

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

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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

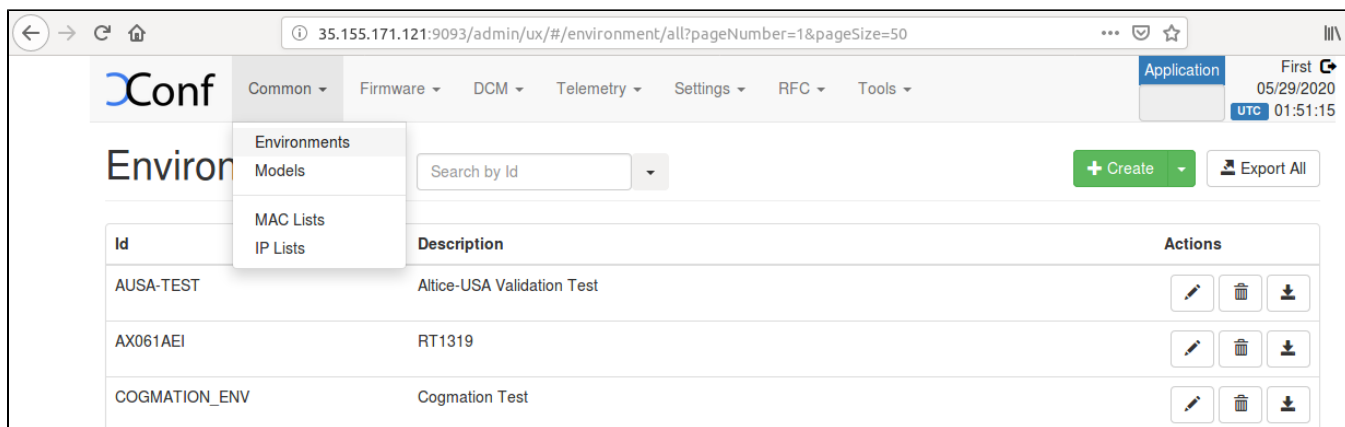
`http://35.155.171.121:9093/admin/ux`

Create Environments

STEP 1:

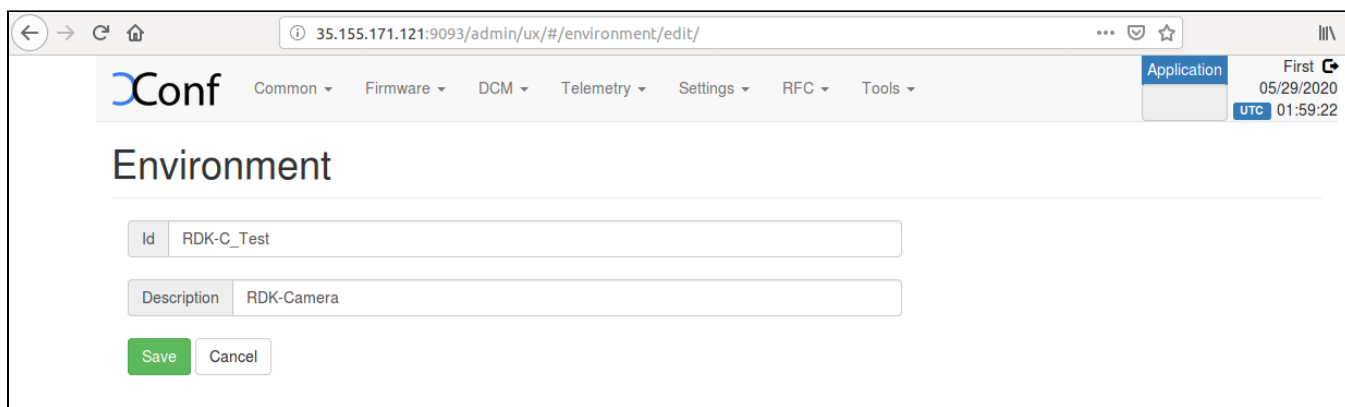
Select Environments option within common list to enter Environments page.

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 content area displays a table of environments:

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 content area displays a table of models:

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 the name 'First' and a clock icon, showing the date '05/29/2020' and time 'UTC 02:07:13'. The form has a title 'Add MAC List' and a 'Choose File' button. Below the title, there's a 'Name' field with the value 'RDK-C_Test'. Under the 'Data' section, there's a text input field with the placeholder 'Please enter item' and a blue '+' button. Below this, a MAC address 'B8:27:EB:2E:72:2B' is displayed with a close icon. At the bottom, there 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 the name 'First' and a clock icon, showing the date '05/29/2020' and time 'UTC 02:07:34'. The page title is 'Mac Lists'. Below the title, there's a 'Create' button and an 'Export All' button. A dropdown menu is open under the 'Firmware' tab, showing options: 'Firmware Configs', 'Firmware Rules', 'Firmware Templates', 'Download Location Filter', 'Percent Filter', 'Logs', 'Report page', and 'Test page'. 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 set of icons for editing, deleting, and downloading.

