



视沃科技

# 大牛直播 SDK Unity3D 调用说明

官网: <http://daniusdk.com>

Github: <https://github.com/daniulive/SmarterStreaming>

# 声 明

非常感谢您选用我们的 SDK，您的支持将激励我们持续进步。

随着产品的迭代，产品手册会在每个版本发布后不定期更新，最新版本请以官方网站 (<https://daniusdk.com>) 为准。

本手册中内容仅为开发者提供参考指导作用，具体调用请以 SDK 示例为准。

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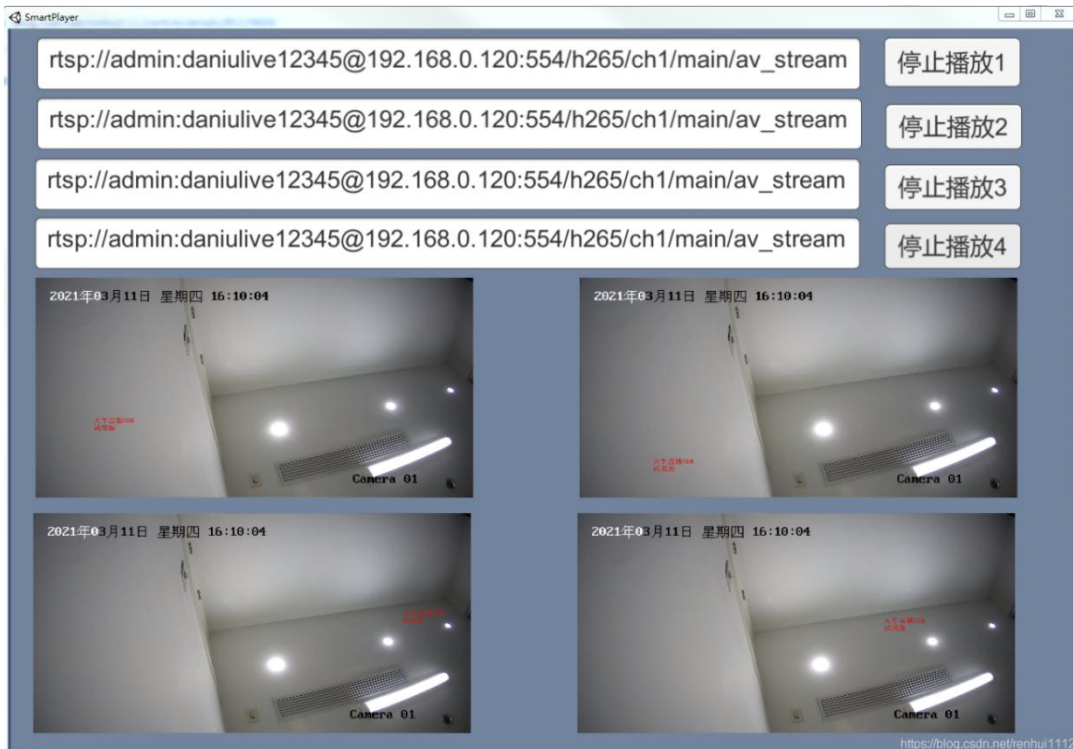
# 1. Windows 播放端 SDK 说明

随着 Unity3D 的应用范围越来越广，越来越多的行业开始基于 Unity3D 开发产品，如传统行业中虚拟仿真教育、航空工业、室内设计、城市规划、工业仿真等领域。

基于此，我们在 Unity 环境下推出了跨平台低延迟的 RTMP|RTSP 直播播放器，很好的解决了好多对延迟要求苛刻的使用场景。

## 1.1 demo 说明

- SmartU3dWinPlayer: 大牛直播 SDK Unity3D Windows 平台 RTMP/RTSP 直播播放端工程。Demo 界面如下：



## 1.2 集成说明

- Unity3D 接口和调用 demo，参见：SmartPlayerWindowsMono.cs
- SmartU3dWinPlayer\Assets\Plugins\x86 和 SmartU3dWinPlayer\Assets\Plugins\x86\_64 下相关库到工程：
- 将以下文件加到集成工程(SmartU3dWinPlayer\Assets\SmartPlayerSDK 目录下)：

- nt\_base\_code\_define.cs;
  - smart\_player\_define.cs;
  - smart\_player\_sdk.cs;
  - smart\_log.cs;
  - smart\_log\_define.cs。
- 如需集成到自己系统测试，请用大牛直播 SDK 的 app name(不然集成提示 license failed)，正式授权版按照授权 app name 正常使用即可，windows 测试 app name: SmartPlayer。

## 1.3 调用时序

Windows 平台 Unity3D 实际上调用的是大牛直播 SDK 的 C#相关接口实现，无需二次封装，相关调用时序，也可参照 Windows C#调用 SDK 调用说明(参见“视沃科技-Windows-SDK 集成说明.pdf”)。

调用流程：

### 1. 准备播放：

开始播放的时候，调用 OpenPlayer()，完成 PlayerInit 和 PlayerOpen 操作，并设置 eventcallback 和 videoframecallback，并完成相关参数配置，设置 YUV 回调输出，调用 PlayerStart，完成播放端的启动。

**注意：**正式授权版，需在调用 NT\_SP\_Init()接口之前，调用 NT\_SP\_SetSDKClientKey()，设置相关 license key，确保证通过。

```
public void Play(int sel)
{
    if (videoctrl[sel].is_running)
    {
        Debug.Log("已经在播放..");
        return;
    }

    lock (videoctrl[sel].frame_lock_)
    {
        videoctrl[sel].cur_video_frame_ = null;
    }

    OpenPlayer(sel);

    if (videoctrl[sel].player_handle_ == IntPtr.Zero)
        return;

    //设置播放 URL
    NTSmartPlayerSDK.NT_SP_SetURL(videoctrl[sel].player_handle_, videoctrl[sel].videoUrl);

    /* ++ 播放前参数配置可加在此处 ++ */

    int play_buffer_time_ = 100;
    NTSmartPlayerSDK.NT_SP_SetBuffer(videoctrl[sel].player_handle_, play_buffer_time_); //设置 buffer
time
```

```

int is_using_tcp = 0;           //TCP 模式

NTSmartPlayerSDK.NT_SP_SetRTSPtcpMode(videoctrl[sel].player_handle_, is_using_tcp);

int timeout = 10;
NTSmartPlayerSDK.NT_SP_SetRtspTimeout(videoctrl[sel].player_handle_, timeout);

int is_auto_switch_tcp_udp = 1;
NTSmartPlayerSDK.NT_SP_SetRtspAutoSwitchTcpUdp(videoctrl[sel].player_handle_, is_auto_switch_tcp_udp);

Boolean is_mute_ = false;
NTSmartPlayerSDK.NT_SP_SetMute(videoctrl[sel].player_handle_, is_mute_ ? 1 : 0);           //是否启动播
放的时候静音

int is_fast_startup = 1;
NTSmartPlayerSDK.NT_SP_SetFastStartup(videoctrl[sel].player_handle_, is_fast_startup);           //设置快速启
动模式

Boolean is_low_latency_ = false;
NTSmartPlayerSDK.NT_SP_SetLowLatencyMode(videoctrl[sel].player_handle_, is_low_latency_ ? 1 : 0);           //设置是否
启用低延迟模式

//设置旋转角度(设置 0, 90, 180, 270 度有效, 其他值无效)
int rotate_degrees = 0;
NTSmartPlayerSDK.NT_SP_SetRotation(videoctrl[sel].player_handle_, rotate_degrees);

int volume = 100;
NTSmartPlayerSDK.NT_SP_SetAudioVolume(videoctrl[sel].player_handle_, volume);           //设置播放音量, 范围是[0,
100], 0 是静音, 100 是最大音量, 默认是 100

// 设置上传下载报速度
int is_report = 0;
int report_interval = 1;
NTSmartPlayerSDK.NT_SP_SetReportDownloadSpeed(videoctrl[sel].player_handle_, is_report, report_interval);
/* -- 播放前参数配置可加在此处 -- */

//video frame callback (YUV/RGB)
videoctrl[sel].video_frame_call_back_ = new SP_SDKVideoFrameCallBack(NT_SP_SetVideoFrameCallBack);
NTSmartPlayerSDK.NT_SP_SetVideoFrameCallBack(videoctrl[sel].player_handle_,
(Int32)NT.NT_SmartPlayerDefine.NT_SP_E_VIDEO_FRAME_FORMAT.NT_SP_E_VIDEO_FRAME_FORMAT_I420,
window_handle_, videoctrl[sel].video_frame_call_back_);

UInt32 flag = NT_SmartPlayerSDK.NT_SP_StartPlay(videoctrl[sel].player_handle_);

if (flag == DANIULIVE_RETURN_OK)
{
    videoctrl[sel].is_need_get_frame_ = true;
    Debug.Log("播放成功");
}
else
{
    videoctrl[sel].is_need_get_frame_ = false;
    Debug.LogError("播放失败");
}

videoctrl[sel].is_running = true;
}

```

## 2. OpenPlayer 实现:

```

private void OpenPlayer(int sel)
{
    window_handle_ = IntPtr.Zero;
}

```

```

    if (videoctrl[sel].player_handle_ == IntPtr.Zero)
    {
        videoctrl[sel].player_handle_ = new IntPtr();
        UInt32 ret_open = NTSmartPlayerSDK.NT_SP_Open(out videoctrl[sel].player_handle_, window_handle_, 0,
        IntPtr.Zero);
        if (ret_open != 0)
        {
            videoctrl[sel].player_handle_ = IntPtr.Zero;
            Debug.LogError("调用 NT_SP_Open 失败..");
            return;
        }
    }

    videoctrl[sel].event_call_back_ = new SP_SDKEventCallBack(NT_SP_SDKEventCallBack);
    NTSmartPlayerSDK.NT_SP_SetEventCallBack(videoctrl[sel].player_handle_, window_handle_,
    videoctrl[sel].event_call_back_);

    videoctrl[sel].sdk_video_frame_call_back_ = new VideoControl.SetVideoFrameCallBack(SDKVideoFrameCallBack);
    videoctrl[sel].sdk_event_call_back_ = new VideoControl.SetEventCallBack(SDKEventCallBack);
}

