detail.

← → ↻ 🏠 35.155.171.121:9093/admin/ux/#/firmwareconfig/all

**XConf** Common ▾ Firmware ▾ DCM ▾ Telemetry ▾ Settings ▾ RFC ▾ Tools ▾

Application: stb First: 05/29/2020 UTC 02:16:54

## Firmware config

Search by Model ▾

Create ▾ Export All

|   | Description       |                                                 | Supported Models | Actions |
|---|-------------------|-------------------------------------------------|------------------|---------|
| 👁 | Cogmation_config  | -broadband-image_default_20200406103506.txt     | COGMATION_BB     | ✎ 🗑 ⬇   |
| 👁 | CPEfirmware       |                                                 | TESTCPE          | ✎ 🗑 ⬇   |
| 👁 | emulator_firmware | YB_default_20200416061502                       | EMULATOR1        | ✎ 🗑 ⬇   |
| 👁 | Firmware_Camera   | rdk-generic-camera-image_default_20200527100029 | RPI0             | ✎ 🗑 ⬇   |

### STEP 2:

After entered firmware Rule page you can see list of template.

Choose MAC\_RULE in this list of Template to add your device MAC list in Firmware Configuration.

The screenshot shows the 'Add Firmware Rule' page in the XConf web interface. The browser address bar displays '35.155.171.121:9093/admin/ux/#/firmwareconfig/all'. The top navigation bar includes the 'XConf' logo and several menu items: 'Common', 'Firmware', 'DCM', 'Telemetry', 'Settings', 'RFC', and 'Tools'. On the right side of the navigation bar, there is an 'Application' dropdown menu set to 'stb', a 'First' button, and a timestamp '05/29/2020 UTC 02:22:05'. The main heading is 'Add Firmware Rule', followed by the instruction 'Please Select a Template'. Below this, there is a list of templates: 'ENV\_MODEL\_RULE', 'IP\_RULE', 'IV\_RULE', 'MAC\_RULE' (which is highlighted with a grey background), and 'MIN\_CHECK\_RULE'.

### STEP 3:

After entered Firmware Rule page.If any estbmac if there under build condition then remove that estbmac before add your device specific Firmware rules.

The screenshot shows the 'Add Firmware Rule' page with the 'BUILD CONDITIONS' section expanded. The 'Name' field contains 'RDK-C\_Test' and the 'Type' dropdown is set to 'MAC\_RULE'. In the 'BUILD CONDITIONS' section, there is a red pill-shaped button labeled 'eStbMac IN\_LIST' with a red 'x' icon, which is highlighted by a green rectangle. Below this, there is a form with a 'not' checkbox, an 'eStbMac' input field, an 'IN\_LIST' dropdown, and a '+' button. A light blue informational box at the bottom of the section contains the text: 'Please provide value for each condition in the rule: click condition, enter fixedArg value, then click Plus button to save that condition. Note: Key value in condition can't be modified. It's not allowed to add new conditions.'

### STEP 4:

Add your device specific eStbMac under build condition option.

Select your firmware config under Action option and save your Firmware rule in XConf server.

35.155.171.121:9093/admin/ux/#/firmwarerule/add/RULE/

Conf

Common ▾Firmware ▾DCM ▾Telemetry ▾Settings ▾RFC ▾Tools ▾

Application

First

05/29/2020

UTC 02:20:26

## Add Firmware Rule

PROPERTIES

Name

RDK-C\_Test

Type

MAC\_RULE

BUILD CONDITIONS

eStbMac IN\_LIST RDK-C\_Test

AND

OR

☐ not

IS

+

Please provide value for each condition in the rule:  
click condition, enter fixedArg value, then click Plus button to save that condition.  
**Note:** Key value in condition can't be modified. It's not allowed to add new conditions.

