RDK-V Emulator Users Guide

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Document Status Codes

Work in Progress (WIP)	An incomplete document designed to guide discussion and generate feedback that may include several alternative requirements for consideration.
Draft (D)	A document in specification format considered largely complete, but lacking review. Drafts are susceptible to substantial change during the review process.
Pre-Issued (Pre I)	A revision of a document circulated for review or approval prior to release, but not approved for distribution
Issued (I)	A stable document, which has undergone rigorous review and is suitable for product design and development It will serve as a basis for testing requirements.

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Table of Contents

Introduction

RDK (Reference Design Kit) is an integrated set of software components, tools and documentation that help in the development of the software stack for set-top box based on the standard Linux operating system which is designed to meet the requirements of the latest generation media servers and clients.

The RDK emulator is an x86 based implementation of the RDK software stack. It is primarily targeted towards the RDK development community (integrators, component developers and application developers) that attempts to simplify the process of working with the RDK software stack without the need for a reference hardware platform. As RDK emulator runs on desktop computers, applications can be tested and debugged before trying to deploy them to real devices.

Purpose of this Document

The purpose of this document is to enable RDK users and developers to be able to bring up the RDK stack and emulator on the PC platform. The document also includes step-by-step procedures to setup & build RDK Emulator

Audience

The intended audience includes the MSO teams, developers and external vendors responsible for the development of firmware and applications for RDK-based Set Top Boxes

Scope

Scope of this document includes understanding RDK Emulator and functionalities, supported build types and to run and test in Virtual Box environment.

Limitations

RDK Emulator does not support all components of RDK 4.0 stack. Currently there is no startup UI, system boots up in console mode.

Known Issues

- High bitrate streams played using aamp-cli utility freezes during playback.
- Screen goes blank after sometime

Abbreviations and Acronyms

The following table describes the acronyms and abbreviations used in this document

Abbreviation/Acronym	Description
RDK	Reference Development Kit
VM	Virtual Machine
VBox	Virtual Box
STB	Set Top Box
XRE	Cross-Platform Runtime Environment
SPTS	Single Program Transport Stream
UPNP	Universal Plug and Play

Overview of RDK Emulator

- Executes on x86-based platforms including virtualization environments such as Virtual Box and QEMU.
- Multiple build types - media client
- Up to date with the RDK generic trunk and any x86-specific platform code.
- Built using Yocto and RDK build frameworks

Key Features

- ResidentApp startup UI
- Video/Audio playback using westerossink gstreamer element.
- IP video streaming playback using aamp-cli utility

Supported Build Types

Build Types	RDK Components Involved	Features/Applications Supported	Final Image Name	Startup Application
RDKV Mediaclient	1. wpeframework 2. webkitbrowser 3. westeros 4. gstreamer	1. ResidentApp	rdk-generic-mediaclient-image-qemux86.vmdk	ResidentApp

Build Setup Instructions

Setting up the Host Environment

How to Build#SettinguptheHostEnvironment

Downloading Source Code & Building

RDK-V Emulator Build Guide

Bringing up the Emulator on Virtual Box

Host Requirements

| Requirement	Remarks
Linux	64 bit Ubuntu 18.04 operating system
Free HDD Space	Minimum 100GB Free Memory