```

### 3. Video frame 实时处理并绘制:

开始播放后，daniulive 直播播放端 SDK 回调 yuv 数据及相关信息，unity3d 获取到数据信息后，调用 InitYUVTexture()，完成初始化工作，调用 UpdateYUVTexture()实现数据实时刷新，当数据信息发生变化时，会二次调用 InitYUVTexture()，完成初始化。

```

private void SDKVideoFrameCallBack(UInt32 status, IntPtr frame, int sel)
{
    //这里拿到回调 frame，进行相关操作
    NT_SP_VideoFrame video_frame = (NT_SP_VideoFrame)Marshal.PtrToStructure(frame, typeof(NT_SP_VideoFrame));

    VideoFrame u3d_frame = new VideoFrame();

    u3d_frame.width_ = video_frame.width_;
    u3d_frame.height_ = video_frame.height_;

    u3d_frame.timestamp_ = (UInt64)video_frame.timestamp_;

    int d_y_stride = video_frame.width_;
    int d_u_stride = (video_frame.width_ + 1) / 2;
    int d_v_stride = d_u_stride;

    int d_y_size = d_y_stride * video_frame.height_;
    int d_u_size = d_u_stride * ((video_frame.height_ + 1) / 2);
    int d_v_size = d_u_size;

    int u_v_height = ((u3d_frame.height_ + 1) / 2);

    u3d_frame.y_stride_ = d_y_stride;
    u3d_frame.u_stride_ = d_u_stride;
    u3d_frame.v_stride_ = d_v_stride;

    u3d_frame.y_data_ = new byte[d_y_size];
    u3d_frame.u_data_ = new byte[d_u_size];
    u3d_frame.v_data_ = new byte[d_v_size];

    CopyFramePlane(u3d_frame.y_data_, d_y_stride,
        video_frame.plane0_, video_frame.stride0_, u3d_frame.height_);

    CopyFramePlane(u3d_frame.u_data_, d_u_stride,
        video_frame.plane1_, video_frame.stride1_, u_v_height);
}

```

```

CopyFramePlane(u3d_frame.v_data_, d_v_stride,
               video_frame.plane2_, video_frame.stride2_, u_v_height);

lock (videoctrl[sel].frame_lock_)
{
    videoctrl[sel].cur_video_frame_ = u3d_frame;
    //Debug.LogError("sel: " + sel + " w:" + u3d_frame.width_ + "h:" + u3d_frame.height_);
}
}

```

#### 4. 停止播放

调用 NT\_U3D\_StopPlay()后，调用 NT\_U3D\_Uninit()即可。

```

private void ClosePlayer(int sel)
{
    videoctrl[sel].is_need_get_frame_ = false;
    videoctrl[sel].is_need_init_texture_ = false;

    if (videoctrl[sel].player_handle_ == IntPtr.Zero)
    {
        return;
    }

    UInt32 flag = NTSmartPlayerSDK.NT_SP_StopPlay(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("停止成功");
    }
    else
    {
        Debug.LogError("停止失败");
    }

    videoctrl[sel].player_handle_ = IntPtr.Zero;

    videoctrl[sel].is_running = false;
}

```

#### 5. Event 回调

```

private void SDKEventCallBack(UInt32 event_id,
                              Int64 param1,
                              Int64 param2,
                              UInt64 param3,
                              [MarshalAs(UnmanagedType.LPStr)] String param4,
                              [MarshalAs(UnmanagedType.LPStr)] String param5,
                              IntPtr param6,
                              int sel)
{
    if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTING == event_id
        || (UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTION_FAILED == event_id
        || (UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTED == event_id
        || (UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_DISCONNECTED == event_id)
    {
        connection_status_ = event_id;
    }
    if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_START_BUFFERING == event_id
        || (UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_BUFFERING == event_id
        || (UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_STOP_BUFFERING == event_id)
    {
        buffer_status_ = event_id;
        if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_BUFFERING == event_id)
        {
            buffer_percent_ = (Int32)param1;
        }
    }
}

```



```

    }
}
if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_DOWNLOAD_SPEED == event_id)
{
    download_speed_ = (Int32)param1;
}

String t_show_str = "";
if (connection_status_ != 0)
{
    t_show_str += "链接状态: ";
    if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTING ==
connection_status_)
    {
        t_show_str += "链接中";
    }
    else if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTION_FAILED ==
connection_status_)
    {
        t_show_str += "链接失败";
    }
    else if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_CONNECTED ==
connection_status_)
    {
        t_show_str += "链接成功";
    }
    else if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_DISCONNECTED ==
connection_status_)
    {
        t_show_str += "链接断开";
    }
}

if (download_speed_ != -1)
{
    String ss = " 下载速度: " + (download_speed_ * 8 / 1000).ToString() + "kbps " + (download_speed_ / 1024).ToString()
+ "KB/s";
    t_show_str += ss;
}

if (buffer_status_ != 0)
{
    t_show_str += " 缓冲状态: ";
    if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_START_BUFFERING ==
buffer_status_)
    {
        t_show_str += "开始缓冲";
    }
    else if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_BUFFERING == buffer_status_)
    {
        String ss = "缓冲中 " + buffer_percent_.ToString() + "%";
        t_show_str += ss;
    }
    else if ((UInt32)NTSmartPlayerDefine.NT_SP_E_EVENT_ID.NT_SP_E_EVENT_ID_STOP_BUFFERING ==
buffer_status_)
    {
        t_show_str += "结束缓冲";
    }
}
//show_message = "DaniuEvent: instance" + sel + ": " + t_show_str;
//Debug.LogError(show_message);
}

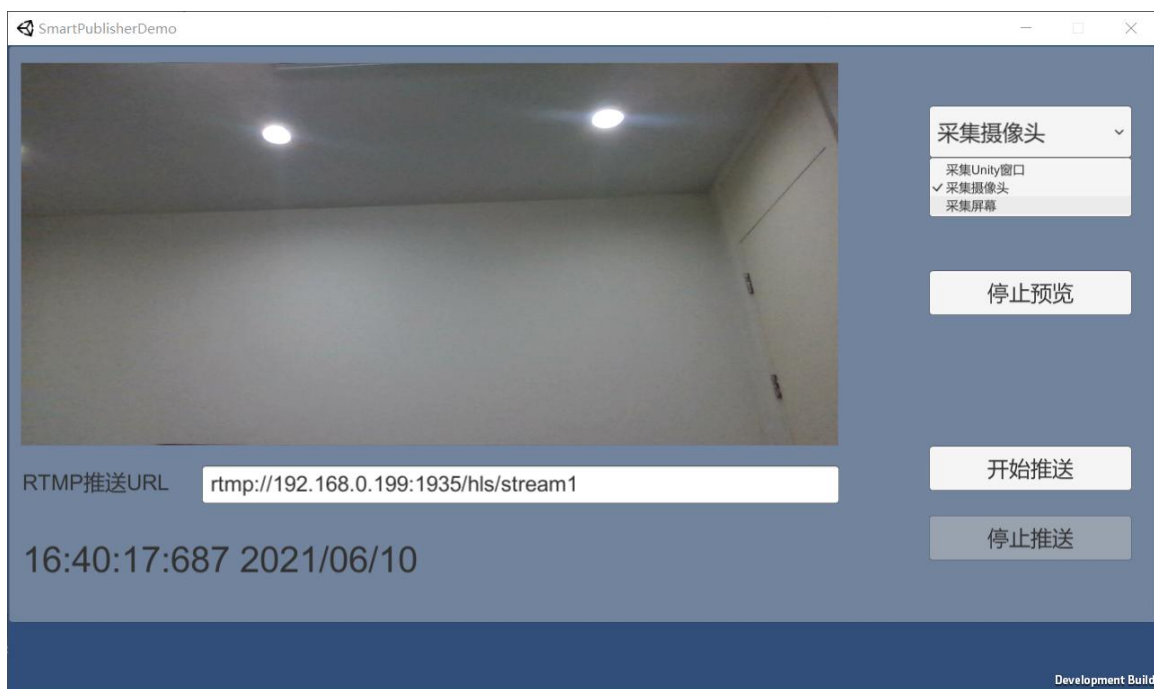
```

## 2. Windows 推送端 SDK 说明

Windows 平台 Unity3D 下的 RTMP 直播推送 SDK，数据源可以是 Unity 的窗口、摄像头或整个屏幕，编码传输模块，还是调用官方原生接口。

### 2.1 demo 说明

SmartU3dWinPublisher：大牛直播 SDK Unity3D Windows 平台 RTMP 直播推送 SDK Demo 工程，Demo 界面如下：



### 2.2 集成说明

- Unity3D 接口和调用 demo，参见：SmartPublishWinMono.cs
- SmartU3dWinPublisher\Assets\Plugins\x86 和 SmartU3dWinPublisher\Assets\Plugins\x86\_64 下相关库到工程：
- 添加以下文件到集成工程(SmartU3dWinPublisher\Assets\SmartPublisherSDK 下)：
  - nt\_base\_code\_define.cs;
  - nt\_common\_media\_define.cs;
  - nt\_publisher\_wrapper.cs;
  - nt\_smart\_publisher\_define.cs;
  - nt\_smart\_publisher\_sdk.cs;

- smart\_log.cs;
  - smart\_log\_define.cs。
- 如需集成到自己系统测试，请用大牛直播 SDK 的 app name(不然集成提示 license failed)，正式授权版按照授权 app name 正常使用即可，windows 测试 app name: SmartPublisherDemo。

## 2.3 调用时序

Windows 平台 Unity3D 实际上调用的是大牛直播 SDK 的 C#相关接口实现，无需二次封装，相关调用时序，也可参照 Windows C#调用 SDK 调用说明(参见“视沃科技-Windows-SDK 集成说明.pdf”)。