ACTION

Action Type

RULE

NoOp

false

☐

Firmware Config

Cognition\_config

Save

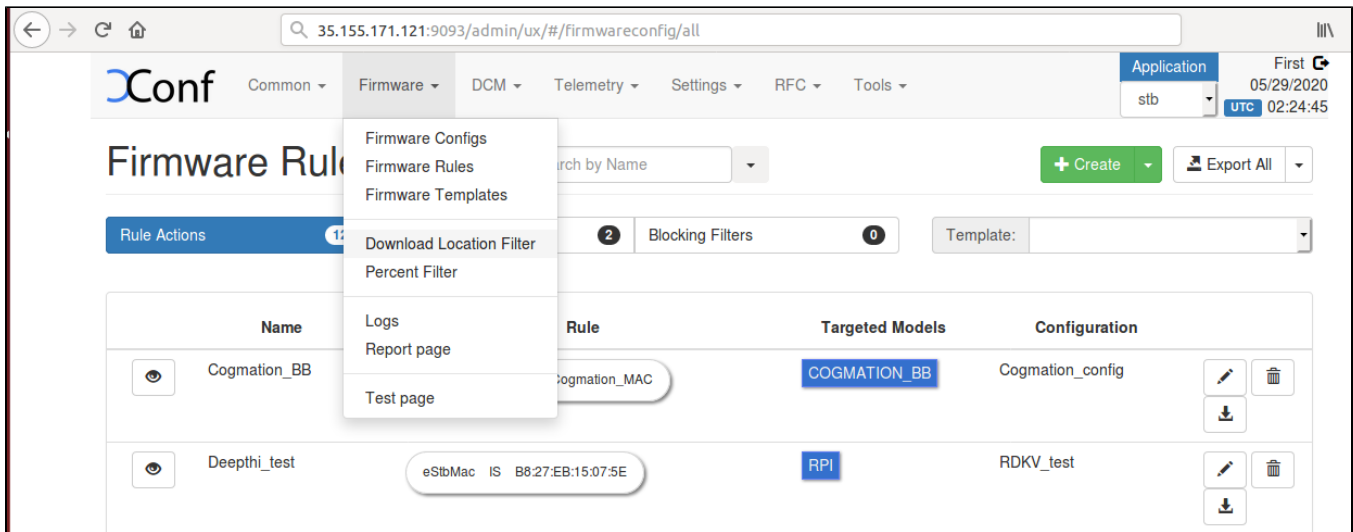
Cancel

## Edit Download Location Round Robin Filter

### STEP 1:

Select Download Location Filter option within common list to enter Download Location Filter page.

After entered Download Location Filter page press create button to add your Download Location detail.



## **STEP 2:**

After entered Download Location Round Robin filter press edit button to edit your image downloading details.

Enable Never use HTTP and select your Rongue model.

Give TFTP server running IP address to download image.

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35.155.171.121:9093/admin/ux/#/roundrobinfilter/edit

⋮

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☆

XConf

Common ▾

Firmware ▾

DCM ▾

Telemetry ▾

Settings ▾

RFC ▾

Tools ▾

Application

First

05/29/2020

UTC 02:27:26

stb

UTC 02:27:26

## Download Location Round Robin Filter

HTTP

Location (FQDN):

www.myfirmware.com

Location (full HTTP locaiton)

http://myfirmware.com

Never use HTTP:

☒

(if this box is checked TFTP location will always be used no matter what the STB sends)

Rogue models:

AX061AEI

COGMATION\_BB

EMULATOR

EMULATOR1

MOCKRT1319\_TEST TEST

RDk-C\_TEST

RDkB-TECHSUMMIT

RDkB\_RPI

RPI

RPI0

RPI\_BB

TESTCPE

Firmware versions

Type here...

TFTP

IPv4 locations:

🗑

192.168.0.107

100

%

+

IPv6 locations:

+

Save

Cancel

### Verify XConf server configuration

Verify that XConf Server configuration displays the Json response from the mentioned URL:

<http://<Xconf Server IP:port no.>/xconf/swu/stb?eStbMac=<MAC address of Rpi board>>

For Ex: <http://35.155.171.121:9092/xconf/swu/stb?eStbMac=B8:27:EB:2E:72:2B>

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35.155.171.121:9092/xconf/swu/stb?eStbMac=B8:27:EB:2E:72:2B

JSON

Raw Data

Headers

Save

Copy

Collapse All

Expand All

firmwareDownloadProtocol:

"tftp"

firmwareFilename:

"rdk-generic-camera-image\_default\_20200329074421.rootfs.rpi-sdimg"

firmwareLocation:

"192.168.1.102"

firmwareVersion:

"rdk-generic-camera-image\_default\_20200329074421"

