DRM Integration Framework User Guide

Revision History

Revision	Date	Change Description
1.0	10/15/2015	Initial release
1.1	10/29/2015	Added a step to section 3.2 for correcting the system time on the board
1.2	12/4/2015	Added single process mode
1.3	2/8/2016	Updated command line options with Sage 2.8 Added mosaic mode with playback_dif

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1 Introduction

DRM Integration Framework (DIF) provides APIs that simplifies playback application development with DRM with SAGE/SVP support. Currently it supports Playready and Widevine.

We provide a sample application playback_dif which is a simple example to utilize the DIF APIs.

This document outlines how to build and run playback_dif example.

2 Building playback_dif example

2.1 Environment variable settings

1) Define URSR_TOP to point at the root folder of your URSR sources. This is optional and absolute path can be used to replace $(URSR_TOP). It is used in this document for convenience. For example:

```
export URSR_TOP=/projects/stbdev/$USER/repos/URSR_baseline
```

2) Set these platform specific environment variables:

```
export NEXUS_PLATFORM=<Platform_ID>

export BCHP_VER=<Revision>
```

Below is needed only if your board has a subtype like SV, VMS_SFF, C, DBS….etc.)

```
export NEXUS_USE_<ChipID>_<BoardSubType>=y
```

3) The following variables need to be set:

```
export NEXUS_MODE=proxy

export LINUX=<Kernel_path>

export PATH=<Toolchain_path>:$PATH

export MSDRM_PRDY_SUPPORT=y

export MSDRM_PRDY_SDK_VERSION=2.5
```

Below is required if the chip is ARM processor.

```
export B_REFSW_ARCH=arm-linux
```

DIF will be built with SAGE/SVP support using the below setting. If you want to build without SAGE/SVP support, please set it "n":

```
export SAGE_SUPPORT=y
```

Currently multi-process mode is the default build. If you want to build single process mode, please set NXCLIENT_SUPPORT to "n":

```
export NXCLIENT_SUPPORT=n
```

2.2 Building DIF library and playback_dif example

You can build DIF library and playback_dif example at the same time using the following commands:

```
cd $URSR_TOP/BSEAV/lib/security/dif

make examples
```

An executable file "playback_dir" will be copied to $(URSR_TOP)/obj.$(NEXUS_PLATFORM)/nexus/bin together with libdif.so and other required libraries.

Note: Under some networks, you may get an error similar to the following (full path will be shown instead of $(URSR_TOP)):

```
=============== Downloading OPENSSL tarball to
$(URSR_TOP)/obj.97439/BSEAV/lib/protobuf/arm-linux.debug
$(URSR_TOP)/BSEAV/lib/protobuf/protobuf-2.5.0
$(URSR_TOP)/obj.97439/BSEAV/lib/protobuf/arm-linux.debug
--2015-08-20 11:21:59-- https://protobuf.googlecode.com/files/protobuf-
2.5.0.tar.bz2
Resolving protobuf.googlecode.com... 74.125.20.82, 2607:f8b0:400e:c05::52
Connecting to protobuf.googlecode.com|74.125.20.82|:443... connected.
ERROR: cannot verify protobuf.googlecode.com's certificate, issued by
`/C=US/O=Google Inc/CN=Google Internet Authority G2':
Unable to locally verify the issuer's authority.
To connect to protobuf.googlecode.com insecurely, use `--no-check-
certificate'.
Unable to establish SSL connection.
Tarball $(URSR_TOP)/obj.97439/BSEAV/lib/protobuf/arm-linux.debug/protobuf-
2.5.0.tar.bz2 is missing
Makefile:98: recipe for target 'source' failed
make: *** [source] Error 1

make: Leaving directory '$(URSR_TOP)/BSEAV/lib/protobuf'===============
```

As a workaround, you can use curl as follows and then proceed with the build command again.

```
curl https://protobuf.googlecode.com/files/protobuf-2.5.0.tar.bz2 >
$(URSR_ROP)/obj.97439/BSEAV/lib/protobuf/arm-linux.debug/protobuf-
2.5.0.tar.bz2
```

3   Runtime environment setup

3.1 Preparing drm.bin and playready.bin

Please prepare appropriate drm.bin and playready.bin for your board, and copy them to the directory where playback_dif executable exists.