### 1. 基础初始化

```
private bool InitSDK()
{
    if (!is_pusher_sdk_init_)
    {
        // 设置日志路径(请确保目录存在)
        String log_path = "D:\\publisherlog";
        NTSmartLog.NT_SL_SetPath(log_path);

        UInt32 isInitd = NTSmartPublisherSDK.NT_PB_Init(0, IntPtr.Zero);

        if (isInitd != 0)
        {
            Debug.Log("调用 NT_PB_Init 失败..");
            return false;
        }

        is_pusher_sdk_init_ = true;
    }

    return true;
}
```

### 2. 调用 Open()接口，获取推送实例

```
public bool OpenPublisherHandle(uint video_option, uint audio_option)
{
    if (publisher_handle_ != IntPtr.Zero)
    {
        return true;
    }

    publisher_handle_count_ = 0;

    if (NTBaseCodeDefine.NT_ERC_OK != NTSmartPublisherSDK.NT_PB_Open(out publisher_handle_,
        video_option, audio_option, 0, IntPtr.Zero))
    {
        return false;
    }

    if (publisher_handle_ != IntPtr.Zero)
    {
        pb_event_call_back_ = new NT_PB_SDKEventCallBack(PbEventCallBack);

        NTSmartPublisherSDK.NT_PB_SetEventCallBack(publisher_handle_, IntPtr.Zero, pb_event_call_back_);
    }
}
```

```

        return true;
    }
    else
    {
        return false;
    }
}

```

### 3. 初始化参数配置

这里需要注意下，如果要采集 unity 窗口，需要设置图层模式，先填充一层 RGBA 黑色背景，然后再添加一层，用于叠加外部数据。

```

private void SetCommonOptionToPublisherSDK()
{
    if (!IsPublisherHandleAvailable())
    {
        Debug.Log("SetCommonOptionToPublisherSDK, publisher handle with null..");
        return;
    }

    NTSmartPublisherSDK.NT_PB_ClearLayersConfig(publisher_handle_, 0, IntPtr.Zero);

    if (video_option == NTSmartPublisherDefine.NT_PB_E_VIDEO_OPTION.NT_PB_E_VIDEO_OPTION_LAYER)
    {
        // 第 0 层填充 RGBA 矩形，目的是保证帧率，颜色就填充全黑
        int red = 0;
        int green = 0;
        int blue = 0;
        int alpha = 255;

        NT_PB_RGBARectangleLayerConfig rgba_layer_c0 = new NT_PB_RGBARectangleLayerConfig();

        rgba_layer_c0.base_type_ =
(Int32)NTSmartPublisherDefine.NT_PB_E_LAYER_TYPE.NT_PB_E_LAYER_TYPE_RGBA_RECTANGLE;
        rgba_layer_c0.base_index_ = 0;
        rgba_layer_c0.base_enable_ = 1;
        rgba_layer_c0.base_region_x_ = 0;
        rgba_layer_c0.base_region_y_ = 0;
        rgba_layer_c0.base_region_width_ = video_width_;
        rgba_layer_c0.base_region_height_ = video_height_;

        rgba_layer_c0.base_offset_ = Marshal.OffsetOf(rgba_layer_c0.GetType(), "base_").ToInt32();
        rgba_layer_c0.base_cb_size_ = (uint)Marshal.SizeOf(rgba_layer_c0);

        rgba_layer_c0.red_ = System.BitConverter.GetBytes(red)[0];
        rgba_layer_c0.green_ = System.BitConverter.GetBytes(green)[0];
        rgba_layer_c0.blue_ = System.BitConverter.GetBytes(blue)[0];
        rgba_layer_c0.alpha_ = System.BitConverter.GetBytes(alpha)[0];

        IntPtr rgba_conf = Marshal.AllocHGlobal(Marshal.SizeOf(rgba_layer_c0));

        Marshal.StructureToPtr(rgba_layer_c0, rgba_conf, true);

        UInt32 rgba_r = NTSmartPublisherSDK.NT_PB_AddLayerConfig(publisher_handle_, 0,
            rgba_conf,
(Int)NTSmartPublisherDefine.NT_PB_E_LAYER_TYPE.NT_PB_E_LAYER_TYPE_RGBA_RECTANGLE,
            0, IntPtr.Zero);

        Marshal.FreeHGlobal(rgba_conf);
    }
}

```

```
NT_PB_ExternalVideoFrameLayerConfig external_layer_c1 = new NT_PB_ExternalVideoFrameLayerConfig();

external_layer_c1.base_.type_ =
(Int32)NTSmartPublisherDefine.NT_PB_E_LAYER_TYPE.NT_PB_E_LAYER_TYPE_EXTERNAL_VIDEO_FRAME;
external_layer_c1.base_.index_ = 1;
external_layer_c1.base_.enable_ = 1;
external_layer_c1.base_.region_.x_ = 0;
external_layer_c1.base_.region_.y_ = 0;
external_layer_c1.base_.region_.width_ = video_width_;
external_layer_c1.base_.region_.height_ = video_height_;

external_layer_c1.base_.offset_ = Marshal.OffsetOf(external_layer_c1.GetType(), "base_").ToInt32();
external_layer_c1.base_.cb_size_ = (uint)Marshal.SizeOf(external_layer_c1);

IntPtr external_layer_conf = Marshal.AllocHGlobal(Marshal.SizeOf(external_layer_c1));

Marshal.StructureToPtr(external_layer_c1, external_layer_conf, true);

UInt32 external_r = NTSmartPublisherSDK.NT_PB_AddLayerConfig(publisher_handle_, 0,
external_layer_conf,
(int)NTSmartPublisherDefine.NT_PB_E_LAYER_TYPE.NT_PB_E_LAYER_TYPE_EXTERNAL_VIDEO_FRAME,
0, IntPtr.Zero);

Marshal.FreeHGlobal(external_layer_conf);
}
else if (video_option ==
NTSmartPublisherDefine.NT_PB_E_VIDEO_OPTION.NT_PB_E_VIDEO_OPTION_CAMERA)
{
    CameraInfo camera = cameras_[cur_sel_camera_index_];
    NT_PB_VideoCaptureCapability cap = camera.capabilities_[cur_sel_camera_resolutions_index_];

    SetVideoCaptureDeviceBaseParameter(camera.id_.ToString(), (UInt32)cap.width_, (UInt32)cap.height_);
}

SetFrameRate((UInt32)CalBitRate(edit_key_frame_, video_width_, video_height_));

Int32 type = 0; //软编码
Int32 encoder_id = 1;
UInt32 codec_id = (UInt32)NTCommonMediaDefine.NT_MEDIA_CODEC_ID.NT_MEDIA_CODEC_ID_H264;
Int32 param1 = 0;

SetVideoEncoder(type, encoder_id, codec_id, param1);

SetVideoQualityV2(CalVideoQuality(video_width_, video_height_, is_h264_encoder));

SetVideoMaxBitRate((CalMaxKBitRate(edit_key_frame_, video_width_, video_height_, false)));

SetVideoKeyFrameInterval((edit_key_frame_));

if (is_h264_encoder)
{
    SetVideoEncoderProfile(1);
}

SetVideoEncoderSpeed(CalVideoEncoderSpeed(video_width_, video_height_, is_h264_encoder));

// 音频相关设置

SetAudioInputDeviceId(0);
SetPublisherAudioCodecType(1);
SetPublisherMute(is_mute);
SetEchoCancellation(0, 0);
SetNoiseSuppression(0);
```

```

SetAGC(0);
SetVAD(0);
SetInputAudioVolume(Convert.ToSingle(edit_audio_input_volume_));

}

```

#### 4. 数据采集

摄像头和屏幕的数据采集，还是调用原生的 SDK 接口，本文不再赘述，如果需要采集 Unity 窗体的数据，可以用参考以下代码：

```

if ( texture_ == null || video_width_ != Screen.width || video_height_ != Screen.height)
{
    Debug.Log("OnPostRender screen changed++ scr_width: " + Screen.width + " scr_height: " + Screen.height);

    if (screen_image_ != IntPtr.Zero)
    {
        Marshal.FreeHGlobal(screen_image_);
        screen_image_ = IntPtr.Zero;
    }

    if (texture_ != null)
    {
        UnityEngine.Object.Destroy(texture_);
        texture_ = null;
    }

    video_width_ = Screen.width;
    video_height_ = Screen.height;

    texture_ = new Texture2D(video_width_, video_height_, TextureFormat.BGRA32, false);

    screen_image_ = Marshal.AllocHGlobal(video_width_ * 4 * video_height_);

    Debug.Log("OnPostRender screen changed--");

    return;
}

texture_.ReadPixels(new Rect(0, 0, video_width_, video_height_), 0, 0, false);
texture_.Apply();

```

从 `texture` 里面，通过调用 `GetRawTextureData()`，获取到原始数据。

#### 5. 数据对接

获取到数据后，通过调用 `OnPostRGBAData()` 接口，传递给 SDK 层。

#### 6. 本地数据预览

```

public bool StartPreview()
{
    if(CheckPublisherHandleAvailable() == false)
        return false;

    video_preview_image_callback_ = new
    NT_PB_SDKVideoPreviewImageCallback(SDKVideoPreviewImageCallback);

    NTSmartPublisherSDK.NT_PB_SetVideoPreviewImageCallBack(publisher_handle_,
    (int)NTSmartPublisherDefine.NT_PB_E_IMAGE_FORMAT.NT_PB_E_IMAGE_FORMAT_RGB32, IntPtr.Zero,
    video_preview_image_callback_);
}

```

```
        if (NTBaseCodeDefine.NT_ERC_OK != NTSmartPublisherSDK.NT_PB_StartPreview(publisher_handle_, 0,
IntPtr.Zero))
        {
            if (0 == publisher_handle_count_)
            {
                NTSmartPublisherSDK.NT_PB_Close(publisher_handle_);
                publisher_handle_ = IntPtr.Zero;
            }

            return false;
        }

        publisher_handle_count_++;

        is_previewing_ = true;

        return true;
    }

    public void StopPreview()
    {
        if (is_previewing_ == false) return;

        is_previewing_ = false;

        publisher_handle_count--;
        NTSmartPublisherSDK.NT_PB_StopPreview(publisher_handle_);

        if (0 == publisher_handle_count_)
        {
            NTSmartPublisherSDK.NT_PB_Close(publisher_handle_);
            publisher_handle_ = IntPtr.Zero;
        }
    }
}
```

