# AMD AMF Reference Manual

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# Preface

## About This Document

This document describes the AMD Media Framework (AMF) for real-time processing of multimedia. It also describes how to use the AMF to implement multimedia use-cases.

## Audience

This document is intended for media processing developers, multimedia engineering managers, and multimedia architects making use of the AMD media processing technology.

## Organization

This document begins with an overview of the AMD AMF API Framework. Chapter 2 lists and describes the APIs used in AMF. Chapter 3 lists and defines the enumerations. Chapter 4 lists and describes the structure definitions. Chapter 5 describes how to use the AMD AMF API. Chapter 6 describes the pipeline framework. Appendix A, “Encoding and Frame parameters description” describes the encoder frame parameters.

## Conventions

The following definitions, acronyms, and abbreviations are used in this document.

| Term | Definition | Comments |
|---|---|---|
| Stream SDK | Accelerated Parallel Processing | AMD SDK implementing OpenCL spec |
| OCL | OpenCL | AMD SDK implementing OpenCL spec |
| MF | Media Foundation | Current video/audio framework in Windows |
| MFT | Media Foundation Transform | Main element of Media Foundation (filter) |
| MMD | Multi Media Driver | AMD driver for low-level multimedia functionality |
| UVD | Unified Video Decoder | Fixed function video decoder hardware |
| VCE | Video Compression Engine | Fixed function H.264 video encoder hardware |
| AMF | AMD Media Framework | Internal AMD C++ SDK created to build flexible pipelines |
| EG | Evergreen | GPU family |
| SI | Southern Islands | GPU family |

| | | |
|---|---|---|
| DEM | Display Encode Mode | Direct connection of encoder and display – VCE mode |
| WinRT | Windows Runtime | Short name for Windows Store Application API |

## Related Documents

# Chapter 1
# Overview

The AMD Media Framework (AMF) delivers comprehensive APIs for video encoding, decoding, and pre- or post-processing that provide access to and benefits from the VCE and UVD hardware blocks and GPU shader-based acceleration.

The AMF is implemented in the form of C++ interfaces. The AMF supports SI and later platforms at full performance and on NI platforms at reduced performance. It supports 32- and 64-bit Windows 7 and Windows 8.1 Desktop applications.

This document describes the AMF APIs that can be used to build a complete multimedia application.

# Chapter 2
# AMF API

## Elementary Data Type

*Description*

Elementary data types and AMF types are defined to make code potentially portable to other operating systems. A detailed list of Elementary Data types is available in `inc/amf/core/Platform.h`.

```
typedef     __int64             amf_int64;
typedef     __int32             amf_int32;
typedef     __int16             amf_int16;
typedef     __int8              amf_int8;

typedef     unsigned __int64    amf_uint64;
typedef     unsigned __int32    amf_uint32;
typedef     unsigned __int16    amf_uint16;
typedef     unsigned __int8     amf_uint8;
typedef     size_t              amf_size;

#define AMF_STD_CALL            __stdcall
#define AMF_CDECL_CALL          __cdecl
#define AMF_FAST_CALL           __fastcall
#define AMF_INLINE              inline
#define AMF_FORCEINLINE         __forceinline

typedef     void*                   amf_handle;
typedef     double                  amf_double;
typedef     float                   amf_float;

typedef     void                    amf_void;
typedef     bool                    amf_bool;
typedef     long                    amf_long;
typedef     int                     amf_int;
typedef     unsigned long           amf_ulong;
typedef     unsigned int            amf_uint;

typedef     amf_int64               amf_pts;  // in 100 nanosecs
```

## C++ Interfaces
## AMF Interface

*Description*

All new objects and components in AMF are implemented in the form of AMF Interfaces. These interfaces implemented in form of abstract C++ classes. Every other interface will be derived from the `AMFInterface` basic interface. It will expose two reference counting methods and a query interface method.

AMF provides default implementation for `AMFInterface` with self-destroying behavior. The SDK also provides a smart pointer template class for easy interface manipulations.

The header file containing the interface definition is located in `inc\amf\core\Interface.h`.

```
class AMFInterface : public AMFObject
```

### AMFInterface::Acquire()

*Description*

Increments the reference count for an interface on an object

```
virtual amf_long AMF_STD_CALL Acquire() = 0;
```

### AMFInterface::Release()

*Description*

Decrements the reference count for an interface on an object.

```
virtual amf_long AMF_STD_CALL Release() = 0;
```

### AMFInterface::QueryInterface()

*Description*

Retrieves pointers to the supported interface on an object.

```
virtual AMF_RESULT AMF_STD_CALL QueryInterface(
const AMFGuid& interfaceID,
void** ppInterface) = 0;
```

*Parameters*

*interfaceID [in]* The identifier of the interface being requested.

*ppInterface [out]* The address of a pointer variable that receives the interface pointer requested in the `interfaceID` parameter.

*Return Value*

This method returns `AMF_OK` if the interface is supported, else `AMF_NO_INTERFACE`.

## AMFPropertyStorage

*Description* Most objects in AMF implement `AMFPropertyStorage` or `AMFPropertyStorageEx`. `AMFPropertyStorage` implements property map with string as an ID and AMFVARIANT structure as data. There are sets of helper classes and template functions that deal with `AMFVariantStruct` in C++ in a safe way. The default implementation is not thread-safe.

The header file containing the interface definition is located in `inc\amf\core\PropertyStorage.h`.

```
class AMFPropertyStorage : virtual public AMFInterface
```

### AMFPropertyStorage::SetProperty()

*Description* This method is used to set properties on the object.

```
virtual AMF_RESULT AMF_STD_CALL SetProperty(
const wchar_t* name,
AMFVariantStruct value) = 0;
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to be set. |
| *value [in]* | The value of the specified property. |

*Return Value* `AMF_OK`.

### AMFPropertyStorage::SetProperty()

*Description* Template method: This method is used to set properties on the object.

```
template<typename _T>
AMF_RESULT AMF_STD_CALL    SetProperty(
const wchar_t* name,
const _T& value);

Implementation
template<typename _T> inline
AMF_RESULT AMF_STD_CALL
AMFPropertyStorage::SetProperty(
const wchar_t* name, const _T& value)
{
AMF_RESULT err = SetProperty(
name,
static_cast<const AMFVariantStruct&>(AMFVariant(value)));
return err;
}
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to be set. |
| *value [in]* | The value of the template argument. |

*Return Value* `AMF_OK`.

### AMFPropertyStorage::GetProperty

*Description* Gets a specific property of the current type.

```
virtual AMF_RESULT AMF_STD_CALL GetProperty(
const wchar_t* name,
AMFVariantStruct* pValue) const = 0;
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to get. |
| *pValue [out]* | The pointer to the retrieved parameter value. |

*Return Value* `AMF_NOT_FOUND` if property not found, else `AMF_OK`

### AMFPropertyStorage::GetProperty

*Description* Template method: Gets a specific property of the current type.

```
template<typename _T>
AMF_RESULT AMF_STD_CALL    GetProperty(
const wchar_t* name,
_T* pValue) const;
```

**Implementation**

```
template<typename _T> inline
AMF_RESULT AMF_STD_CALL
AMFPropertyStorage::GetProperty(
const wchar_t* name, _T* pValue) const
{
AMFVariant var;
AMF_RESULT err = GetProperty(name,

static_cast<AMFVariantStruct*>(&var));
if(err == AMF_OK)
{
*pValue = static_cast<_T>(var);
}
return err;
}
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to get. |
| *pValue [out]* | The value of the template argument. |

*Return Value* `AMF_NOT_FOUND` if property not found, else `AMF_OK`

### AMFPropertyStorage::GetPropertyString

*Description* Template method: Gets a specific property as a string of the current type.

```
template<typename _T>
AMF_RESULT AMF_STD_CALL    GetPropertyString(
const wchar_t* name,
T* pValue) const;
```

**Implementation**

```
template<typename _T> inline
AMF_RESULT AMF_STD_CALL
AMFPropertyStorage::GetPropertyString(
const wchar_t* name, _T* pValue) const
{
    AMFVariant var;
    AMF_RESULT err = GetProperty(name,
      static_cast<AMFVariantStruct*>(&var));
    if(err == AMF_OK)
    {
    *pValue = var.ToString().c_str();
    }
    return err;
}
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to get. |
| *pValue [out]* | The value of the template argument. |

*Return Value* AMF_NOT_FOUND if property not found, else AMF_OK.

### AMFPropertyStorage::GetPropertyWString

*Description* Template method: Gets a specific property as a wide string of the current type.