Oracle Virtual Box	6.1 or higher

Install Virtual Box and follow the following steps to bring up RDK Emulator on Virtual Box:
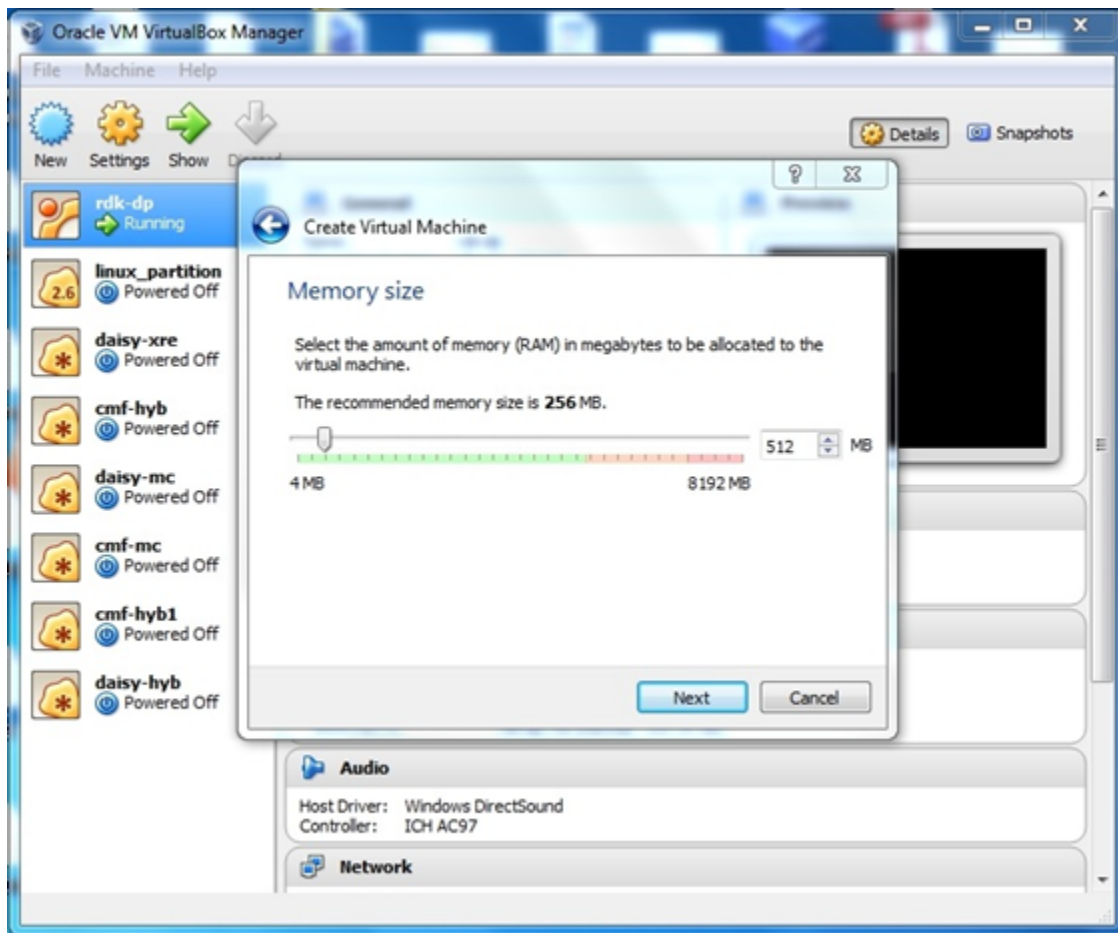