设置 preview 后，处理 preview 的数据回调。

```
//预览数据回调
public void SDKVideoPreviewImageCallBack(IntPtr handle, IntPtr user_data, IntPtr image)
{
    NT_PB_Image pb_image = (NT_PB_Image)Marshal.PtrToStructure(image, typeof(NT_PB_Image));

    NT_VideoFrame pVideoFrame = new NT_VideoFrame();

    pVideoFrame.width_ = pb_image.width_;
    pVideoFrame.height_ = pb_image.height_;

    pVideoFrame.stride_ = pb_image.stride_[0];

    Int32 argb_size = pb_image.stride_[0] * pb_image.height_;

    pVideoFrame.plane_data_ = new byte[argb_size];

    if (argb_size > 0)
    {
        Marshal.Copy(pb_image.plane_[0], pVideoFrame.plane_data_, 0, argb_size);
    }

    {
        cur_image_ = pVideoFrame;
    }
}
```

```
}
```

## 7. 相关 event 回调处理

```
private void PbEventCallBack(IntPtr handle, IntPtr user_data,
    UInt32 event_id,
    Int64 param1,
    Int64 param2,
    UInt64 param3,
    UInt64 param4,
    [MarshalAs(UnmanagedType.LPStr)] String param5,
    [MarshalAs(UnmanagedType.LPStr)] String param6,
    IntPtr param7)
{
    String event_log = "";

    switch (event_id)
    {
        case (uint)NTSmartPublisherDefine.NT_PB_E_EVENT_ID.NT_PB_E_EVENT_ID_CONNECTING:
            event_log = "连接中";
            if (!String.IsNullOrEmpty(param5))
            {
                event_log = event_log + " url:" + param5;
            }
            break;

        case (uint)NTSmartPublisherDefine.NT_PB_E_EVENT_ID.NT_PB_E_EVENT_ID_CONNECTION_FAILED:
            event_log = "连接失败";
            if (!String.IsNullOrEmpty(param5))
            {
                event_log = event_log + " url:" + param5;
            }
            break;

        case (uint)NTSmartPublisherDefine.NT_PB_E_EVENT_ID.NT_PB_E_EVENT_ID_CONNECTED:
            event_log = "已连接";
            if (!String.IsNullOrEmpty(param5))
            {
                event_log = event_log + " url:" + param5;
            }
            break;

        case (uint)NTSmartPublisherDefine.NT_PB_E_EVENT_ID.NT_PB_E_EVENT_ID_DISCONNECTED:
            event_log = "断开连接";
            if (!String.IsNullOrEmpty(param5))
            {
                event_log = event_log + " url:" + param5;
            }
            break;

        default:
            break;
    }

    if (OnLogEventMsg != null) OnLogEventMsg.Invoke(event_id, event_log);
}
```

## 8. 开始推送、停止推送

```
public bool StartPublisher(String url)
{
    if (CheckPublisherHandleAvailable() == false) return false;

    if (publisher_handle_ == IntPtr.Zero)
```



```
{
    return false;
}
if (!String.IsNullOrEmpty(url))
{
    NTSmartPublisherSDK.NT_PB_SetURL(publisher_handle_, url, IntPtr.Zero);
}

if (NTBaseCodeDefine.NT_ERC_OK != NTSmartPublisherSDK.NT_PB_StartPublisher(publisher_handle_,
IntPtr.Zero))
{
    if (0 == publisher_handle_count_)
    {
        NTSmartPublisherSDK.NT_PB_Close(publisher_handle_);
        publisher_handle_ = IntPtr.Zero;
    }

    is_publishing_ = false;

    return false;
}

publisher_handle_count_++;

is_publishing_ = true;

return true;
}

public void StopPublisher()
{
    if (is_publishing_ == false) return;

    publisher_handle_count_--;
    NTSmartPublisherSDK.NT_PB_StopPublisher(publisher_handle_);

    if (0 == publisher_handle_count_)
    {
        NTSmartPublisherSDK.NT_PB_Close(publisher_handle_);
        publisher_handle_ = IntPtr.Zero;
    }

    is_publishing_ = false;
}
```

## 9. 关闭实例

```
public void Close()
{
    if (0 == publisher_handle_count_)
    {
        NTSmartPublisherSDK.NT_PB_Close(publisher_handle_);
        publisher_handle_ = IntPtr.Zero;
    }
}
```

## 3. Android 播放端 SDK 说明

### 3.1 demo 说明

- SmartU3dAndroidPlayer: 大牛直播 SDK Unity3D Android 平台 RTMP/RTSP 直播播放端工程。

### 3.2 集成说明

- Unity3D 接口和调用 demo, 参见: SmartPlayerAndroidMono.cs
- SmartU3dAndroidPlayer\Assets\Plugins\Android\libs 下相关库到工程:

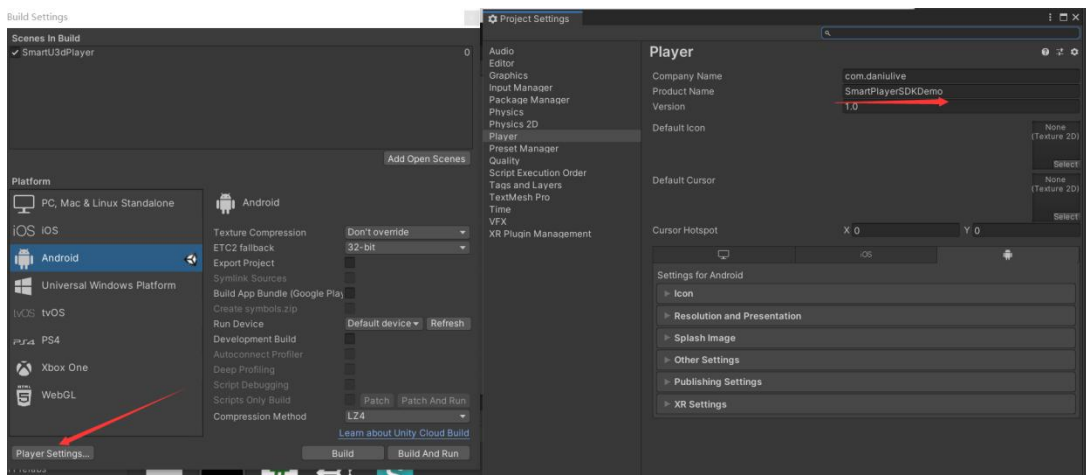
arm64-v8a	2021/4/7 11:28	文件夹
armeabi-v7a	2021/4/7 11:28	文件夹
x86	2021/4/7 11:28	文件夹
x86_64	2021/4/7 11:28	文件夹
smartavengine.jar	2020/11/5 10:16	JAR 文件
smartplayerunity3d.jar	2020/3/25 10:22	JAR 文件

- smartavengine.jar 加入到工程;
- smartplayerunity3d.jar 加入工程;
- 32/64 位 arm 和 x86 下 libSmartPlayer.so;
- 在 SmartU3dAndroidPlayer\Assets\Plugins\Android\AndroidManifest.xml 配置相关权限:

```
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" >
</uses-permission>

<uses-permission android:name="android.permission.INTERNET" ></uses-permission>
<uses-permission android:name="android.permission.MOUNT_UNMOUNT_FILESYSTEMS" />
<uses-permission android:name="android.permission.MODIFY_AUDIO_SETTINGS" />
```

- 如需集成到自己系统测试, 请用大牛直播 SDK 的 app name(不然集成提示 license failed), 正式授权版按照授权 app name 正常使用即可;
- 正式授权版, 需要调用 license 设置接口, 确保 license key 正确设置方可正常使用;
- 如何改 app-name:
  - Unity3D 模式下: File-->Build Settings-->Android-->Player Settings:



### 3.3 调用时序

1. **【最先调用】** NT\_U3D\_Init: player 初始化, 目前预留;
2. **【正式授权版设置 license key】** NT\_U3D\_SetSDKClientKey, 设置正式授权版 license, 请早于 NT\_U3D\_Open 接口调用;
3. **【获得 player 句柄】** NT\_U3D\_Open, 设置上下文信息, 返回 player 句柄;
4. **【设置 GameObject】** NT\_U3D\_Set\_Game\_Object, 注册 Game Object, 用于消息传递;
5. **【设置硬解码】** NT\_U3D\_SetVideoDecoderMode, 设置特定机型硬解码播放, 如硬解码检测到不支持, 切换到软解码;
6. **【audio 输出类型】** NT\_U3D\_SetAudioOutputType(), 如果 use\_audiotrack 设置为 0, 将会自动选择输出设备, 如果设置为 1, 使用 audiotrack 模式, 一般建议使用 audiotrack 模式;
7. **【缓冲设置】** NT\_U3D\_SetBuffer, 设置播放端缓存数据 buffer, 以毫秒(ms)为单位, 如超低延迟模式下, 不需 buffer 数据, 设置为 0;