```
template<typename _T>
AMF_RESULT AMF_STD_CALL    GetPropertyWString(
const wchar_t* name,
T* pValue) const;

Implementation

template<typename _T> inline
AMF_RESULT AMF_STD_CALL
AMFPropertyStorage::GetPropertyWString(
const wchar_t* name, _T* pValue) const
{
AMFVariant var;
AMF_RESULT err = GetProperty(
name,
static_cast<AMFVariantStruct*>(&var));
       if(err == AMF_OK)
       {
       *pValue = var.ToWString().c_str();
       }
       return err;
}
```

*Parameters*

| | |
|---|---|
| *name [in]* | The name of the property to get. |
| *pValue [out]* | The value of the template argument. |

*Return Value* AMF_NOT_FOUND if property not found, else AMF_OK.

### AMFPropertyStorage::HasProperty()

*Description* This method checks whether a given property exists.

```
virtual bool AMF_STD_CALL HasProperty(
const wchar_t* name) const = 0;
```

| | | |
|---|---|---|
| *Parameters* | *name [in]* | The name of the property. |
| *Return Value* | *bool* | Returns `TRUE` if the property exists else returns `FALSE`. |

### AMFPropertyStorage::GetPropertyCount()

*Description* Gets the number of properties.

```
virtual amf_size AMF_STD_CALL GetPropertyCount()
const=0;
```

*Return Value* Returns the number of supported properties.

### AMFPropertyStorage::GetPropertyAt()

*Description* Gets the property at a particular index.

```
virtual AMF_RESULT AMF_STD_CALL   GetPropertyAt(
amf_size index,
wchar_t* name,
amf_size nameSize,
AMFVariantStruct* pValue) const = 0;
```

| | | |
|---|---|---|
| *Parameters* | *index [in]* | Index to the property to get |
| | *name[out]* | Name of the property at the index |
| | *nameSize [out]* | Size of the property at the index |
| | *pValue [out]* | Pointer to the value of the property |
| *Return Value* | | Returns `AMF_OK` if property found, else returns `AMF_INVALID_ARG`. |

### AMFPropertyStorage::Clear()

*Description* Clears the property values.

```
virtual AMF_RESULT AMF_STD_CALL Clear() = 0;
```

### AMFPropertyStorage::AddTo()

*Description* Adds appropriate properties from “this” object to the `pDest` object.

```
virtual AMF_RESULT AMF_STD_CALL AddTo(
AMFPropertyStorage* pDest,
bool overwrite,
bool deep) const= 0;
```

*Parameters*

| | |
|---|---|
| *pDest [in]* | Destination Object |
| *overwrite [in]* | Controls what to do if the property already exists in pDest |
| *deep [in]* | Controls behavior of the properties that are of `AMF_VARIANT_INTERFACE` type. If true the operation will try to query for `AMFClonable` interface and call `Clone()`. |

### AMFPropertyStorage::CopyTo()

*Description* Copies appropriate properties from “this” object to the pDest object. Clears the destination properties before copying.

```
virtual AMF_RESULT AMF_STD_CALL CopyTo(
AMFPropertyStorage* pDest,
bool deep) const = 0;
```

*Parameters*

| | |
|---|---|
| *pDest [in]* | Destination Object |
| *deep [in]* | Controls behavior of the properties that are of `AMF_VARIANT_INTERFACE` type. If true the operation will try to query for `AMFClonable` interface and call `Clone()`. |

### AMFPropertyStorage::AddObserver()

*Description* Adds a callback that will be notified when property is changed by calling `AMFPropertyStorageObserver::OnPropertyChanged()`.

```
virtual void AMF_STD_CALL AddObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

*Parameters*

| | |
|---|---|
| *pObserver [in]* | Callback. |

### AMFPropertyStorage::RemoveObserver()

*Description* Removes previously added callback by `AddObserver()`.

```
virtual void AMF_STD_CALL RemoveObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

*Parameters* *pObserver [in]* Callback.

## AMFPropertyStorageEx

*Description* Most objects in AMF implement `AMFPropertyStorage` or `AMFPropertyStorageEx`. `AMFPropertyStorage` implements property map with string as an ID and `AMFVARIANT` structure as data. There are sets of helper classes and template functions that deal with `AMFVARIANT` in C++ in a safe way. The default implementation is not thread-safe.

The header file containing the interface definition is located in `inc\amf\core\PropertyStorageEx.h`.

```
class AMFPropertyStorageEx : virtual public AMFPropertyStorage
```

### AMFPropertyStorageEx::GetPropertiesInfoCount()

*Description* Return number of items that are indexed by the first parameter in `AMFPropertyStorageEx::GetPropertyInfo()`.

```
virtual amf_size AMF_STD_CALL
GetPropertiesInfoCount() const=0;
```

*Return Value* Number of items that are indexed by first parameter in `AMFPropertyStorageEx::GetPropertyInfo()`.

### AMFPropertyStorageEx::GetPropertyInfo()

*Description* Gets further property information such as the name, description, variant type, property content type, default values, min and max values, access type (Private, Read, Write, Read-Write, Write-Runtime) for a given property.

```
virtual AMF_RESULT AMF_STD_CALL GetPropertyInfo(
amf_size ind,
const AMFPropertyInfo** ppInfo)
const = 0;
```

*Parameters*

| | |
|---|---|
| *ind [in]* | Index to the properties information array |
| *ppInfo [out]* | The pointer to the parameter information class. |

*Return Value* `AMF_OK`.

### AMFPropertyStorageEx::GetPropertyInfo()

*Description* Gets further property information such as the name, description, variant type, property content type, default values, min and max values, access type (Private, Read, Write, Read-Write, Write-Runtime) for a given property.

```
virtual AMF_RESULT AMF_STD_CALL GetPropertyInfo(
const wchar_t* name,
const AMFPropertyInfo** ppInfo)
const=0;
```

*Parameters*

| | |
|---|---|
| *name [in]* | Name of the property for which the information is to be retrieved. |
| *ppInfo [out]* | The pointer to the parameter information class. |

*Return Value* `AMF_OK` if property found else `AMF_NOT_FOUND`.

### AMFPropertyStorageEx::ValidateProperty()

*Description* This method validates the value of a property.

```
virtual AMF_RESULT AMF_STD_CALL ValidateProperty(
const wchar_t* name,
AMFVariantStruct value,
AMFVariantStruct* pOutValidated) const = 0;
```

*Parameters*

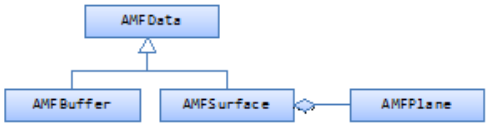
| | |
|---|---|
| *name [in]* | The name of the property. |
| *value [in]* | The value of the property. |
| *pOutValidated [out]* | The validated value of the property. |

*Return Value* `AMF_OK` if the value is within the range, else `AMF_OUT_OF_RANGE` in case it's out of range.

## 2.1 Memory

AMF provides two types of memory object: `AMFBuffer` and `AMFSurface`. Each object implements the common base interface, `AMFData`. Each object is allocated via several factory methods in `AMFContext` (see below). `AMFContext` also provides methods to create `AMFBuffer` or `AMFBuffer` based on existing memory objects in various technologies:

- DX9 surfaces (Win Desktop only)
- DX11 Textures
- OpenCL 2D images and buffers (Win Desktop only)
- OpenGL textures (Win Desktop only)
- Host memory




### AMFData

*Description*

Data interface is a base interface for `AMFBuffer` and `AMFSurface` interfaces. It is responsible for storing common properties of video or audio data objects: presentation time, duration, type, etc. Data interface is also responsible for memory type storage and memory conversion.

The header file containing the interface definition located in `inc\amf\core\Data.h`.

```
class AMFData : virtual public AMFPropertyStorage
```

### AMFData::GetMemoryType()

*Description*

Returns the memory type of the memory associated with the device.