In the following steps, it is recommended to review the description and screenshot completely before proceeding with steps.

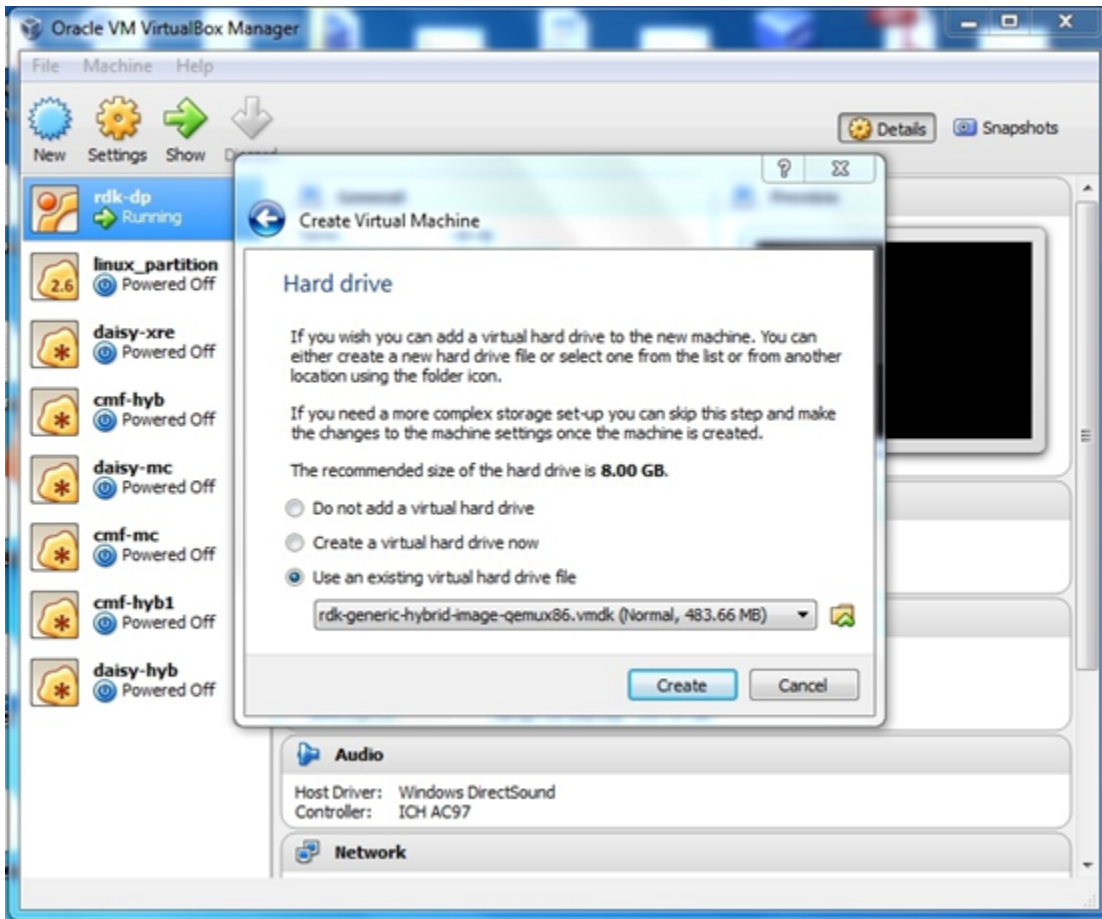## STEP 1: Create your new VM Instance:

- Open Virtualbox
- Select New [A popup will come up]
- Select Type as 'Linux'
- Select Version as 'Other Linux (32 Bit)'
- Click on "Next"
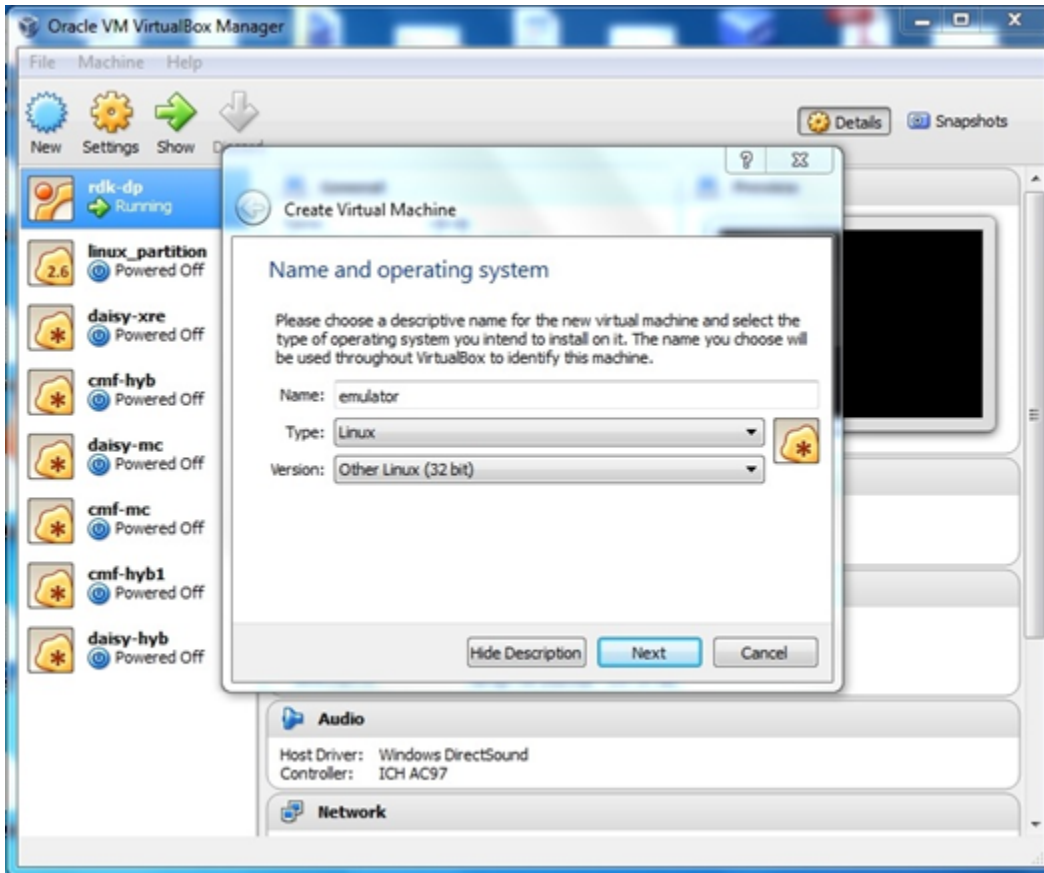
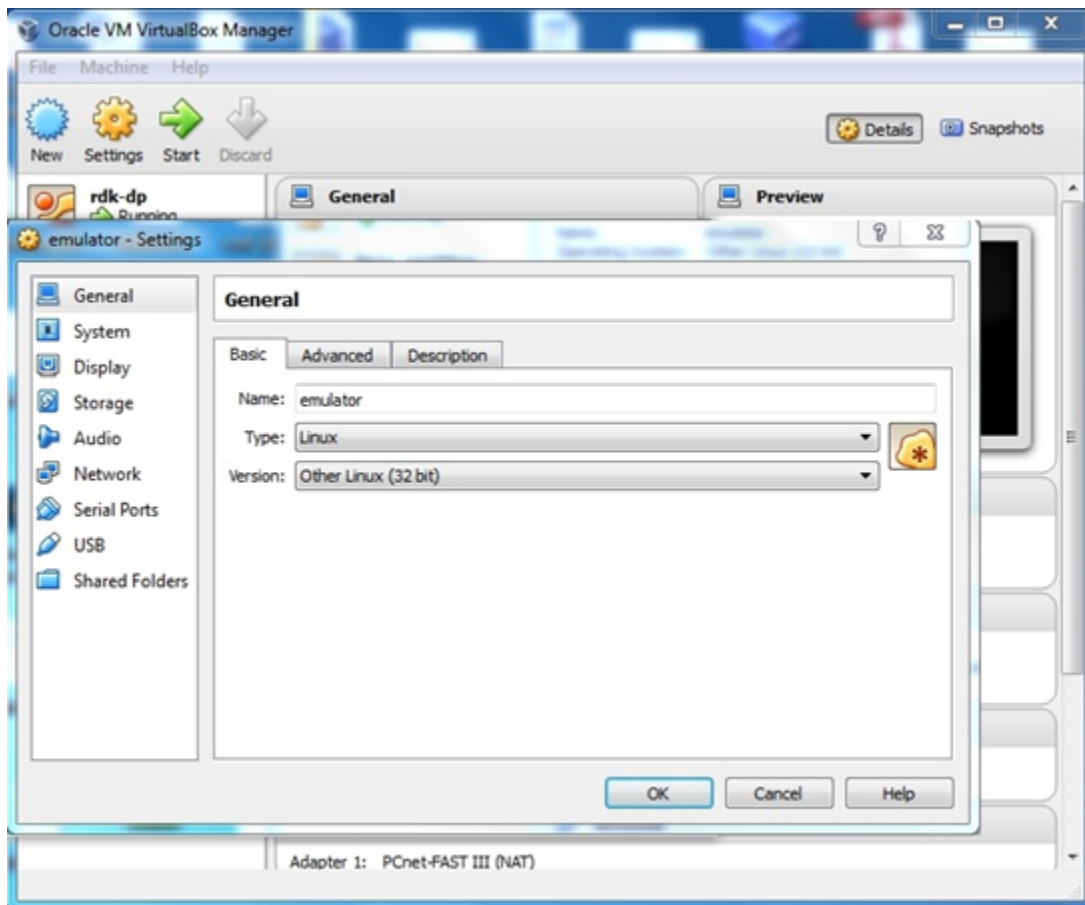- Choose a Memory Size of at least 4GB