8. 【RTSP TCP/UDP 设置】NT\_U3D\_SetRTSPTcpMode, 设置 TCP/UDP 播放模式, **注意:**  
**此接口仅用于 RTSP;**
9. 【RTSP 超时时间设置】NT\_U3D\_SetRTSPTimeout, 设置 RTSP 超时时间, timeout 单位为秒, 必须大于 0;
10. 【RTSP TCP/UDP 自动切换】NT\_U3D\_SetRTSPAutoSwitchTcpUdp, 设置 RTSP TCP/UDP 自动切换, is\_auto\_switch\_tcp\_udp: 如果设置 1 的话, sdk 将在 tcp 和 udp 之间尝试切换播放, 如果设置为 0, 则不尝试切换;
11. 【实时静音-可实时调用】NT\_U3D\_SetMute, 设置播放过程中, 实时静音/取消静音;
12. 【快速启动】NT\_U3D\_SetFastStartup, 设置快速启动后, 如果 CDN 缓存 GOP, 播放端可快速出帧;
13. 【低延迟模式】NT\_U3D\_SetPlayerLowLatencyMode, 设置低延迟模式;
14. 【视频垂直反转-可实时调用】NT\_U3D\_SetFlipVertical, 视频垂直反转;
15. 【视频水平反转-可实时调用】NT\_U3D\_SetFlipHorizontal, 视频水平反转;
16. 【视频显示角度设置-可实时调用】NT\_U3D\_SetRotation, 针对类似于安防摄像头或其他设备出来的图像倒置现象, 支持视频播放 view 顺时针旋转, 当前支持 0 度, 90 度, 180 度, 270 度 旋转, 注意除了 0 度之外, 其他角度都会额外消耗性能;
17. 【下载速度回调设置】NT\_U3D\_SetReportDownloadSpeed, 设置下载速度上报, 默认不上报下载速度;
18. 【快照设置】NT\_U3D\_SetSaveImageFlag, 设置是否需要在播放或录像过程中快照;

19. **【快照-录像或播放后，可随时调用】** NT\_U3D\_SaveCurlImage, 播放过程中，根据设置路径和文件名，实时快照；
20. **【快速切换 url-可实时调用】** NT\_U3D\_SwitchPlaybackUrl, 快速切换播放 url, 快速切换时，只换播放 source 部分，适用于不同数据流之间，快速切换；
21. **【录像设置】** NT\_U3D\_CreateFileDirectory, 创建文件路径；
22. **【录像设置】** NT\_U3D\_SetRecorderDirectory, 设置文件路径；
23. **【录像设置】** NT\_U3D\_SetRecorderFileMaxSize, 设置每个录像文件最大 size，以兆（M）为单位，范围[5M~500M]；
24. **【录像设置】** NT\_U3D\_SetRecorderAudioTranscodeAAC, 支持拉取的 RTMP/RTSP 的 PCMA/PCMU/SPEEX 音频格式转 AAC 后录制；
25. **【设置播放或录像 URL】** NT\_U3D\_SetUrl, 设置播放/录像 url；
26. **【播放】** NT\_U3D\_StartPlay, 开始播放；
27. **【播放】** NT\_U3D\_GetVideoFrame, 获取底层回调的 YUV 数据；
28. **【播放】** NT\_U3D\_StopPlay, 停止播放；
29. **【录像】** NT\_U3D\_StartRecorder, 开始录像；
30. **【录像】** NT\_U3D\_StopRecorder, 停止录像；
31. **【关闭】** NT\_U3D\_Close, 关闭播放器实例；
32. **【最后调用】** NT\_U3D\_UnInit, UnInit Player, 最后调用。

### 3.4 相关实现

## 1. 初始化播放

完成相关的初始化和接口参数设定后，调用 NT\_U3D\_StartPlay()实现音视频数据播放。

```
public void Play(int sel)
{
    if (java_obj_cur_activity_ == null)
    {
        Debug.LogError("getApplicationContext is null");
        return;
    }

    videoplayer[sel].player_handle_ = NT_U3D_Open();
    if (videoplayer[sel].player_handle_ == 0)
    {
        Debug.LogError("open fail");
        return;
    }

    NT_U3D_Set_Game_Object(videoplayer[sel].player_handle_, game_object_);

    NT_U3D_SetUrl(videoplayer[sel].player_handle_, videoplayer[sel].videoUrl);

    /* ++ 播放前参数配置可加在此处 ++ */
    NT_U3D_SetRTSPtcpMode(videoplayer[sel].player_handle_, 0);

    NT_U3D_SetReportDownloadSpeed(videoplayer[sel].player_handle_, 0, 1); //下载速度回调

    NT_U3D_SetBuffer(videoplayer[sel].player_handle_, 100); //设置 buffer time

    NT_U3D_SetPlayerLowLatencyMode(videoplayer[sel].player_handle_, 0); //设置是否启用低延迟模式

    NT_U3D_SetMute(videoplayer[sel].player_handle_, 0); //是否启动播放的时候静音

    int cur_audio_volume = 100; //默认播放音量
    NT_U3D_SetAudioVolume(videoplayer[sel].player_handle_, cur_audio_volume); //设置播放音量

    int is_hw_decode = 1;
    NT_U3D_SetVideoDecoderMode(videoplayer[sel].player_handle_, is_hw_decode); //设置 H.264 软硬解模式

    NT_U3D_SetVideoHvcDecoderMode(videoplayer[sel].player_handle_, is_hw_decode); //设置 H.265 软硬解模式

    NT_U3D_SetFastStartup(videoplayer[sel].player_handle_, 1); //设置快速启动模式

    NT_U3D_SetRTSPTimeout(videoplayer[sel].player_handle_, 10); //设置 RTSP 超时时间

    NT_U3D_SetRTSPAutoSwitchTcpUdp(videoplayer[sel].player_handle_, 1); //设置 TCP/UDP 模式自动切换
    int is_audiotrack = 1;
    NT_U3D_SetAudioOutputType(videoplayer[sel].player_handle_, is_audiotrack); //设置音频输出模式: if
    0: 自动选择; if with 1: audiotrack 模式
    /* -- 播放前参数配置可加在此处 -- */

    int flag = NT_U3D_StartPlay(videoplayer[sel].player_handle_);

    if (flag == DANIULIVE_RETURN_OK)
    {
        videoplayer[sel].is_need_get_frame_ = true;
        Debug.Log("播放成功");
    }
    else
    {
        videoplayer[sel].is_need_get_frame_ = false;
        Debug.LogError("播放失败");
    }
}
```

```
    videoctrl[sel].is_running = true;
}
```

## 2. 停止播放:

调用 NT\_U3D\_StopPlay()后, 如果没有录像, 调用 NT\_U3D\_Close(), 播放 handler 置空, 然后调用 NT\_U3D\_UnInit()即可。

```
private void ClosePlayer(int sel)
{
    videoctrl[sel].is_need_get_frame_ = false;
    videoctrl[sel].is_need_init_texture_ = false;

    int flag = NT_U3D_StopPlay(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("停止成功");
    }
    else
    {
        Debug.LogError("停止失败");
    }

    flag = NT_U3D_Close(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("关闭成功");
    }
    else
    {
        Debug.LogError("关闭失败");
    }

    videoctrl[sel].player_handle_ = 0;

    videoctrl[sel].video_width_ = 0;
    videoctrl[sel].video_height_ = 0;
    videoctrl[sel].is_running = false;
}
}
```

## 3. 相关 Event 处理:

```
/// <summary>
/// android 传递过来 code
/// </summary>
/// <param name="code"></param>
public void onNTSmartEvent(string param)
{
    if (!param.Contains(","))
    {
        Debug.Log("[onNTSmartEvent] android 传递参数错误");
        return;
    }

    string[] strs = param.Split(',');

    string player_handle =strs[0];
    string code = strs[1];
    string param1 = strs[2];
    string param2 = strs[3];
    string param3 = strs[4];
    string param4 = strs[5];
}
```

```
Debug.Log("[onNTSmartEvent] code: 0x" + Convert.ToString(Convert.ToInt32(code), 16));

switch (Convert.ToInt32(code))
{
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STARTED:
        Debug.Log("开始。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTING:
        Debug.Log("连接中。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTION_FAILED:
        Debug.Log("连接失败。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTED:
        Debug.Log("连接成功。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DISCONNECTED:
        Debug.Log("连接断开。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP:
        Debug.Log("停止播放。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RESOLUTION_INFO:
        Debug.Log("分辨率信息: width: " + Convert.ToInt32(param1) + ", height: " + Convert.ToInt32(param2));
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_NO_MEDIADATA_RECEIVED:
        Debug.Log("收不到媒体数据, 可能是 url 错误。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_SWITCH_URL:
        Debug.Log("切换播放 URL。。");
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CAPTURE_IMAGE:
        Debug.Log("快照: " + param1 + " 路径: " + param3);

        if (Convert.ToInt32(param1) == 0)
        {
            Debug.Log("截取快照成功。.");
        }
        else
        {
            Debug.Log("截取快照失败。.");
        }
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RECORDER_START_NEW_FILE:
        Debug.Log("[record]开始一个新的录像文件 : " + param3);
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_ONE_RECORDER_FILE_FINISHED:
        Debug.Log("[record]已生成一个录像文件 : " + param3);
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_START_BUFFERING:
        Debug.Log("Start_Buffering");
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_BUFFERING:
        Debug.Log("Buffering: " + Convert.ToInt32(param1));
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP_BUFFERING:
        Debug.Log("Stop_Buffering");
        break;
}
```



```
case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DOWNLOAD_SPEED:  
    Debug.Log("download_speed:" + param1 + "Byte/s" + ", "  
        + (Convert.ToInt32(param1) * 8 / 1000) + "kbps" + ", " + (Convert.ToInt32(param1) / 1024)  
        + "KB/s");  
    break;  
}  
}
```

## 4. Android 推送端 SDK 说明

### 4.1 demo 说明

SmartU3dAndroidPublisher: 大牛直播 SDK Unity3D Android 平台 RTMP 直播推送 SDK 工程 demo, 以采集 Unity 窗体为例。