```
virtual AMF_MEMORY_TYPE AMF_STD_CALL
GetMemoryType() = 0;
```

*Return Value*

One of the Memory types from the `AMF_MEMORY_TYPE` enumerator.

### AMFData::Duplicate()

*Description* Duplicates the memory associated with the device to a memory of the type specified by the application.

```
virtual AMF_RESULT AMF_STD_CALL Duplicate(
AMF_MEMORY_TYPE type,
AMFData** ppData) = 0;
```

*Parameters*

| | |
|---|---|
| *type [in]* | Type of the duplicate memory. |
| *ppData [out]* | Pointer to the duplicate memory. |

*Return Value* `AMF_OK`.

### AMFData::Convert()

*Description* Convert the memory associated with the device to the 'type' specified by the application. Basically convert the buffer to another memory type using available inter-operation helpers.

```
virtual AMF_RESULT AMF_STD_CALL Convert(
AMF_MEMORY_TYPE type)=0;
```

*Parameters*

| | |
|---|---|
| *type [in]* | Type of the converted memory. |

*Return Value* Returns `AMF_OK` if the memory associated with the device is successfully converted to the type specified by the application, else returns the appropriate error value.

### AMFData::GetDataType()

*Description* Returns the data type of the memory interface

```
virtual AMF_DATA_TYPE AMF_STD_CALL GetDataType()=0;
```

*Return Value* One of the Data types from the `AMF_DATA_TYPE` enumerator.

### AMFData::IsReusable()

*Description* Checks whether the memory object is reusable. The object is reusable if allocated by AMF. It is not when the AMF surface or buffer is wrapped around external memory.

```
virtual bool AMF_STD_CALL IsReusable() = 0;
```

*Return Value* `TRUE` if reusable, else `FALSE`.

### AMFData::SetPts()

*Description* Sets the presentation timestamp to the memory object.

```
virtual void AMF_STD_CALL SetPts(amf_pts pts) = 0;
```

*Parameters*

| | |
|---|---|
| *pts [in]* | PTS value to be set |

### AMFData::GetPts()

*Description* Get the presentation timestamp of the memory object.

```
virtual amf_pts AMF_STD_CALL GetPts() = 0;
```

*Return Value* PTS value.

### AMFData::SetDuration()

*Description* Sets the duration to the memory object.

```
virtual void AMF_STD_CALL SetDuration(
amf_pts duration) = 0;
```

*Parameters*

| | |
|---|---|
| *duration [in]* | The duration value to be set. |

### AMFData::GetDuration()

*Description* Gets the duration for the memory object.

```
virtual void AMF_STD_CALL SetDuration(
amf_pts duration) = 0;
```

*Return Value* The duration value.

## AMFBuffer

*Description* The `AMFBuffer` interface allows access to unordered memory buffer. This memory object is allocated via several factory methods in `AMFContext`.

The `AMFBuffer` memory object is not thread-safe. It is assumed that a memory object is used by one component at a time.

The header file containing the interface definition located in `inc\amf\core\Buffer.h`.

```
class AMFBuffer : virtual public AMFData
```

### AMFBuffer::GetSize()

*Description* Gets the size of a buffer.

```
virtual amf_size AMF_STD_CALL GetSize()=0;
```

*Return Value* Returns the size of the AMF buffer.

### AMFBuffer::GetNative()

*Description* Allows access to the underlying memory object. Returns pointer to data - for host buffer or `cl_mem` buffer handle - for OpenCL buffer.

All objects that support reference counting do not change the reference count inside this call. The caller should not release the returned object.

```
virtual void*     AMF_STD_CALL GetNative()=0;
```

*Return Value* Pointer to the underlying native memory object

### AMFBuffer::AddObserver()

*Description* Interface to get callbacks from the `AMFPropertyStorageObserver` instance. `OnPropertyChanged` is the callback function executed in case of any property change.

```
virtual void AMF_STD_CALL AddObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

*Parameters* *pObserver [in]* Pointer to the `AMFPropertyStorageObserver` interface.

### AMFBuffer::RemoveObserver()

*Description* Remove the observer.

```
virtual void AMF_STD_CALL RemoveObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

*Parameters* *pObserver [in]* Observer to be removed.

### AMFSurface

*Description*

The `AMFSurface` interface represents video frame and consists of collection of planes. It also holds types of the frame - Progressive, Interlaced.

Surfaces are created via factory methods in the `AMFContext` interface. The factory methods allow one to create allocated surface or attach OpenCL / DX9 / DX9Ex /DX11 / OpenGL objects to an empty surface. The plane objects are created inside surface creation and recreated with every memory type conversion.

The `AMFSurface` memory object is not thread-safe. It is assumed that a memory object is used by one component at a time.

The header file containing the interface definition located in `include\core\Surface.h`.

```
class AMFSurface : virtual public AMFData
```

#### AMFSurface::GetFormat()

*Description* Gets the size of the buffer.

```
virtual AMF_SURFACE_FORMAT AMF_STD_CALL
GetFormat() = 0;
```

*Return Value* Returns the format from the list of supported surface formats as specified in `AMF_SURFACE_FORMAT`.

#### AMFSurface::GetPlanesCount()

*Description* Gets the number of planes.

```
virtual amf_size AMF_STD_CALL GetPlanesCount() = 0;
```

*Return Value* Number of planes in the surface

#### AMFSurface::GetPlaneAt()

*Description* Gets the plane at a particular index.

```
virtual AMFPlane* AMF_STD_CALL GetPlaneAt(
amf_size index)=0;
```

*Parameters* *index [in]* Index to the plane.

*Return Value* Pointer to the plane at the specified index.

### AMFSurface::GetPlane()

*Description* Gets the plane of a particular type.

```
virtual AMFPlane* GetPlane(AMF_PLANE_TYPE type)=0;
```

| | | |
|---|---|---|
| *Parameters* | *type [in]* | Type of plane as specified in the `AMF_PLANE_TYPE` enumerator. |
| *Return Value* | | Pointer to the plane of the specified type. |

### AMFSurface:: GetFrameType()

*Description* Gets the type of frame.

```
virtual AMF_FRAME_TYPE AMF_STD_CALL GetFrameType() = 0;
```

| | | |
|---|---|---|
| *Return Value* | | Returns the frame type from the list mentioned in the `AMF_FRAME_TYPE` enumerator. |

### AMFSurface:: SetFrameType()

*Description* Sets the type of the frame.

```
virtual void AMF_STD_CALL SetFrameType(
AMF_FRAME_TYPE type) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *type [in]* | Type of the frame as specified in the `AMF_FRAME_TYPE` enumerator |

### AMFSurface::AddObserver()

*Description* Interface to get callbacks from the `AMFPropertyStorageObserver` instance. `OnPropertyChanged` is the callback function executed in case of any property change.

```
virtual void AMF_STD_CALL AddObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *pObserver [in]* | Pointer to the `AMFPropertyStorageObserver` interface. |

### AMFSurface::RemoveObserver()

*Description* Remove the observer.

```
virtual void AMF_STD_CALL RemoveObserver(
AMFPropertyStorageObserver* pObserver) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *pObserver [in]* | Observer to be removed. |

### AMFSurface::SetCrop()

*Description* Sets the crop parameters.

```
virtual AMF_RESULT AMF_STD_CALL    SetCrop(
amf_int32 x,
amf_int32 y,
amf_int32 width,
amf_int32 height) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *x [in]* | Offset in x direction |
| | *y [in]* | Offset in y direction |
| | *width [in]* | Crop width |
| | *height [in]* | Crop height |
| Return Value | | `AMF_OK` if success; else `AMF_INVALID_ARG`. |

## AMFPlane

*Description* Plane interface represents two-dimensional array of pixel component values (e.g. Y or UV planes for NV12 surface). It could be part of image for multi-plane image format or whole image for packed image format.

The `AMFPlane` memory object is not thread-safe.

The header file containing the interface definition located in `inc\amf\core\Plane.h`.

```
class AMFPlane : virtual public AMFInterface
```

### AMFPlane::GetType()

*Description* Gets the type of the plane.

```
virtual AMF_PLANE_TYPE AMF_STD_CALL GetType() = 0;
```

*Return Value* Type of plane as specified in the `AMF_PLANE_TYPE` enumerator.

### AMFPlane::GetNative()

*Description* Allows access to the underlying memory object. For plane in surface which is created as DirectX 11 surface, `GetNative()` returns pointer to the `ID3D11Texture2D` interface.

All objects that support reference counting do not change reference count inside this call. The caller should not release the returned object.