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.

The screenshot shows the 'Firmware config' page in the XConf interface. At the top, there's a navigation bar with 'XConf' logo and various menu items: Common, Firmware, DCM, Telemetry, Settings, RFC, and Tools. On the right, there's a status bar showing 'Application: stb', 'First: 05/29/2020', and 'UTC: 02:15:59'. The main content area has three input fields: 'Description' with the value 'RDK-C_Test', 'File name' with 'rdk-generic-camera-image_default_20200329074421.rootfs.rpi-sdimg', and 'Version' with 'rdk-generic-camera-image_default_20200329074421'. Below these is a 'Models:' section with a horizontal list of model buttons: AX061AEI, COGMATION_BB, EMULATOR, EMULATOR1, MOCKRT1319_TEST TEST, RDK-C_TEST (which is highlighted in blue), RDKB-TECHSUMMIT, RDKB_RPI, RPI, RPI0, RPI_BB, and TESTCPE. At the bottom left are 'Save' and 'Cancel' buttons.

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.

This screenshot shows the 'Firmware config' page with the 'Firmware' dropdown menu open. The menu options are 'Firmware Configs', 'Firmware Rules' (which is highlighted), 'Firmware Templates', 'Download Location Filter', 'Percent Filter', 'Logs', 'Report page', and 'Test page'. In the background, a table of existing firmware rules is visible. The table has columns for 'Description', 'Supported Models', and 'Actions'. The visible rows are:

Description	Supported Models	Actions
Cogmation_conf...	COGMATION_BB	[Edit] [Delete] [Download]
CPEfirmware	TESTCPE	[Edit] [Delete] [Download]
emulator_firmwar...	EMULATOR1	[Edit] [Delete] [Download]
Firmware_Camera	RPI0	[Edit] [Delete] [Download]

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.

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

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

Application: stb ▾ First: 05/29/2020 UTC: 02:22:05

Add Firmware Rule

Please Select a Template

ENV_MODEL_RULE
IP_RULE
IV_RULE
MAC_RULE
MIN_CHECK_RULE

STEP 3:

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

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

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

Application: stb ▾ First: 05/29/2020 UTC: 02:22:05

Add Firmware Rule

PROPERTIES

Name: RDK-C_Test Type: MAC_RULE

BUILD CONDITIONS

eStbMac IN_LIST ✕

☐ not eStbMac IN_LIST +

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/

ConfCommonFirmwareDCMTelemetrySettingsRFCTools

ApplicationstbFirst05/29/202002:20:26UTC

Add Firmware Rule

PROPERTIES

Name

RDK-C_Test

Type

MAC_RULE

BUILD CONDITIONS

eStbMacIN_LISTRDK-C_Test

ANDOR

☐ 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

Cogmation_config

Save

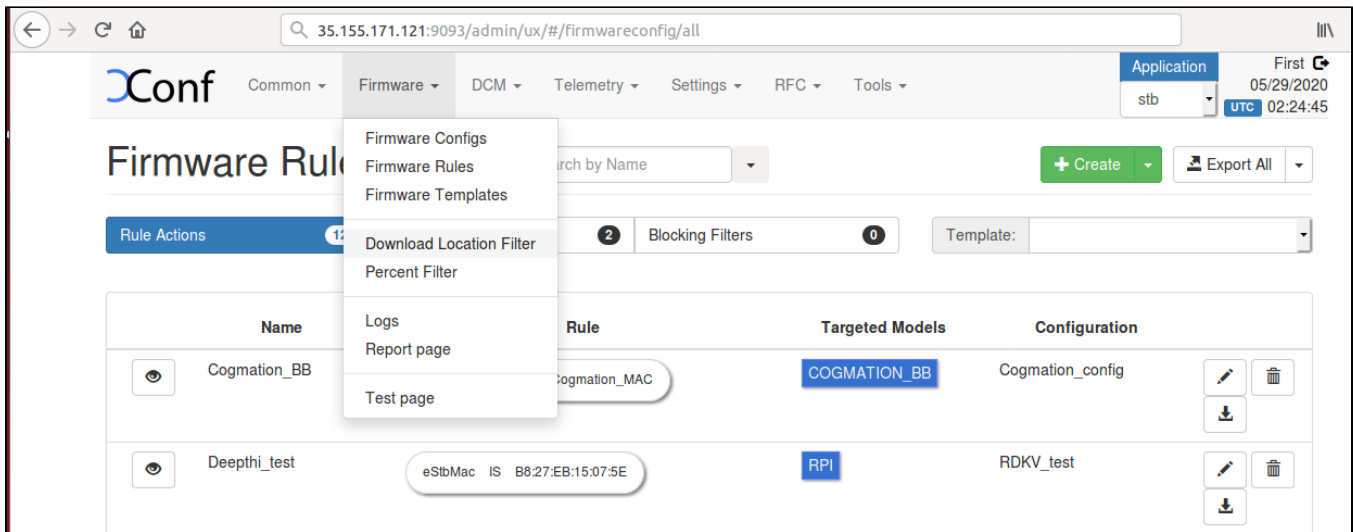
Cancel

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

...

🔍

☆

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"

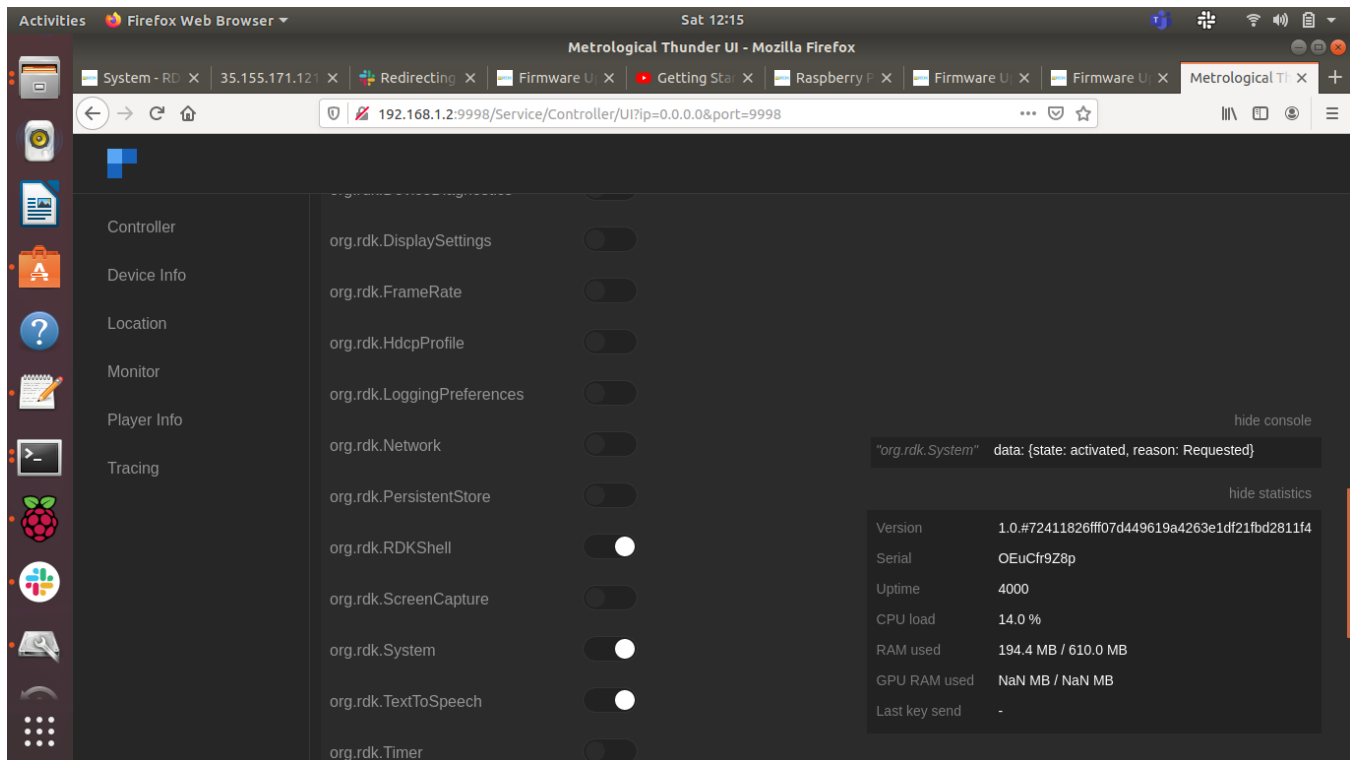
rebootImmediately:

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