### 4.2 集成说明

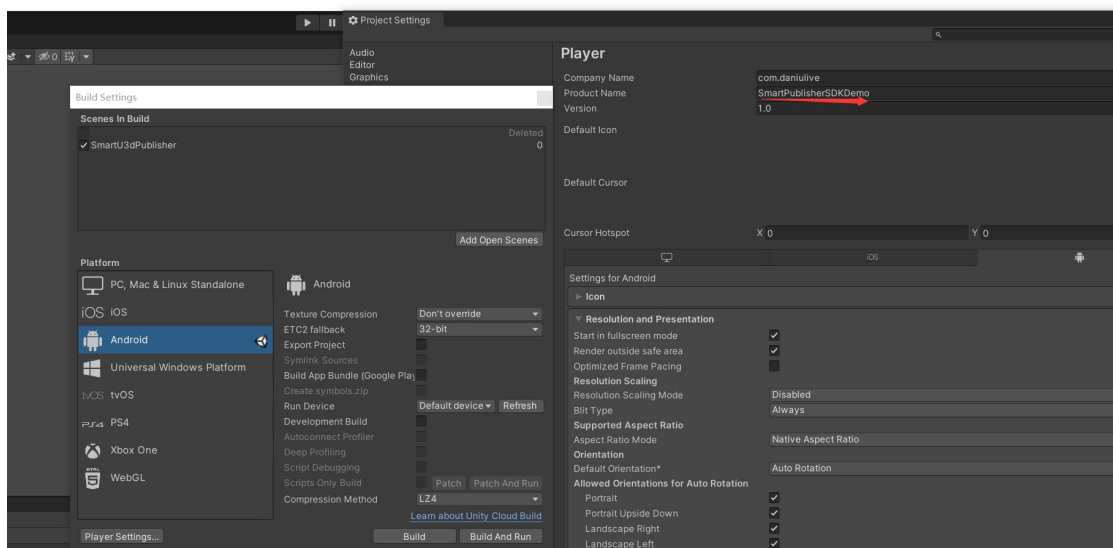
- Unity3D 接口和调用 demo, 参见: SmartPublisherAndroidMono.cs
- SmartU3dPublisher\Assets\Plugins\Android\libs 下相关库到工程:

arm64-v8a	2021/6/10 11:45	文件夹	
armeabi-v7a	2021/6/10 11:45	文件夹	
x86	2021/6/10 11:45	文件夹	
x86_64	2021/6/10 11:45	文件夹	
smartavengine.jar	2020/11/5 10:16	JAR 文件	98 KB
smartpublisherunity3d.jar	1980/2/1 0:00	JAR 文件	12 KB

- smartavengine.jar 加入到工程;
- smartpublisherunity3d.jar 加入工程;
- 32/64 位 arm 和 x86 下 libSmartPublisher.so;
- 在 SmartU3dPublisher\Assets\Plugins\Android\AndroidManifest.xml 配置相关权限:

```
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" ></uses-permission>
<uses-permission android:name="android.permission.INTERNET" ></uses-permission>
<uses-permission android:name="android.permission.MOUNT_UNMOUNT_FILESYSTEMS" />
<uses-permission android:name="android.permission.MODIFY_AUDIO_SETTINGS" />
<uses-permission android:name="android.permission.RECORD_AUDIO" />
<uses-permission android:name="android.permission.WAKE_LOCK" />
<uses-permission android:name="android.permission.ACCESS_WIFI_STATE" />
<uses-permission android:name="android.permission.CHANGE_WIFI_MULTICAST_STATE" />
```

- 如需集成到自己系统测试, 请用大牛直播 SDK 的 app name(不然集成提示 license failed), 正式授权版按照授权 app name 正常使用即可;
- 正式授权版, 需要调用 license 设置接口, 确保 license key 正确设置方可正常使用;
- 如何改 app-name:  
Unity3D 模式下: File-->Build Settings-->Android-->Player Settings:



### 4.3 调用时序

1. **【最先调用】** NT\_PB\_U3D\_Init, 推送实例初始化, 目前预留;
2. **【正式授权版设置 license key】** NT\_PB\_U3D\_SetSDKClientKey, 设置正式授权版 license, 请早于 NT\_PB\_U3D\_Open 接口调用;
3. **【获得推送实例句柄】** NT\_PB\_U3D\_Open, 设置上下文信息, 返回推送实例句柄;
4. **【设置 GameObject】** NT\_PB\_U3D\_Set\_Game\_Object, 注册 Game Object, 用于消息传递;
5. **【设置 H.264 硬编码】** NT\_PB\_U3D\_SetVideoHWEncoder, 设置特定机型 H.264 硬编码;
6. **【设置 H.265 硬编码】** NT\_PB\_U3D\_SetVideoHevcHWEncoder, 设置特定机型 H.265 硬编码;
7. **【设置软编码可变码率编码】** NT\_PB\_U3D\_SetSwVBRMode, 设置软编码可变码率编码模式;

8. 【设置关键帧间隔】NT\_PB\_U3D\_SetGopInterval, 设置关键帧间隔, 一般来说, 关键帧间隔可以设置到帧率的 2-4 倍;
9. 【软编码编码码率】NT\_PB\_U3D\_SetSWVideoBitRate, 设置软编码编码码率;
10. 【设置帧率】NT\_PB\_U3D\_SetFPS, 设置视频帧率;
11. 【设置编码 profile】NT\_PB\_U3D\_SetSWVideoEncoderProfile, 设置软编码编码 profile;
12. 【设置软编码编码速度】NT\_PB\_U3D\_SetSWVideoEncoderSpeed, 设置软编码编码速度;
13. 【实时静音】NT\_PB\_U3D\_SetMute, 设置推送过程中, 音频实时静音;
14. 【输入音量调节】NT\_PB\_U3D\_SetInputAudioVolume, 设置输入音量, 这个接口一般不建议调用, 在一些特殊情况下可能会用, 一般不建议放大音量;
15. 【设置音频编码类型】NT\_PB\_U3D\_SetAudioCodecType, 设置音频编码类型, 默认 AAC 编码;
16. 【设置音频编码码率】NT\_PB\_U3D\_SetAudioBitRate, 设置音频编码码率, 当前只对 AAC 编码有效;
17. 【设置 speex 音频编码质量】NT\_PB\_U3D\_SetSpeexEncoderQuality, 设置 speex 音频编码质量;
18. 【设置音频噪音抑制】NT\_PB\_U3D\_SetNoiseSuppression, 设置音频噪音抑制;
19. 【设置音频自动增益控制】NT\_PB\_U3D\_SetAGC, 设置音频自动增益控制;
20. 【设置快照 flag】NT\_PB\_U3D\_SetSaveImageFlag, 设置是否需要在推流或录像过程中快照;

21. 【实时快照】NT\_PB\_U3D\_SaveCurlImage, 推流或录像过程中快照;
22. 【录像音频控制】NT\_PB\_U3D\_SetRecorderAudio, 音频录制开关, 目的是为了更细粒度的去控制录像, 一般不需要调用这个接口, 这个接口使用场景比如同时推送音视频, 但只想录制视频, 可以调用这个接口关闭音频录制;
23. 【录像视频控制】NT\_PB\_U3D\_SetRecorderVideo, 视频录制开关, 目的是为了更细粒度的去控制录像, 一般不需要调用这个接口, 这个接口使用场景比如同时推送音视频, 但只想录制音频, 可以调用这个接口关闭视频录制;
24. 【录像】NT\_PB\_U3D\_CreateFileDirectory, 创建录像存储路径;
25. 【录像】NT\_PB\_U3D\_SetRecorderDirectory, 设置录像存储路径;
26. 【录像】NT\_PB\_U3D\_SetRecorderFileMaxSize, 设置单个录像文件大小;
27. 【数据投递】NT\_PB\_U3D\_OnCaptureVideoI420Data, 实时投递 YUV 数据;
28. 【数据投递】NT\_PB\_U3D\_OnCaptureVideoRGB24Data, 实时投递 RGB24 数据;
29. 【数据投递】NT\_PB\_U3D\_OnCaptureVideoRGBA32Data, 实时投递 RGBA 数据;
30. 【推送 URL】NT\_PB\_U3D\_SetPushUrl, 设置推送的 RTMP URL;
31. 【开始 RTMP 推流】NT\_PB\_U3D\_StartPublisher, 开始 RTMP 推流;
32. 【停止 RTMP 推流】NT\_PB\_U3D\_StopPublisher, 停止 RTMP 推流;
33. 【开始录像】NT\_PB\_U3D\_StartRecorder, 开始 RTMP 推流;
34. 【暂停录像】NT\_PB\_U3D\_PauseRecorder, 开始 RTMP 推流;
35. 【停止录像】NT\_PB\_U3D\_StopRecorder, 停止 RTMP 推流;
36. 【关闭】NT\_U3D\_Close, 关闭推送实例;

37. **【最后调用】** NT\_PB\_U3D\_UnInit, UnInit 推送 SDK, 最后调用。

## 4.4 相关实现

### 1. 初始化播放

完成相关的初始化和接口参数设定后，调用 NT\_U3D\_StartPlay()实现音视频数据播放。

```
public void Play(int sel)
{
    if (java_obj_cur_activity_ == null)
    {
        Debug.LogError("getApplicationContext is null");
        return;
    }

    videoctrl[sel].player_handle_ = NT_U3D_Open();
    if (videoctrl[sel].player_handle_ == 0)
    {
        Debug.LogError("open fail");
        return;
    }

    NT_U3D_Set_Game_Object(videoctrl[sel].player_handle_, game_object_);

    NT_U3D_SetUrl(videoctrl[sel].player_handle_, videoctrl[sel].videoUrl);

    /* ++ 播放前参数配置可加在此处 ++ */
    NT_U3D_SetRTSPTcpMode(videoctrl[sel].player_handle_, 0);

    NT_U3D_SetReportDownloadSpeed(videoctrl[sel].player_handle_, 0, 1);//下载速度回调

    NT_U3D_SetBuffer(videoctrl[sel].player_handle_, 100);//设置 buffer time

    NT_U3D_SetPlayerLowLatencyMode(videoctrl[sel].player_handle_, 0);//设置是否启用低延迟模式

    NT_U3D_SetMute(videoctrl[sel].player_handle_, 0);//是否启动播放的时候静音

    int cur_audio_volume = 100;           //默认播放音量
    NT_U3D_SetAudioVolume(videoctrl[sel].player_handle_, cur_audio_volume);           //设置播放音量

    int is_hw_decode = 1;
    NT_U3D_SetVideoDecoderMode(videoctrl[sel].player_handle_, is_hw_decode);           //设置 H.264 软硬解模式

    NT_U3D_SetVideoHvcDecoderMode(videoctrl[sel].player_handle_, is_hw_decode);           //设置 H.265 软硬解模式

    NT_U3D_SetFastStartup(videoctrl[sel].player_handle_, 1);//设置快速启动模式

    NT_U3D_SetRTSPTimeout(videoctrl[sel].player_handle_, 10);//设置 RTSP 超时时间

    NT_U3D_SetRTSPAutoSwitchTcpUdp(videoctrl[sel].player_handle_, 1);//设置 TCP/UDP 模式自动切换
    int is_audiotrack = 1;
    NT_U3D_SetAudioOutputType(videoctrl[sel].player_handle_, is_audiotrack);           //设置音频输出模式: if
    0: 自动选择; if with 1: audiotrack 模式
    /* -- 播放前参数配置可加在此处 -- */

    int flag = NT_U3D_StartPlay(videoctrl[sel].player_handle_);

    if (flag == DANIULIVE_RETURN_OK)
    {
```

```
        videoctrl[sel].is_need_get_frame_ = true;
        Debug.Log("播放成功");
    }
    else
    {
        videoctrl[sel].is_need_get_frame_ = false;
        Debug.LogError("播放失败");
    }

    videoctrl[sel].is_running = true;
}
```