```
virtual void*     AMF_STD_CALL GetNative()=0;
```

*Return Value* Pointer to the underlying native memory object.

### AMFPlane:: GetPixelSizeInBytes()

*Description* Gets the pixel size in bytes.

```
virtual amf_int32 AMF_STD_CALL GetPixelSizeInBytes()
= 0;
```

*Return Value* Pixel size in bytes.

### AMFPlane::GetOffsetX()

*Description* Gets the offset in the x-coordinate.

```
virtual amf_int32 AMF_STD_CALL GetOffsetX() = 0;
```

*Return Value* The value of the offset in the x-coordinate.

### AMFPlane::GetOffsetY()

*Description* Gets the offset in the y-coordinate.

```
virtual amf_int32 AMF_STD_CALL GetOffsetY() = 0;
```

*Return Value* The value of the offset in the y-coordinate.

### AMFPlane::GetWidth()

*Description* Gets the plane width.

```
virtual amf_int32 AMF_STD_CALL    GetWidth() = 0;
```

*Return Value* Width of the plane.

### AMFPlane::GetHeight()

*Description* Ges the plane height.

```
virtual amf_int32 AMF_STD_CALL    GetHeight() = 0;
```

*Return Value* Height of the plane.

### AMFPlane:: GetHPitch()

*Description* Gets the horizontal pitch for the plane which is a product of the width in pixels and the number of bytes per pixel.

```
virtual amf_int32 AMF_STD_CALL    GetHPitch() = 0;
```

*Return Value* Value of the Horizontal pitch.

### AMFPlane:: GetVPitch()

*Description* Gets the vertical pitch for the plane which is equal to the height in pixels of the plane.

```
virtual amf_int32 AMF_STD_CALL    GetVPitch() = 0;
```

*Return Value* Value of the Vertical pitch.

## AMFContext

*Description* The Context interface is responsible for initializing and storing API-specific data (DX devices, OpenCL contexts). The context provides pairs of Lock/Unlock methods to allow thread-safe access to DX or OpenCL devices. It also provides buffer and surface allocation factory methods.

The context object is thread-safe.

The header file containing the interface definition located in `inc\amf\core\Context.h`.

```
class AMFContext : virtual public AMFPropertyStorage
```

### AMFContext:: Terminate()

*Description* Terminates the context.

```
virtual AMF_RESULT AMF_STD_CALL Terminate() = 0;
```

*Return Value* AMF_OK

## DirectX 9

### AMFContext:: InitDX9()

*Description* Initializes the DX9 device in the context.

```
virtual AMF_RESULT AMF_STD_CALL InitDX9(
void* pDX9Device) = 0;
```

*Parameters* *pDX9Device [out]* Valid pointer to DX9 device. If passed NULL, then DX9 is initialized by AMF.

*Return Value* AMF_ALREADY_INITIALIZED if pDX9Device is initialized earlier (pDX9Device != NULL). AMF_OK if device Created and initialized successfully.

### AMFContext:: GetDX9Device ()

*Description* Get the DirectX9 device.

```
virtual void* AMF_STD_CALL GetDX9Device(
AMF_DX_VERSION dxVersionRequired=AMF_DX9) = 0;
```

*Parameters* *dxVersionRequired [in]* Version of DirectX - DX9, DX9EX.

*Return Value* Pointer to the DX9 device.

### AMFContext:: LockDX9 ()

*Description* Locks the DX9 device.

```
virtual AMF_RESULT AMF_STD_CALL LockDX9() = 0;
```

*Return Value* AMF_NOT_INITIALIZED if device is NULL else AMF_OK.

### AMFContext:: UnlockDX9 ()

*Description* Unlocks the DX9 device.

```
virtual AMF_RESULT AMF_STD_CALL UnlockDX9() = 0;
```

*Return Value* AMF_NOT_INITIALIZED if device is NULL else AMF_OK.

### DirectX 11

#### AMFContext:: InitDX11()

*Description* Initializes the DX11 device in the context.

```
virtual AMF_RESULT AMF_STD_CALL InitDX11(
void* pDX11Device,
AMF_DX_VERSION dxVersionRequired = AMF_DX11_0) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *pDX11Device [out]* | Valid pointer to DX11 device. If Passed `NULL`, then DX11 is initialized by AMF. |
| | *dxVersionRequired [in]* | DirectX 11 required version - AMF_DX11_0 and AMF_DX11_1. |
| *Return Value* | | `AMF_ALREADY_INITIALIZED` if pDX11Device is initialized earlier (pDX11Device != NULL). |
| | | `AMF_OK` if device Created and initialized Successfully. |

#### AMFContext:: GetDX11Device ()

*Description* Get the DirectX11 device.

```
virtual void* AMF_STD_CALL GetDX11Device(
AMF_DX_VERSION dxVersionRequired=AMF_DX11_0)=0;
```

| | | |
|---|---|---|
| *Parameters* | *dxVersionRequired [in]* | Version of DirectX - DX11.0, DX11.1 |
| *Return Value* | | Pointer to the DX11 device. |

#### AMFContext:: LockDX11 ()

*Description* Locks the DX11 device.

```
virtual AMF_RESULT AMF_STD_CALL LockDX11() = 0
```

*Return Value* `AMF_NOT_INITIALIZED` if device is NULL else `AMF_OK`.

#### AMFContext:: UnlockDX11 ()

*Description* Unlocks the DX11 device.

```
virtual AMF_RESULT AMF_STD_CALL UnlockDX11() = 0;
```

*Return Value* `AMF_NOT_INITIALIZED` if device is NULL else `AMF_OK`.

## OpenCL

### AMFContext:: InitOpenCL ()

*Description* Initializes the OpenCL device in the context.

```
virtual AMF_RESULT AMF_STD_CALL InitOpenCL(
void* pCommandQueue = NULL) = 0;
```

| | | |
|---|---|---|
| *Parameters* | *pCommandQueue [in]* | Pointer to valid command queue. If passed NULL, then OpenCL initialized by AMF. |
| *Return Value* | | `AMF_ALREADY_INITIALIZED` if OpenCL device is initialized earlier (m_pDeviceOpenCL != NULL). |
| | | `AMF_OK` if device Created and initialized successfully. |

### AMFContext:: GetOpenCLContext ()

*Description* Gets the OpenCL context.

```
virtual void* AMF_STD_CALL GetOpenCLContext() = 0;
```

| | |
|---|---|
| *Return Value* | Pointer to the OpenCL context. |

### AMFContext:: GetOpenCLCommandQueue()

*Description* Gets the OpenCL command queue.

```
virtual void* AMF_STD_CALL GetOpenCLCommandQueue()=0;
```

| | |
|---|---|
| *Return Value* | Pointer to the OpenCL command queue. |

### AMFContext:: GetOpenCLDeviceID ()

*Description* Gets the OpenCL device ID.

```
virtual void* AMF_STD_CALL GetOpenCLDeviceID() = 0;
```

| | |
|---|---|
| *Return Value* | Pointer to the OpenCL device ID. |

### AMFContext:: LockOpenCL ()

*Description* Locks the OpenCL device.

```
virtual AMF_RESULT AMF_STD_CALL LockOpenCL() = 0;
```

| | |
|---|---|
| *Return Value* | `AMF_NOT_INITIALIZED` if device is `NULL`, `else AMF_OK`. |

### AMFContext:: UnlockOpenCL ()

*Description* Unlocks the OpenCL device.

```
virtual AMF_RESULT AMF_STD_CALL UnlockOpenCL() = 0;
```

*Return Value* AMF_NOT_INITIALIZED if device is NULL, else AMF_OK.

## OpenGL

### AMFContext:: InitOpenGL ()

*Description* Initializes the OpenGL device in the context.

```
virtual AMF_RESULT AMF_STD_CALL InitOpenGL(
amf_handle hOpenGLContext,
amf_handle hWindow,
amf_handle hDC) = 0;
```

*Parameters*

| | |
|---|---|
| *hOpenGLContext [in]* | OpenGL Context |
| *hWindow [in]* | OpenGL Window handle |
| *hDC [in]* | Device Context |

*Return Value*

AMF_ALREADY_INITIALIZED if OpenGL device is initialized earlier (m_pDeviceOpenGL!= NULL).