- Use an existing virtual hard drive file which would be your newly built image in *.vmdk format and create your VM:
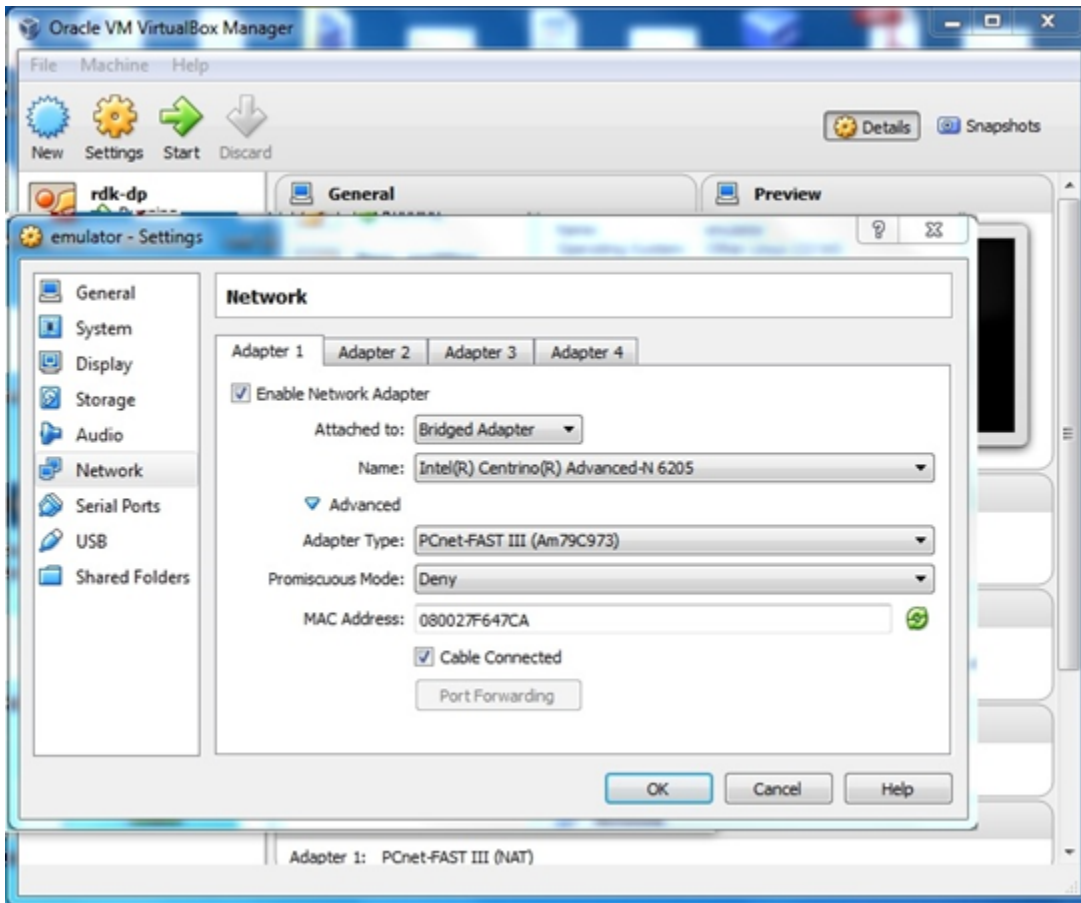
STEP 2: Configure your new VM Instance:

- Click on "Settings" tab to configure your new VM instance

- Set video memory to at least 64 MB in Display tab, and select the 3D acceleration option
- Configure your VM's network settings
- Choose "Bridged Adapter" mode as shown in the screenshot below

STEP 3 : Copy a video file to your file system to be used for emulator video playback.

- Copy your video file from your host machine to any folder folder on the emulator VM
- Note: The following command is performed from your Host Machine

```
$ scp <file_name> root@<your_emulator_vm_ip>:/<path>
```

Usage Instructions

Logging into your VM

As described in the previous section, you can log in to your emulator VM from your Host Machine using the ssh command.

```
$ ssh root@x.x.x.x
```

Testing animation using westeros compositor test application

RDK emulator supports westeros compositor and renderer module as westeros-renderer-gl. Do the following to check westeros animation using *westeros_test* command line utility.

- After logging in to the Emulator via ssh, kill the already running compositor application via below command and comment the last line in *westeros-init.sh* so that compositor is not started automatically on bootup

```
$ killall westeros

Comment the last line in /usr/bin/westeros-init.sh so that compositor is not started automatically on bootup
#westeros --renderer /usr/lib/libwesteros_render_gl.so.0.0.0 --display WPE
```

- Restart the Emulator VM
- Run following commands in terminal for manual starting the westeros compositor application

```
$ mkdir -p /run/user/0
$ export XDG_RUNTIME_DIR=/run/user/0/
$ export LD_PRELOAD=/usr/lib/libwesteros_gl.so.0.0.0
$ westeros --renderer /usr/lib/libwesteros_render_gl.so.0.0.0 --display WPE
```

- Run *westeros_test* application in another window as given below

```
$ westeros_test
```
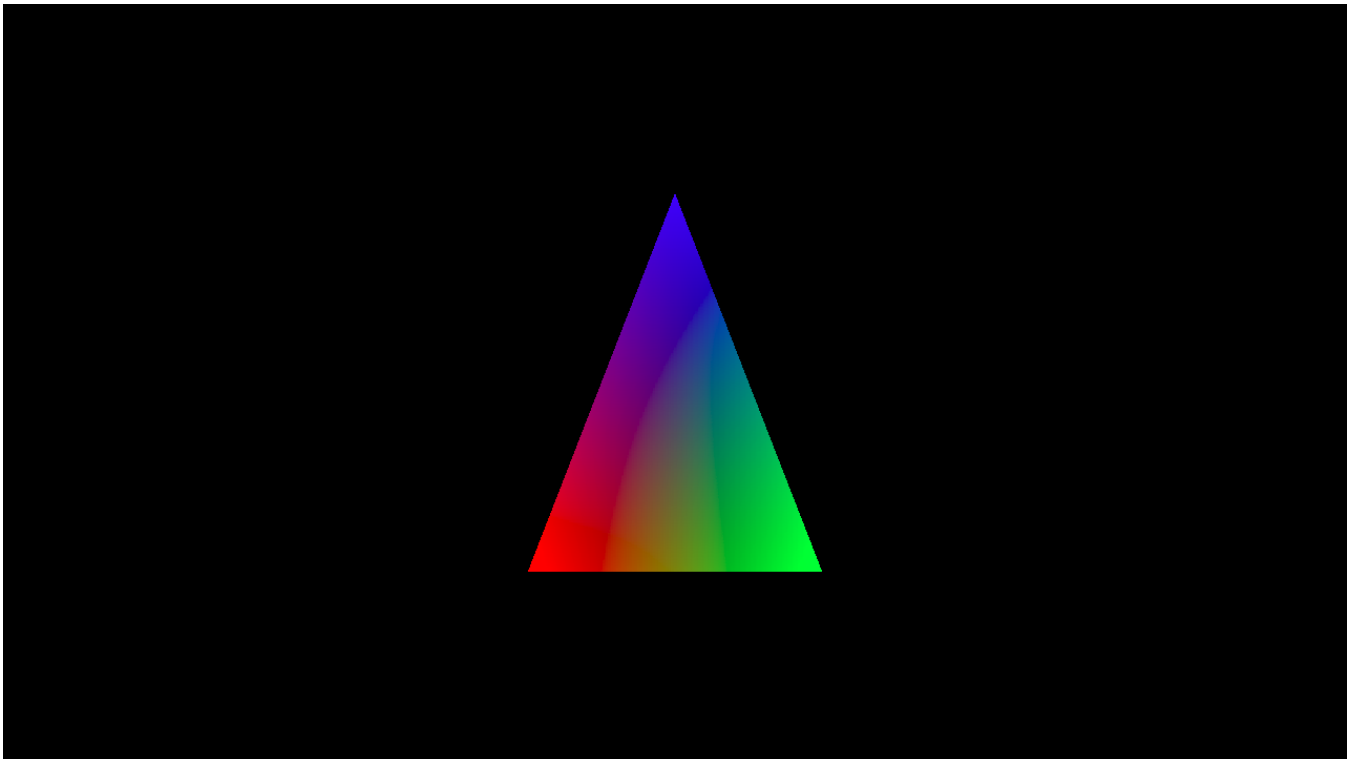

Testing video playback using Gstreamer command line utility

- Start the westeros compositor application as mentioned before if its not already running.
- Copy video files to the VM
- Execute below command(s) to play video

```
$ gst-launch-1.0 playbin uri=file:///<video file name with full path>
```

Testing video streaming using aamp-cli utility

- Start the westeros compositor application as mentioned before if its not already running.
- Execute the below command to play clear-stream videos

```
$ aamp-cli <url>
e.g.
$ aamp-cli http://devimages.apple.com/iphone/samples/bipbop/bipbopall.m3u8
```