## 2. 停止播放:

调用 NT\_U3D\_StopPlay()后, 如果没有录像, 调用 NT\_U3D\_Close(), 播放 handler 置空, 然后调用 NT\_U3D\_UnInit()即可。

```
private void ClosePlayer(int sel)
{
    videoctrl[sel].is_need_get_frame_ = false;
    videoctrl[sel].is_need_init_texture_ = false;

    int flag = NT_U3D_StopPlay(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("停止成功");
    }
    else
    {
        Debug.LogError("停止失败");
    }

    flag = NT_U3D_Close(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("关闭成功");
    }
    else
    {
        Debug.LogError("关闭失败");
    }

    videoctrl[sel].player_handle_ = 0;

    videoctrl[sel].video_width_ = 0;
    videoctrl[sel].video_height_ = 0;
    videoctrl[sel].is_running = false;
}
```

## 3. 相关 Event 处理:

```
/// <summary>
/// android 传递过来 code
/// </summary>
/// <param name="code"></param>
public void onNTSmartEvent(string param)
{
    if (!param.Contains(","))
    {
        Debug.Log("[onNTSmartEvent] android 传递参数错误");
        return;
    }
}
```

```
string[] strs = param.Split(',');

string player_handle =strs[0];
string code = strs[1];
string param1 = strs[2];
string param2 = strs[3];
string param3 = strs[4];
string param4 = strs[5];

Debug.Log("[onNTSmartEvent] code: 0x" + Convert.ToString(Convert.ToInt32(code), 16));

switch (Convert.ToInt32(code))
{
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STARTED:
        Debug.Log("开始。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTING:
        Debug.Log("连接中。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTION_FAILED:
        Debug.Log("连接失败。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTED:
        Debug.Log("连接成功。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DISCONNECTED:
        Debug.Log("连接断开。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP:
        Debug.Log("停止播放。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RESOLUTION_INFO:
        Debug.Log("分辨率信息: width: " + Convert.ToInt32(param1) + ", height: " + Convert.ToInt32(param2));
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_NO_MEDIADATA_RECEIVED:
        Debug.Log("收不到媒体数据, 可能是 url 错误。。");
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_SWITCH_URL:
        Debug.Log("切换播放 URL。。");
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CAPTURE_IMAGE:
        Debug.Log("快照: " + param1 + " 路径: " + param3);

        if (Convert.ToInt32(param1) == 0)
        {
            Debug.Log("截取快照成功。.");
        }
        else
        {
            Debug.Log("截取快照失败。.");
        }
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RECORDER_START_NEW_FILE:
        Debug.Log("[record]开始一个新的录像文件 : " + param3);
        break;
    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_ONE_RECORDER_FILE_FINISHED:
        Debug.Log("[record]已生成一个录像文件 : " + param3);
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_START_BUFFERING:
        Debug.Log("Start Buffering");
```



```
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_BUFFERING:
        Debug.Log("Buffering: " + Convert.ToInt32(param1));
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP_BUFFERING:
        Debug.Log("Stop_Buffering");
        break;

    case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DOWNLOAD_SPEED:
        Debug.Log("download_speed:" + param1 + "Byte/s" + ", " +
            + (Convert.ToInt32(param1) * 8 / 1000) + "kbps" + ", " + (Convert.ToInt32(param1) / 1024)
            + "KB/s");
        break;
    }
}
```

## 5. iOS 播放端 SDK 说明

### 5.1 demo 说明

- SmartU3diOSPlayer: 大牛直播 SDK Unity3D iOS 平台 RTMP/RTSP 直播播放端工程。

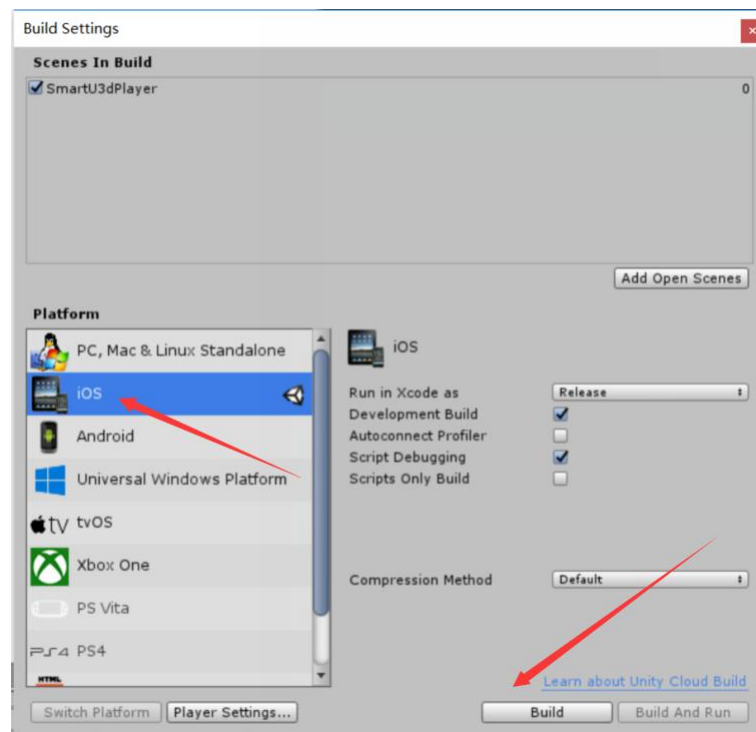
### 5.2 集成说明

拷贝以下文件，到 Assets-->Plugins-->iOS 目录：

名称	修改日期	类型	大小
nt_event_define.h	2018/1/25 11:03	C/C++ 标头	5 KB
SmartPlayerSDK.h	2018/1/25 11:16	C/C++ 标头	9 KB
SmartPlayerSDKU3d.h	2018/5/16 18:51	C/C++ 标头	1 KB
SmartPlayerSDKU3d.mm	2018/5/28 19:38	MM 文件	31 KB

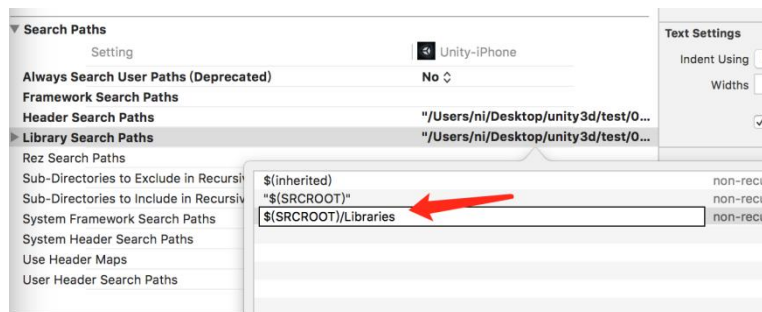
相关头文件和调用说明，参见：SmartPlayeriOSMono.cs

Unity3D 工程下，File-->Build Settings，Platform 选择 iOS，然后点击 build，设置目录，生成 xcode 工程：



生成后的 xcode 工程，添加以下依赖库：

- 相关库: libSmartPlayerSDK.a
- 引入以下依赖 framework
  - libbz.tbd
  - Libbz2.tbd
  - libiconv.tbd
  - libstdc++.tbd
  - Libc++.tbd
  - Accelerate.framework
  - AssetsLibrary.framework
  - AudioToolBox.framework
  - AVFoundation.framework
  - CoreMedia.framework
  - Foundation.framework
  - GLKit.framework
  - OpenGL.ES.framework
  - UIKit.framework
  - VideoToolBox.framework
- 如需集成到自己系统测试, 请用大牛直播的 app name:
  - Info.plist-->右键 Open As-->Source Code
  - 添加或者编辑
  - <key>CFBundleName</key>
  - <string>SmartiOSPlayer</string>
- 快照添加到“照片”权限:
  - Info.plist-->右键 Open As-->Source Code
  - 添加
  - <key>NSPhotoLibraryUsageDescription</key>
  - <string>1</string>
- 导出后的 xcode 工程, 如编译不过, 参考以下设置:



## 5.3 调用时序

1. **【最先调用】** NT\_U3D\_Init: player 初始化, 目前预留;