AMF_OK if device Created and initialized successfully.

### AMFContext:: GetOpenGLContext ()

*Description* Gets the OpenGL context.

```
virtual amf_handle AMF_STD_CALL GetOpenGLContext()=0;
```

*Return Value* Pointer to the OpenGL context.

### AMFContext:: GetOpenGLDrawable ()

*Description* Gets the OpenGL drawable.

```
virtual amf_handle AMF_STD_CALL GetOpenGLDrawable()=0
```

*Return Value* Pointer to the OpenGL drawable.

### AMFContext:: LockOpenGL ()

*Description* Locks the OpenGL device.

```
virtual AMF_RESULT AMF_STD_CALL LockOpenGL() = 0;
```

*Return Value* `AMF_NOT_INITIALIZED` if device is NULL else `AMF_OK`.

### AMFContext:: UnlockOpenGL ()

*Description* Unlocks the OpenGL device.

```
virtual AMF_RESULT AMF_STD_CALL UnlockOpenGL() = 0;
```

*Return Value* `AMF_NOT_INITIALIZED` if device is NULL else `AMF_OK`.

## Buffer Allocation

### AMFContext:: AllocBuffer()

*Description* Creates a buffer and allocates memory for it.

```
virtual AMF_RESULT AMF_STD_CALL AllocBuffer(
AMF_MEMORY_TYPE type,
amf_size size,
AMFBuffer** ppBuffer) = 0;
```

*Parameters*

| | |
|---|---|
| *type [in]* | Memory type of the buffer to be created |
| *size [in]* | Size of the buffer |
| *ppBuffer [out]* | Pointer to the buffer created |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateBufferFromHostNative ()

*Description* Creates `AMFBuffer` on the passed system memory contiguous block.

```
virtual AMF_RESULT AMF_STD_CALL CreateBufferFromHostNative(
void* pHostBuffer,
amf_size size,
AMFBuffer** ppBuffer,
AMFBufferObserver* pObserver) = 0;
```

| *Parameters* | | |
|---|---|---|
| | *pHostBuffer [in]* | Host memory to which the `AMFBuffer` Is attached. |
| | *size [in]* | Size of the buffer |
| | *ppBuffer [out]* | Pointer to the buffer created |
| | *pObserver [in]* | Observer associated with the memory block |

*Return Value* `AMF_OK` on success.

## Surface Allocation

### AMFContext:: AllocSurface()

*Description* Creates a surface and allocates memory for it.

```
virtual AMF_RESULT AMF_STD_CALL AllocSurface(
AMF_MEMORY_TYPE type,
AMF_SURFACE_FORMAT format,
amf_int32 width,
amf_int32 height,
AMFSurface** ppSurface) = 0;
```

| *Parameters* | | |
|---|---|---|
| | *type [in]* | Memory type of the surface to be created |
| | *format [in]* | Format of the surface |
| | *width [in]* | Width in pixels |
| | *height [in]* | Height in pixels |
| | *ppSurface [out]* | Pointer to the surface created |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateSurfaceFromHostNative ()

*Description* Creates `AMFSurface` on passed system memory contiguous block. This version with one width, height, hPitch and vPitch values is applicable only to formats having one plane.

```
virtual AMF_RESULT AMF_STD_CALL CreateSurfaceFromHostNative(
AMF_SURFACE_FORMAT format,            amf_int32 width,
amf_int32 height,
amf_int32 hPitch,
amf_int32 vPitch,
void* pData,
AMFSurface** ppSurface,
AMFSurfaceObserver* pObserver) = 0;
```

*Parameters*

| | |
|---|---|
| *format [in]* | Format of the surface |
| *width [in]* | Width in pixels |
| *height [in]* | Height in pixels |
| *hPitch [in]* | Horizontal pitch |
| *vPitch [in]* | Vertical pitch |
| *pData [in]* | Host memory to which the AMFSurface is attached. |
| *ppSurface [out]* | Pointer to the surface created |
| *pObserver [in]* | Observer associated with the memory block |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateSurfaceFromDX9Native ()

*Description* Creates `AMFSurface` on passed DX9 Surface.

```
AMF_RESULT AMF_STD_CALL CreateSurfaceFromDX9Native(
void* pDX9Surface,
AMFSurface** ppSurface,
AMFSurfaceObserver* pObserver) = 0;
```

*Parameters*

| | |
|---|---|
| *pDX9Surface [in]* | DX9 Surface to which the `AMFSurface` is attached. |
| *ppSurface [out]* | Pointer to the surface created |
| *pObserver [in]* | Observer associated with the memory block. This is to get a notification when attached resources could be released. |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateSurfaceFromDX11Native ()

*Description* Creates `AMFSurface` on passed DX11 Texture.

```
virtual AMF_RESULT AMF_STD_CALL CreateSurfaceFromDX11Native(
void* pDX11Surface,
AMFSurface** ppSurface,
AMFSurfaceObserver* pObserver) = 0
```

*Parameters*

| | |
|---|---|
| *pDX11Surface [in]* | DX11 texture to which the AMFSurface is attached. |
| *ppSurface [out]* | Pointer to the surface created |
| *pObserver [in]* | Observer associated with the memory block. This is to get a notification when attached resources could be released. |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateSurfaceFromOpenCLNative()

*Description* Creates `AMFSurface` on passed OpenCL object.

```
virtual AMF_RESULT AMF_STD_CALL
CreateSurfaceFromOpenCLNative (
AMF_SURFACE_FORMAT format,
amf_int32 width,
amf_int32 height,
void** pClPlanes,
AMFSurface** ppSurface,
AMFSurfaceObserver* pObserver ) = 0;
```

*Parameters*

| | |
|---|---|
| *format [in]* | Surface format |
| *width [in]* | width in pixels |
| *height [in]* | Height in pixels |
| *pCLPlanes [in]* | OpenCL handle to which the AMFSurface is attached. |
| *ppSurface [out]* | Pointer to the surface created |
| *pObserver [in]* | Observer associated with the memory block. This is to get notification when attached resources could be released. |

*Return Value* `AMF_OK` on success.

### AMFContext:: CreateSurfaceFromOpenGLNative()

*Description* Creates `AMFSurface` on passed OpenGL texture handle.

```
virtual AMF_RESULT AMF_STD_CALL
CreateSurfaceFromOpenGLNative(
AMF_SURFACE_FORMAT format,
amf_handle hGLTextureID,
AMFSurface** ppSurface,
AMFSurfaceObserver* pObserver) = 0;
```

*Parameters*

| | |
|---|---|
| *format [in]* | Surface format |
| *hGLTextureID [in]* | OpenGL texture handle to which the `AMFSurface` is attached. |
| *ppSurface [out]* | Pointer to the surface created |
| *pObserver [in]* | Observer associated with the memory block. This is to get notification when attached resources could be released. |

*Return Value* `AMF_OK` on success.

## AMFComponent

*Description* Each component implements the common `AMFComponent` interface. The `AMFComponent` interface is derived from `AMFPropertyStorageEx`.
All components are thread-safe.

The header file containing the interface definition located in `inc\amf\components\Component.h`.

```
class AMFComponent : virtual public AMFPropertyStorageEx
```

### AMFComponent:: Init()

*Description* Initializes the AMF component.

```
virtual AMF_RESULT  AMF_STD_CALL Init(
AMF_SURFACE_FORMAT format,
amf_int32 width,
amf_int32 height) = 0;
```

*Parameters*

| | |
|---|---|
| *format [in]* | Format |
| *width [in]* | Width in pixels |
| *height [in]* | Height in pixels |

*Return Value* `AMF_OK` on success.

### AMFComponent:: ReInit ()

*Description* Reinitializes the AMFComponent with updated input parameters

```
virtual AMF_RESULT  AMF_STD_CALL ReInit(
amf_int32 width,
amf_int32 height) = 0;
```

*Parameters*

| | |
|---|---|
| *width [in]* | Width in pixels |
| *height [in]* | Height in pixels |

*Return Value* If successful returns `AMF_OK`.

### AMFComponent:: Terminate ()

*Description* Destroys the AMF component. Releases all the internal resources.

```
virtual AMF_RESULT  AMF_STD_CALL Terminate() = 0;
```

*Return Value* If successful returns `AMF_OK`.