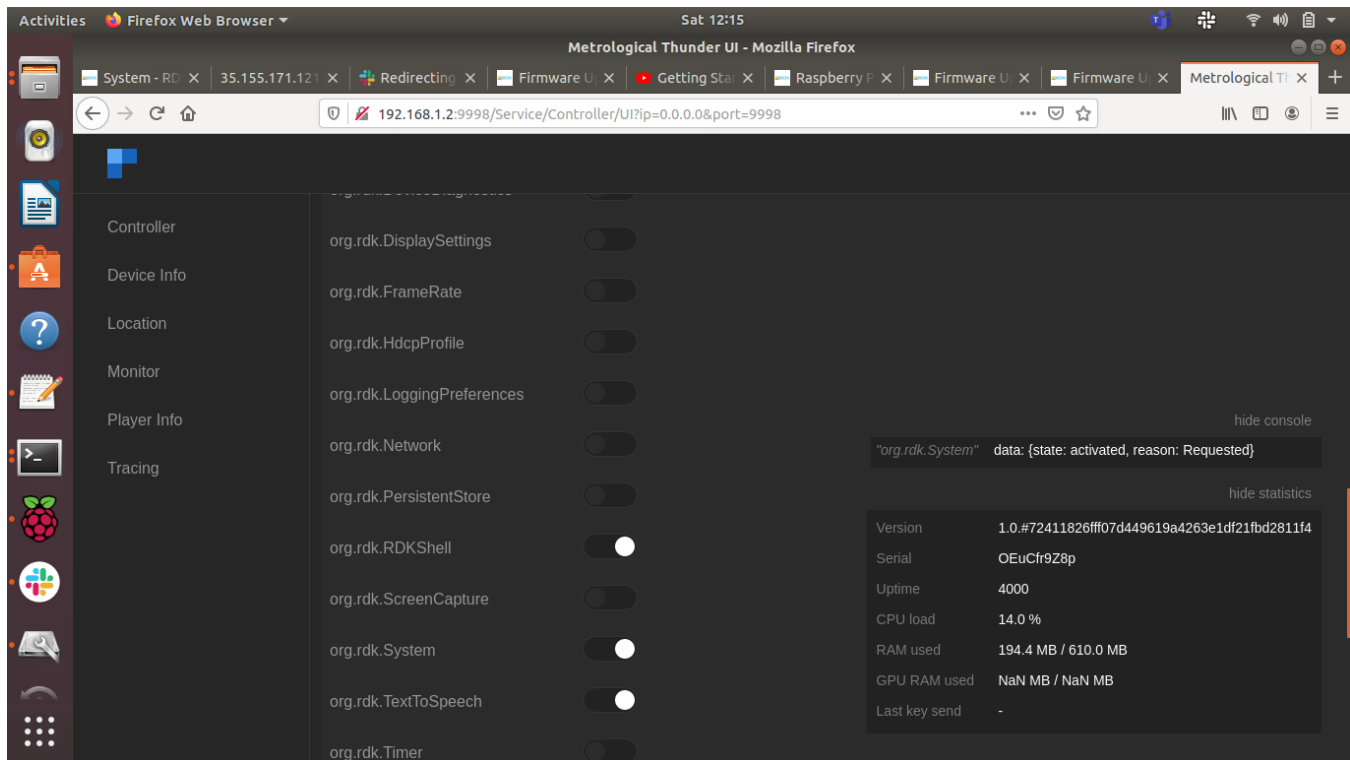
rebootImmediately:

false

## Activate the System Service Plugin in the Controller UI

`http://<ip_address_pi_board>:9998`

For Example:`http://192.168.1.2:9998`



## Provide the UpdateFirmware Curl command in the Rpi board

```
root@raspberrypi-rdk-hybrid:~# curl --data-binary '{"jsonrpc":"2.0","id":"3","method":"org.rdk.System.1.updateFirmware","params":{}}' -H 'content-type:text/plain;' http://localhost:9998/jsonrpc
```

## RPI-Board

1. Flash the RDKV image supported for Firmware upgrade feature in the Rpi and verify the 2 partitions(ex. mmcblk0p1, mmcblk0p2) present under dev folder (use command `ls /dev`)
2. Verify System Service plugin is activated in controller UI as: `http://<ip_address_pi_board>:9998`
3. Provide the updateFirmware curl command on the pi board ex: `root@raspberrypi-rdk-hybrid:~# curl --data-binary '{"jsonrpc":"2.0","id":"3","method":"org.rdk.System.1.updateFirmware","params":{}}' -H 'content-type:text/plain;' http://localhost:9998/jsonrpc`
4. Device auto-reboots and verify there are 2 more additional partitions are created (ex. mmcblk0p3, mmcblk0p4).
5. After the board gets auto-reboots for creation of 2 more additional partitions (ex. mmcblk0p3, mmcblk0p4).Again activate the System Service plugin in controller UI as: `http://<ip_address_pi_board>:9998`
6. Provide the updateFirmware curl command on the pi board ex: `root@raspberrypi-rdk-hybrid:~# curl --data-binary '{"jsonrpc":"2.0","id":"3","method":"org.rdk.System.1.updateFirmware","params":{}}' -H 'content-type:text/plain;' http://localhost:9998/jsonrpc`
7. Open `/etc/include.properties` file and verify the CLOUDURL parameter where XConf Server URL is configured
8. Verify the image version ( `cat /version.txt`) displays the flashed image version
9. Open `/opt/logs/swupdate.log` to verify the communication from RPI board with XConf Server and the download status
10. Verify the tftp download is happening by noticing the change of file size using below command: `ls /extblock/tftpimage/imagewndls -sh` (use this command frequently to verify the file size change)
11. Once image download completed, the Rpi board will auto reboot and come up with downloaded image
12. Verify the version of booted image which shows the downloaded image version

## Conclusion

Please find the summary on firmware upgrade explained above

- Build the image RDK-V Image.
- Ensure 8GB sd-card is available for flashing
- Flash the build image to sd-card
- Setup xconf server ready with rules and download location for RPI device
- Place the upgrading image and checksum file in tftp server
- Boot the flashed image
- Activation of System Service plugin in controller UI before executing Curl command
- Curl command need to be provide twice initially after the RPI board bootup ,curl command for the creation of 2 more additional partitions (ex. mmcblk0p3, mmcblk0p4) in /dev folder.and again after the auto-reboot of the RPI board curl command for image download