You need version 3.1.0 or higher of the DRM Utility to generate a proper "drm.bin" and "playready.bin" files. drm.bin needs to be generated with a "WIDEVINE_PLAYBACK" key and playready.bin needs to include Playready key. You can generate a single bin file with both keys and copy it to drm.bin and playready.bin.

Note that these binary files generated with older versions of the DRM utility will not work properly. Also these bin files for SAGE/SVP support cannot be used for a build without SAGE/SVP support.

Objainint OTP ID for your board (optional)

If you need to obtain drm.bin for your board, please follow the instructions here, otherwise, jump to the next section. This section describes how to obtain OTP ID for your board which is needed for getting appropriate drm.bin. However, it is assumed that you have instructions on how to obtain the drm.bin.

OTP can be retrieved with 2 steps below
a. Build otpgetchipid – The commands below build Nexus along with the app otpgetchipid.
```
  cd nexus/examples/security/otp/nexus

  plat <Platform_ID> <Revision>

  unset SAGE_SUPPORT

  unset NEXUS_SECURITY_SUPPORT
```

b. Run otpgetchipid on your board.
   Boot the board up to the shell prompt.

```
  mount -t nfs NFS_SERVER_IP:/<path-to-built-nexus-and-otpgetchipid>
  /mnt/nfs

  ./nexus otpgetchipid
```

Note the OTP id Displayed on the console.

drm.bin can then be requested as per the OTP ID and board type.

3.2 Mounting the build and setting up runtime environment

Copy the build (contents of $(URSR_TOP)/obj.$(NEXUS_PLATFORM)/nexus/bin) to your NFS server and mount it from your board using the following example. The example below assumes that it is mounted under /mnt/nfs on the device (Here '#' is a command prompt on the terminal of the board).

```
#mount -o nolock NFS_SERVER_IP:/<path-to-built-nexus-bin> /mnt/nfs
```

Make sure that the directory <path-to-built-nexus-bin> containing Nexus, required libs (such as libdif.so, libwvcdm.so, libplayreadypk_host.so, libcmndrm*.so, etc.) and playback_dif is mounted using nfs from the device. Also the permissions of these files must be properly set for the runtime user's access. The <path-to-built-nexus-bin> directory must be writable to the runtime user.

Make sure that drm.bin and playready.bin are present with at least read permission for the runtime user in the current directory.

```
#cd /mnt/nfs

#ls -l drm.bin playready.bin

-r--r--r--    1 15176    20            19488 Oct  7 19:02 drm.bin

-r--r--r--    1 15176    20            19488 Oct  7 19:05 playready.bin
```

If not running playback_dif from `/mnt/nfs`, set up your PATH to include the directory where playback_dif exists.

```
# PATH=$PATH:/mnt/nfs

# which playback_dif

/mnt/nfs/playback_dif
```

Make sure the system time is correct. The below example shows a wrong system time.

```
# date

Thu Jan  1 00:04:34 UTC 1970
```

An easy way to set the correct time is to run ntpd command for example:

```
# ntpd -p uk.pool.ntp.org
```

But the above command only runs the ntpd daemon and the system time is not updated immediately. Please wait for a few seconds and then confirm the system time gets synchronized.

For multi process mode, start Nexus server. This step is not required for single process mode.

```
#cd /mnt/nfs

#./nexus nxserver –memconfig videoDecoder,svp,all,s –memconfig
display,svp,all,s &
```

4 Running playback_dif example

Make sure that Environment is setup according to section 3.

4.1 Play CENC media

1. From host machine, visit http://dash-mse-test.appspot.com/media.html from browser.

2. Scroll down to "OOPS_CENC" secion and download a CENC media file such as oops_cenc-20121114-142.mp4 and copy it to the directory in your NFS server where playback_dif exists. Make sure the read permission is set for the runtime user.