### AMFComponent:: Drain ()

*Description* Drains the AMF component. Returns all the accumulated resources.

```
virtual AMF_RESULT  AMF_STD_CALL Drain() = 0;
```

*Return Value* If successful returns `AMF_OK`.

### AMFComponent:: Flush ()

*Description* Flush the AMF component.

```
virtual AMF_RESULT  AMF_STD_CALL Flush() = 0;
```

*Return Value* If successful returns `AMF_OK`.

### AMFComponent:: SubmitInput ()

| | | |
|---|---|---|
| *Description* | Submits input data to the AMF component. | |
| | `virtual AMF_RESULT  AMF_STD_CALL SubmitInput( AMFData* pData) = 0;` | |
| *Parameters* | *pData [in]* | *AMFData* fed to the component to be processed |
| *Return Value* | | If successful returns `AMF_OK`. |

### AMFComponent:: QueryOutput ()

| | | |
|---|---|---|
| *Description* | Query the component for the output result. | |
| | `virtual AMF_RESULT  AMF_STD_CALL QueryOutput( AMFData** ppData) = 0;` | |
| *Parameters* | *ppData [out]* | Pointer to the buffer outputted by the component |
| *Return Value* | | If successful returns `AMF_OK`. |

### AMFComponent:: GetContext ()

| | | |
|---|---|---|
| *Description* | Gets the context that the component is associated with. | |
| | `virtual AMFContext* AMF_STD_CALL GetContext() = 0;` | |
| *Return Value* | | The context that the component is associated with. |

### AMFComponent:: SetOutputDataAllocatorCB ()

| | | |
|---|---|---|
| *Description* | Sets the callback function for the output data. | |
| | `virtual AMF_RESULT  AMF_STD_CALL SetOutputDataAllocatorCB( AMFDataAllocatorCB* callback) = 0;` | |
| *Parameters* | *callback [in]* | The callback function to be set. |

## AMFDataAllocatorCB

*Description* Class to implement Buffer and Surface allocation for a component.

The header file containing the interface definition located in `inc\amf\components\Component.h`.

```
class AMFDataAllocatorCB : virtual public AMFInterface
```

### AMFDataAllocatorCB : AllocBuffer

*Description* Allocates the AMF buffer.

```
virtual AMF_RESULT AMF_STD_CALL AllocBuffer(
AMF_MEMORY_TYPE type,
amf_size size,
AMFBuffer** ppBuffer) = 0;
```

| *Parameters* | | |
|---|---|---|
| | *type [in]* | Memory Type |
| | *size [in]* | Size of memory to be allocated |
| | *ppBuffer [out]* | Allocated AMF Buffer pointer |
| *Return Value* | | `AMF_OK` on success. |

### AMFDataAllocatorCB : AllocSurface

*Description* Allocates AMF Surface.

```
virtual AMF_RESULT AMF_STD_CALL AllocSurface(
AMF_MEMORY_TYPE type, AMF_SURFACE_FORMAT format,
amf_int32 width,  amf_int32 height, amf_int32 hPitch,
amf_int32 vPitch, AMFSurface** ppSurface) = 0;
```

| *Parameters* | | |
|---|---|---|
| | *type [in]* | Memory Type |
| | *format [in]* | AMF Surface format |
| | *width [in]* | Width of surface in pixels |
| | *height [in]* | Height of surface in pixels |
| | *hPitch [in]* | Pitch in horizontal direction |
| | *vPitch [in]* | Pitch in Vertical direction |
| | *ppSurface [out]* | Allocated AMF Surface pointer |
| *Return Value* | | If successful returns `AMF_OK`. |

## Component Capability

### AMFCaps

*Description* This is the base interface for every hardware module supported. Every module-specific interface must extend this interface.

The header file containing the interface definition located in `inc\amf\components\ComponentCaps.h`.

```
class AMFCaps : public virtual AMFInterface
```

### AMFCaps: GetAccelerationType

*Description* Get the acceleration type for a component.

```
virtual AMF_ACCELERATION_TYPE AMF_STD_CALL
GetAccelerationType() const = 0;
```

*Return Value* Returns one of the acceleration types defined in `AMF_ACCELERATION_TYPE` enumeration (`Not supported`, `Hardware`, `GPU`, or `Software`).

### AMFCaps: GetInputCaps

*Description* Get input capabilities of a component.

```
virtual AMF_RESULT AMF_STD_CALL GetInputCaps(AMFIOCaps**
input) = 0;
```

*Parameters*

| | |
|---|---|
| *input [out]* | Pointer to AMFIOCaps containing component Capability information. |

*Return Value*

`AMF_INVALID_ARG` if input is `NULL`
`AMF_OK` if input capabilities of the component are successfully retrieved.

### AMFCaps: GetOutputCaps

*Description* Get output capabilities of a component.

```
virtual AMF_RESULT AMF_STD_CALL
GetOutputCaps(AMFIOCaps** output) = 0;
```

*Parameters*

| | |
|---|---|
| *output [out]* | Pointer to `AMFIOCaps` containing component Capability information. |

*Return Value*

`AMF_INVALID_ARG` if input is `NULL`
`AMF_OK` if output capabilities of the component are successfully retrieved.

## AMFIOCaps

*Description* Interface containing input as well as output capabilities for a component.

The header file containing the interface definition located in `inc\amf\components\ComponentCaps.h`.

```
class AMFIOCaps : public virtual AMFInterface
```

### AMFIOCaps: GetWidthRange

*Description* Get the width range supported by the component in pixels.

```
virtual void AMF_STD_CALL GetWidthRange(
amf_int32* minWidth,
amf_int32* maxWidth) const = 0;
```

*Parameters*

| | |
|---|---|
| *minWidth [out]* | Min supported width in pixels |
| *maxWidth [out]* | Max supported width in pixels |

### AMFIOCaps: GetHeightRange

*Description* Get the height range supported by the component in pixels.

```
virtual void AMF_STD_CALL GetHeightRange(
amf_int32* minHeight,
amf_int32* maxHeight) const = 0;
```

*Parameters*

| | |
|---|---|
| *minHeight [out]* | Min supported height in pixels |
| *maxHeight [out]* | Max supported height in pixels |

### AMFIOCaps: GetVertAlign

*Description* Get memory alignment in lines. Vertical alignment must be multiples of this number.

```
virtual amf_int32 AMF_STD_CALL GetVertAlign() const = 0;
```

*Return Value*

Vertical alignment in number of lines.

### AMFIOCaps: GetNumOfFormats

*Description* Get the number of surface formats supported.

```
virtual amf_int32 AMF_STD_CALL GetNumOfFormats() const = 0;
```

*Return Value*

Returns the number of supported surface formats from the list of formats defined in `AMF_SURFACE_FORMAT`.

### AMFIOCaps: GetFormatAt

*Description* Get the surface format for a particular index.

```
virtual  AMF_RESULT AMF_STD_CALL GetFormatAt(
amf_int32 index,
AMF_SURFACE_FORMAT* format,
amf_bool* native) const = 0;
```

*Parameters*

| | |
|---|---|
| *index [in]* | index to list of surface formats |
| *format [out]* | format at the index specified |
| *native [out]* | bool value if the format is native or not |

*Return Value*

`AMF_OK` if successful else returns `AMF_INVALID_ARG` if Index is out of range.

### AMFIOCaps: GetNumOfMemoryTypes

*Description* Gets the number of memory types supported.

```
virtual amf_int32 AMF_STD_CALL GetNumOfMemoryTypes()
const = 0;
```

*Return Value*

Returns the number of supported memory types from the list of types defined in `AMF_MEMORY_TYPE`.

### AMFIOCaps: GetMemoryTypeAt

*Description* Get the memory type for a particular index.

```
virtual AMF_RESULT AMF_STD_CALL GetMemoryTypeAt(
amf_int32 index,
AMF_MEMORY_TYPE* memType,
amf_bool* native) const = 0;
```

*Parameters*

| | |
|---|---|
| *index [in]* | index to list of memory type |
| *memType [out]* | memory type at the index specified |
| *native [out]* | bool value if the memory type is native or not |

*Return Value*

`AMF_OK` if successful else returns `AMF_INVALID_ARG` if Index is out of range.