2. **【正式授权版设置 license key】** NT\_U3D\_SetSDKClientKey, 设置正式授权版 license, 请早于 NT\_U3D\_Open 接口调用;
3. **【获得 player 句柄】** NT\_U3D\_Open, 设置上下文信息, 返回 player 句柄;
4. **【设置 GameObject】** NT\_U3D\_Set\_Game\_Object, 注册 Game Object, 用于消息传递;
5. **【设置硬解码】** NT\_U3D\_SetVideoDecoderMode, 设置是否用硬解码播放, 如硬解码不支持, 切换到软解码;
6. **【缓冲设置】** NT\_U3D\_SetBuffer, 设置播放端缓存数据 buffer, 以毫秒(ms)为单位, 如超低延迟模式下, 不需 buffer 数据, 设置为 0;
7. **【RTSP TCP/UDP 设置】** NT\_U3D\_SetRTSPTcpMode, 设置 TCP/UDP 播放模式, **注意: 此接口仅用于 RTSP;**
8. **【RTSP 超时时间设置】** NT\_U3D\_SetRTSPTimeout, 设置 RTSP 超时时间, timeout 单位为秒, 必须大于 0;
9. **【RTSP TCP/UDP 自动切换】**NT\_U3D\_SetRTSPAutoSwitchTcpUdp, 设置 RTSP TCP/UDP 自动切换, is\_auto\_switch\_tcp\_udp: 如果设置 1 的话, sdk 将在 tcp 和 udp 之间尝试切换播放, 如果设置为 0, 则不尝试切换;
10. **【实时静音-可实时调用】** NT\_U3D\_SetMute, 设置播放过程中, 实时静音/取消静音;
11. **【快速启动】** NT\_U3D\_SetFastStartup, Set fast startup(快速启动), 设置快速启动后, 如果 CDN 缓存 GOP, daniulive player 可快速出帧;
12. **【低延迟模式】** NT\_U3D\_SetPlayerLowLatencyMode, 设置低延迟模式;
13. **【视频垂直反转-可实时调用】** NT\_U3D\_SetFlipVertical, **视频垂直反转;**

14. **【视频水平反转-可实时调用】** NT\_U3D\_SetFlipHorizontal, **视频水平反转;**
15. **【视频显示角度设置-可实时调用】** NT\_U3D\_SetRotation, **针对类似于安防摄像头或其他设备出来的图像倒置现象, 支持视频播放 view 顺时针旋转, 当前支持 0 度, 90 度, 180 度, 270 度 旋转, 注意除了 0 度之外, 其他角度都会额外消耗性能;**
16. **【下载速度回调设置】** NT\_U3D\_SetReportDownloadSpeed, 设置下载速度上报, 默认不上报下载速度;
17. **【快照设置】** NT\_U3D\_SetSaveImageFlag, 设置是否需要在播放或录像过程中快照;
18. **【快照-录像或播放后, 可随时调用】** NT\_U3D\_SaveCurlImage, 播放过程中, 根据设置路径和文件名, 实时快照;
19. **【快速切换 url-可实时调用】** NT\_U3D\_SwitchPlaybackUrl, 快速切换播放 url, 快速切换时, 只换播放 source 部分, 适用于不同数据流之间, 快速切换;
20. **【录像设置】** NT\_U3D\_CreateFileDirectory, 创建文件路径, 注意: iOS 只提供接口, 未提供具体实现;
21. **【录像设置】** NT\_U3D\_SetRecorderDirectory, 设置文件路径;
22. **【录像设置】** NT\_U3D\_SetRecorderFileMaxSize, 设置每个录像文件最大 size, 以兆 (M) 为单位, 范围[5M~500M];
23. **【录像设置】** NT\_U3D\_SetRecorderAudioTranscodeAAC, 支持拉取的 RTMP/RTSP 的 PCMA/PCMU/SPEEX 音频格式转 AAC 后录制;
24. **【设置播放或录像 URL】** NT\_U3D\_SetUrl, 设置播放/录像 url;
25. **【播放】** NT\_U3D\_StartPlay, 开始播放;

26. **【播放】** NT\_U3D\_GetVideoFrame, 获取底层回调的 YUV 数据;
27. **【播放】** NT\_U3D\_StopPlay, 停止播放;
28. **【录像】** NT\_U3D\_StartRecorder, 开始录像;
29. **【录像】** NT\_U3D\_StopRecorder, 停止录像;
30. **【关闭】** NT\_U3D\_Close, 关闭播放器实例;
31. **【最后调用】** NT\_U3D\_Uninit, Uninit Player, 最后调用。

## 5.4 相关实现

### 1. 初始化播放

完成相关的初始化和接口参数设定后, 调用 NT\_U3D\_StartPlay()实现音视频数据播放。

```
public void Play(int sel)
{
    if (videoctrl[sel].is_running)
    {
        Debug.Log("已经在播放。。");
        return;
    }

    videoctrl[sel].player_handle_ = NT_U3D_Open();

    if (videoctrl[sel].player_handle_ == IntPtr.Zero)
    {
        Debug.LogError("open fail");
        return;
    }

    NT_U3D_Set_Game_Object(videoctrl[sel].player_handle_, game_object_);

    /* ++ 播放前参数配置可加在此处 ++ */
    int is_using_tcp = 1;           //TCP 模式
    NT_U3D_SetRTSPTcpMode(videoctrl[sel].player_handle_, is_using_tcp);

    int is_report = 0;
    int report_interval = 1;
    NT_U3D_SetReportDownloadSpeed(videoctrl[sel].player_handle_, is_report, report_interval); //下载速度回调

    int play_buffer_time_ = 100;
    NT_U3D_SetBuffer(videoctrl[sel].player_handle_, play_buffer_time_); //设置 buffer time

    int is_low_latency_ = 0;
    NT_U3D_SetPlayerLowLatencyMode(videoctrl[sel].player_handle_, is_low_latency_); //设置是否启用低延迟模式

    int is_mute_ = 0;
    NT_U3D_SetMute(videoctrl[sel].player_handle_, is_mute_); //是否启动播放的时候静音
```

```

int is_hw_decode_ = 1;
NT_U3D_SetVideoDecoderMode(videoctrl[sel].player_handle_, is_hw_decode_); //设置软硬解模式

int is_fast_startup = 1;
NT_U3D_SetFastStartup(videoctrl[sel].player_handle_, is_fast_startup); //设置快速启动模式

int rtsp_timeout = 10;
NT_U3D_SetRTSPTimeout(videoctrl[sel].player_handle_, rtsp_timeout); //设置 RTSP 超时时间

int is_auto_switch_tcp_udp = 1;
NT_U3D_SetRTSPAutoSwitchTcpUdp(videoctrl[sel].player_handle_, is_auto_switch_tcp_udp); //设置 TCP/UDP 模式自动
切换

NT_U3D_SetUrl(videoctrl[sel].player_handle_, videoctrl[sel].videoUrl);
/* -- 播放前参数配置可加在此处 -- */

int isEnabledYuvBlock = 1; //是否回调 YUV 数据
int flag = NT_U3D_StartPlay(videoctrl[sel].player_handle_, isEnabledYuvBlock);

if (flag == DANIULIVE_RETURN_OK)
{
    videoctrl[sel].is_need_init_texture_ = true;
    videoctrl[sel].is_need_get_frame_ = true;
    Debug.Log("播放成功");
}
else
{
    videoctrl[sel].is_need_get_frame_ = false;
    Debug.Log("播放失败");
}

videoctrl[sel].is_running = true;
}

```

## 2. 停止播放:

调用 NT\_U3D\_StopPlay()后, 如果没有录像, 调用 NT\_U3D\_Close(), 播放 handler 置空, 然后调用 NT\_U3D\_UnInit()即可。

```

private void ClosePlayer(int sel)
{
    videoctrl[sel].is_need_get_frame_ = false;
    videoctrl[sel].is_need_init_texture_ = false;

    int flag = NT_U3D_StopPlay(videoctrl[sel].player_handle_);

    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("停止成功");
    }
    else
    {
        Debug.Log("停止失败");
    }

    flag = NT_U3D_Close(videoctrl[sel].player_handle_);
    if (flag == DANIULIVE_RETURN_OK)
    {
        Debug.Log("关闭成功");
    }
    else
    {
        Debug.Log("关闭失败");
    }
}

```

```
videoctrl[sel].player_handle_ = IntPtr.Zero;

videoctrl[sel].is_running = false;
}
```

### 3. 相关 Event 处理:

```
/// <summary>
/// iOS 传递过来 code
/// </summary>
/// <param name="code"></param>
public void onNTSmartEvent(string param)
{
    if (!param.Contains(","))
    {
        Debug.Log("[onNTSmartEvent] iOS 传递参数错误");
        return;
    }

    string[] str = param.Split(',');

    string player_handle = str[0];
    string code = str[1];
    string param1 = str[2];
    string param2 = str[3];
    string param3 = str[4];
    string param4 = str[5];

    Debug.Log("[onNTSmartEvent] code: 0x" + Convert.ToString(Convert.ToInt32(code), 16));

    switch (Convert.ToInt32(code))
    {
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STARTED:
            Debug.Log("开始。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTING:
            Debug.Log("连接中。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTION_FAILED:
            Debug.Log("连接失败。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CONNECTED:
            Debug.Log("连接成功。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DISCONNECTED:
            Debug.Log("连接断开。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP:
            Debug.Log("停止播放。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RESOLUTION_INFO:
            Debug.Log("分辨率信息: width: " + Convert.ToInt32(param1) + ", height: " + Convert.ToInt32(param2));
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_NO_MEDIADATA_RECEIVED:
            Debug.Log("收不到媒体数据, 可能是 url 错误。。");
            break;
        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_SWITCH_URL:
            Debug.Log("切换播放 URL。。");
            break;

        case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_CAPTURE_IMAGE:
            Debug.Log("快照: " + param1 + " 路径: " + param3);

            if (Convert.ToInt32(param1) == 0)
```



```
{
    Debug.Log("截取快照成功。.");
}
else
{
    Debug.LogError("截取快照失败。.");
}
break;

case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_RECORDER_START_NEW_FILE:
    Debug.Log("[record]开始一个新的录像文件 : " + param3);
    break;
case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_ONE_RECORDER_FILE_FINISHED:
    Debug.Log("[record]已生成一个录像文件 : " + param3);
    break;

case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_START_BUFFERING:
    Debug.Log("Start_Buffering");
    break;

case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_BUFFERING:
    Debug.Log("Buffering: " + Convert.ToInt32(param1));
    break;

case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_STOP_BUFFERING:
    Debug.Log("Stop_Buffering");
    break;

case EVENTID.EVENT_DANIULIVE_ERC_PLAYER_DOWNLOAD_SPEED:
    Debug.Log("download_speed:" + param1 + "Byte/s" + ", "
        + (Convert.ToInt32(param1) * 8 / 1000) + "kbps" + ", " + (Convert.ToInt32(param1) / 1024)
        + "KB/s");
    break;
}
}
```