   The first 6 files (numbering from 142 to 146) include only video data and the following 3 files (numbering from 148 to 150) include only audio data. oops_cenc-20121114-161.mp4 is video only.

3. Run playback_dif with Playready DRM

   Multi-process mode:

   ```
   # ./nexus.client playback_dif –secure –pr oops_cenc-20121114-145.mp4
   ```

   Single process mode:

   ```
   # ./nexus playback_dif –secure –pr oops_cenc-20121114-145.mp4
   ```

4. Run playback_dif with Widevine DRM

   Multi-process mode:

   ```
   # ./nexus.client playback_dif –secure –wv oops_cenc-20121114-145.mp4
   ```

   Single process mode:

   ```
   # ./nexus playback_dif –secure –wv oops_cenc-20121114-145.mp4
   ```

5. Run playback_dif without DRM option. This will select a DRM that is found in the first PSSH box in the media file (below results in Widevine DRM).

   Multi-processmode:

   ```
   # ./nexus.client playback_dif –secure oops_cenc–20121114–145.mp4
   ```

   Single processmode:

   ```
   # ./nexus playback_dif –secure oops_cenc–20121114–145.mp4
   ```

4.2 Play PIFF media

1. From host machine, visit http://playready.directtaps.net/smoothstreaming.

2. Scroll down to "SSW 720p H264 PLAYREADY (SuperSpeedWay, 720p, H264 AAC, with encryption)" section and download an ISMV file such as SSWSS720H264PR/SuperSpeedway_720_2962.ismv and copy it to the directory in your NFS server where playback_dif exists. Make sure the read permission is set for the runtime user.

   Those files include both audio and video data and playback_dif can play the video with audio.

3. Run playback_dif with Playready DRM

   Multi-process mode:

   ```
   # ./nexus.client playback_dif –secure –pr
   SuperSpeedway_720_2962_enc.ismv
   ```

   Single process mode:

   ```
   # ./nexus playback_dif –secure –pr SuperSpeedway_720_2962_enc.ismv
   ```

4. Following command will result in Playready DRM (same as above)

   Multi-process mode:

   ```
   # ./nexus.client playback_dif –secure SuperSpeedway_720_2962_enc.ismv
   ```

   Single process mode:

   ```
   # ./nexus playback_dif –secure SuperSpeedway_720_2962_enc.ismv
   ```

5. If you specify a DRM that is not supported in the media, playback_dif will ask if you want to continue with the default DRM (=Playready). You can enter 'y' or 'n'.

   ```
   # ./nexus.client playback_dif –secure –wv SuperSpeedway_720_2962_enc.ismv
   ```

```
*** 00:00:00.015 playback_dif: PiffParser was initialized for
SuperSpeedway_720_2962_enc.ismv

### 00:00:00.015 playback_dif: DRM Type: 2 was not found in the stream.

### 00:00:00.015 playback_dif: Do you want to play it with its default DRM
type: 3? [y/n]
```

4.3 Mosaic mode with CENC files

This feature is only supported in multi-process mode. Up to 5 videos can be played with playready and widevine mixed.

1. From host machine, visit http://dash-mse-test.appspot.com/media.html from browser.

2. Scroll down to "OOPS_CENC" secion and download low resolution CENC media files such as oops_cenc-20121114-142.mp4 and oops_cenc-20121114-161.mp4, and copy them to the directory in your NFS server where playback_dif exists. Make sure the read permission is set for the runtime user.

3. Run playback_dif with several cenc files for example:

```
# ./nexus.client playback_dif -secure oops_cenc-20121114-142.mp4 -pr
oops_cenc-20121114-142.mp4 oops_cenc-20121114-161.mp4 -pr oops_cenc-
20121114-161.mp4

# ./nexus.client playback_dif -secure oops_cenc-20121114-142.mp4 -n 3

# ./nexus.client playback_dif -secure -pr oops_cenc-20121114-161.mp4
oops_cenc-20121114-142.mp4 -n 5
```