### AMFIOCaps: IsInterlacedSupported

*Description* Gets information about whether interlaced is supported or not.

```
virtual amf_bool AMF_STD_CALL IsInterlacedSupported()
const = 0;
```

*Return Value*

Returns `TRUE` if supported else returns `FALSE`.

### AMFDecoderCaps

*Description* Class to implement methods to understand decoder capability.

The header file containing the interface definition located in `inc\amf\components\VideoDecoderCaps.h`.

```
class AMFDecoderCaps : public virtual AMFCaps
```

#### AMFDecoderCaps: GetMaxNumOfStreams

*Description* Method which returns the max. no of streams that can be decoded in parallel by the UVD.

```
virtual amf_int32 AMF_STD_CALL GetMaxNumOfStreams() const =
0;
```

*Return Value* Max. no of streams that can be decoded in parallel by the Hardware.

### AMFEncoderCaps

*Description* Class to implement methods to understand encoder capability.

The header file containing the interface definition located in `inc\amf\components\VideoEncoderCaps.h`.

```
class AMFEncoderCaps : public virtual AMFCaps
```

#### AMFEncoderCaps: GetMaxBitrate

*Description* Method which returns the max. bitrate supported by the encoder.

```
virtual amf_uint32 GetMaxBitrate() const = 0;
```

*Return Value* Max. bitrate supported by the encoder.

### AMFEncoderCaps: GetMaxNumOfStreams

*Description* Method which returns the max. no of streams that can be encoded in parallel by the VCE.

```
virtual amf_int32 AMF_STD_CALL GetMaxNumOfStreams()
const = 0;
```

*Return Value* Max. no of streams that can be encoded in parallel by the hardware.

## AMFH264EncoderCaps

*Description* Class to implement methods to understand the H.264 encoder capability.

The header file containing the interface definition located in `inc\amf\components\VideoEncoderVCECaps.h`.

```
class AMFH264EncoderCaps : public AMFEncoderCaps
```

### AMFH264EncoderCaps: GetNumOfSupportedProfiles

*Description* Get the number of profiles supported by the H.264 Encoder.

```
virtual amf_int32 GetNumOfSupportedProfiles() const = 0;
```

*Return Value* Number of supported profiles.

### AMFH264EncoderCaps: GetProfile

*Description* Get the profile for the specified index.

```
virtual AMF_VIDEO_ENCODER_PROFILE_ENUM
GetProfile(amf_int32 index) const = 0;
```

*Parameters*

| | |
|---|---|
| *index [in]* | Index to profiles mentioned in `AMF_VIDEO_ENCODER_PROFILE_ENUM` |

*Return Value* Profile enum value.

### AMFH264EncoderCaps: GetNumOfSupportedLevels

*Description* Get the number of levels supported by the H.264 Encoder.

```
virtual amf_int32 GetNumOfSupportedLevels() const = 0;
```

*Return Value* Number of supported levels.

### AMFH264EncoderCaps: GetLevel

*Description* Get the level for the specified index.

```
virtual amf_uint32 GetLevel(amf_int32 index) const = 0;
```

*Parameters*

| | |
|---|---|
| *index [in]* | Index. |

*Return Value* Level value.

### AMFH264EncoderCaps: GetNumOfRateControlMethods

*Description* Get the number of rate control methods supported by the H.264 Encoder.

```
virtual amf_int32 GetNumOfRateControlMethods() const =
0;
```

*Return Value* Number of supported rate control methods.

### AMFH264EncoderCaps: GetRateControlMethod

*Description* Get the rate control method for the specified index.

```
virtual AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_ENUM
GetRateControlMethod(amf_int32 index) const = 0;
```

*Parameters*

| | |
|---|---|
| *index [in]* | Index to rate control methods mentioned in the `AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_ENUM` enumerator. |

*Return Value* Rate control method enum value.

### AMFH264EncoderCaps: GetMaxSupportedJobPriority

*Description* Get the max supported job priority.

```
virtual H264EncoderJobPriority
GetMaxSupportedJobPriority() const = 0;
```

*Return Value*

Max. supported job priority from the list of priorities specified in the `H264EncoderJobPriority` enum.

### AMFH264EncoderCaps: IsBPictureSupported

*Description* Method to check whether BPictures is supported or not.

```
virtual amf_bool IsBPictureSupported() const = 0;
```

*Return Value*

Returns `TRUE` if supported else returns `FALSE`.

### AMFH264EncoderCaps: GetNumOfReferenceFrames

*Description* Gets the range for the number of supported reference frames.

```
virtual void GetNumOfReferenceFrames(
amf_uint32* minNum,
amf_uint32* maxNum) const = 0;
```

*Parameters*

| | |
|---|---|
| *minNum [out]* | min number of supported reference frames |
| *maxNum [out]* | max number of supported reference frames |

*Return Value*

### AMFH264EncoderCaps: CanOutput3D

*Description* Check whether the encoder can output 3D content.

```
virtual amf_bool CanOutput3D() const = 0;
```

*Return Value* Returns `TRUE` if 3D output is supported else returns `FALSE`.

### AMFH264EncoderCaps: GetMaxNumOfTemporalLayers

*Description* Get the maximum number of temporal enhancement layers supported by the encoder.

```
virtual amf_int32 GetMaxNumOfTemporalLayers() const = 0;
```

*Return Value* Maximum number of temporal enhancement layers.

### AMFH264EncoderCaps: IsFixedByteSliceModeSupported

*Description* Specifies whether Fixed byte slice mode supported by the encoder or not.

```
virtual amf_bool IsFixedByteSliceModeSupported() const =
0;
```

*Return Value* Returns `TRUE` if the encoder supports the mode; `FALSE` otherwise.

## Debug

### AMFTraceWriter

*Description* Class to implement an interface for custom trace writer.
The header file containing the interface definition is located in `inc\amf\core\Debug.h`.

```
class AMFTraceWriter;
```

### AMFTraceWriter: Write

*Description* Writes a string to a stream.

```
virtual void Write(const wchar_t* scope, const wchar_t*
message) = 0;
```

*Parameter* *message [in]* Output string.

### AMFTraceWriter: Flush

*Description* Flush the stream.

```
virtual void Flush() = 0;
```

### AMFTraceSetPath

*Description* Sets trace path.

```
AMF_CORE_LINK AMF_RESULT AMF_CDECL_CALL AMFTraceSetPath(const
wchar_t* path);
```

*Parameters*

*path [in]* Trace path to be set.

*Return Value*

`AMF_OK` if successful, else `AMF_FAIL`.

### AMFTraceGetPath

*Description* Gets trace path.

```
AMF_CORE_LINK AMF_RESULT AMF_CDECL_CALL AMFTraceGetPath (

wchar_t* path,
amf_size* pSize
);
```

*Parameters*

*path [out]* buffer able to hold *pSize symbols; path is copied there.

*pSize [in, out]* Size of buffer, returned needed size of buffer including zero terminator.

*Return Value*

`AMF_OK` if successful.

### AMFTraceEnableWriter

*Description* Enable/Disable trace to registered writer.

```
AMF_CORE_LINK bool AMF_CDECL_CALL  AMFTraceEnableWriter(
const wchar_t* writerID, bool enable);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | writer ID |
| *enable [in]* | If true and writer not enabled, insert writer to the list of enabled writers. If false and writer already enabled, Erase writer from list of enabled writers. |

*Return Value* Previous state: True if writer already enabled, else false.

### AMFTraceWriterEnabled

*Description* Return flag if writer enabled.

```
AMF_CORE_LINK bool AMF_CDECL_CALL
AMFTraceWriterEnabled(const wchar_t* writerID);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | Writer ID |

*Return Value* True if already enabled, else false.

### AMFTraceSetGlobalLevel

*Description* Sets trace level for writer and scope.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL
AMFTraceSetGlobalLevel(amf_int32 level);
```

*Parameters*

| | |
|---|---|
| *level [in]* | Trace level. |

*Return Value* Previous level value.

### AMFTraceGetGlobalLevel

*Description* Gets the trace level.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL  AMFTraceGetGlobalLevel();
```

*Return Value* Returns global trace level.

### AMFTraceSetWriterLevel

*Description* Sets trace level for writer.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL  AMFTraceSetWriterLevel(
const wchar_t* writerID,
amf_int32 level);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | writer ID |
| *level [in]* | Trace level |

*Return Value* Returns previous settings.

### AMFTraceGetWriterLevel

*Description* Gets trace level for writer.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL   AMFTraceGetWriterLevel(
const wchar_t* writerID);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | Writer ID. |

*Return Value* Trace level for the requested writer.

### AMFTraceSetWriterLevelForScope

*Description* Sets trace level for writer and scope.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL
AMFTraceSetWriterLevelForScope(
const wchar_t* writerID,
const wchar_t* scope,
amf_int32 level);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | Writer ID |
| *scope [in]* | Scope value |
| *level [in]* | Trace level to be set for writer and associated scope. |

*Return Value* Returns previous settings.

### AMFTraceGetWriterLevelForScope

*Description* Gets trace level for writer and scope.

```
AMF_CORE_LINK amf_int32 AMF_CDECL_CALL
AMFTraceGetWriterLevelForScope(
const wchar_t* writerID,
const wchar_t* scope);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | ID of the writer. |
| *scope [in]* | Scope value. |

*Return Value* Trace level value.

### AMFTraceRegisterWriter

*Description* Register custom trace writer.

```
AMF_CORE_LINK void AMF_CDECL_CALL   AMFTraceRegisterWriter(
const wchar_t* writerID, AMFTraceWriter* pWriter);
```

*Parameters*

| | |
|---|---|
| *writerID [in]* | Trace writer ID. |
| *pWritec* | Custom trace writer. |

### AMFTraceUnregisterWriter

*Description* Unregister custom trace writer.

```
AMF_CORE_LINK void AMF_CDECL_CALL   AMFTraceUnregisterWriter(
                                    const wchar_t* writerID);
```

*Parameters*

*writerID [in]* ID of the trace writer to unregister.

### AMFEnablePerformanceMonitor

*Description* Enable performance monitoring logging.

```
AMF_CORE_LINK void AMF_CDECL_CALL  AMFEnablePerformanceMonitor(bool
enable);
```

*Parameters*

*enable [in]* `True` to enable performance monitoring logging.

### AMFPerformanceMonitorEnabled

*Description* Check whether performance monitoring is enabled or disabled.

```
AMF_CORE_LINK bool AMF_CDECL_CALL   AMFPerformanceMonitorEnabled();
```

*Return Value*

`True` if performance monitoring is enabled, else `false`.

### AMFAssertsEnable

*Description* Enable asserts in checks.

```
AMF_CORE_LINK void AMF_CDECL_CALL   AMFAssertsEnable(bool enable);
```

*Parameters*

*enable [in]* Enables or disables asserts in checks.

### AMFAssertsEnabled

*Description* Returns true if asserts in checks are enabled.

```
AMF_CORE_LINK bool AMF_CDECL_CALL   AMFAssertsEnabled();
```

*Return Value*

Returns `true` if asserts in checks are enabled.

# Chapter 3
# Enumerations

## Memory-related enumerations

The header file containing the memory enumeration definition is located in `inc\amf\core\Data.h`, `inc\amf\core\Surface.h`, `inc\amf\core\Plane.h`.

### AMF_MEMORY_TYPE

*Description*

```
enum AMF_MEMORY_TYPE
{
        AMF_MEMORY_UNKNOWN = 0,
        AMF_MEMORY_HOST = 1,
        AMF_MEMORY_DX9 = 2,
        AMF_MEMORY_DX11 = 3,
        AMF_MEMORY_OPENCL = 4,
        AMF_MEMORY_OPENGL = 5,


};
```

### AMF_DATA_TYPE

*Description*

```
enum AMF_DATA_TYPE
{
        AMF_DATA_BUFFER = 0,
        AMF_DATA_SURFACE = 1,
        AMF_DATA_AUDIO_BUFFER = 2,
        AMF_DATA_USER = 1000,
        // all extensions will be AMF_DATA_USER + i
};
```

## Memory-related enumerations

The header file containing the memory enumeration definition is located in `inc\amf\core\Data.h`, `inc\amf\core\Surface.h`, `inc\amf\core\Plane.h`.

### AMF_SURFACE_FORMAT

*Description*

```
enum
AMF_SURFACE_FORMAT
{
AMF_SURFACE_UNKNOWN =  // < 1 - planar Y width x height + packed UV
0,                     width/2 x // height/2. 8 bits per component
AMF_SURFACE_NV12,

                       //< 2 - planar Y width x height + V width/2 x
AMF_SURFACE_YV12,      height/2  // + U width/2 x height/2. 8 bits per
                       component
                       //< 3 - packed - 8 bit per component
                       //< 4 - packed - 8 bit per component
AMF_SURFACE_BGRA,      //< 5 - packed - 8 bit per component
AMF_SURFACE_ARGB,      //< 6 - single component - 8 bit
AMF_SURFACE_RGBA,      //< 7 - planar Y width x height +
AMF_SURFACE_GRAY8,     // U width/2 x height/2 + V width/2 x height/2.
AMF_SURFACE_YUV420P,   // 8 bit per component

                       //< 8 - double component - 8 bit per component
                       //< 9 - YUY2: Byte 0=8-bit Y'0;
AMF_SURFACE_U8V8,      // Byte 1=8-bit Cb;
AMF_SURFACE_YUY2,      // Byte 2=8-bit Y'1;
                       // Byte 3=8-bit Cr


AMF_SURFACE_FIRST =
AMF_SURFACE_NV12,

AMF_SURFACE_LAST =
AMF_SURFACE_YUY2
};
```

### AMF_PLANE_TYPE

*Description*

```
enum AMF_PLANE_TYPE
{
        AMF_PLANE_UNKNOWN = 0,
        AMF_PLANE_PACKED = 1, // for all packed formats: BGRA, YUY2
        AMF_PLANE_Y = 2,
        AMF_PLANE_UV = 3,
        AMF_PLANE_U = 4,
        AMF_PLANE_V = 5,
};
```

### Memory-related enumerations

The header file containing the memory enumeration definition is located in `inc\amf\core\Data.h`, `inc\amf\core\Surface.h`, `inc\amf\core\Plane.h`.

## AMF_FRAME_TYPE

## Memory-related enumerations

The header file containing the memory enumeration definition is located in `inc\amf\core\Data.h`, `inc\amf\core\Surface.h`, `inc\amf\core\Plane.h`.

*Description*

## Memory-related enumerations

The header file containing the memory enumeration definition is located in inc\amf\core\Data.h, inc\amf\core\Surface.h, inc\amf\core\Plane.h.

```
enum AMF_FRAME_TYPE
{
// flags
AMF_FRAME_STEREO_FLAG = 0x10000000,
AMF_FRAME_LEFT_FLAG = AMF_FRAME_STEREO_FLAG | 0x20000000,
AMF_FRAME_RIGHT_FLAG = AMF_FRAME_STEREO_FLAG | 0x40000000,
AMF_FRAME_BOTH_FLAG = AMF_FRAME_LEFT_FLAG | AMF_FRAME_RIGHT_FLAG,
AMF_FRAME_INTERLEAVED_FLAG = 0x01000000,
AMF_FRAME_FIELD_FLAG = 0x02000000,
AMF_FRAME_EVEN_FLAG = 0x04000000,
AMF_FRAME_ODD_FLAG = 0x08000000,

// values
AMF_FRAME_UNKNOWN = -1,
AMF_FRAME_PROGRESSIVE = 0,
AMF_FRAME_INTERLEAVED_EVEN_FIRST =
AMF_FRAME_INTERLEAVED_FLAG |
AMF_FRAME_EVEN_FLAG,

AMF_FRAME_INTERLEAVED_ODD_FIRST =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_ODD_FLAG,

AMF_FRAME_FIELD_SINGLE_EVEN =
AMF_FRAME_FIELD_FLAG | AMF_FRAME_EVEN_FLAG,
AMF_FRAME_FIELD_SINGLE_ODD =
AMF_FRAME_FIELD_FLAG | AMF_FRAME_ODD_FLAG,

AMF_FRAME_STEREO_LEFT = AMF_FRAME_LEFT_FLAG,
AMF_FRAME_STEREO_RIGHT = AMF_FRAME_RIGHT_FLAG,
AMF_FRAME_STEREO_BOTH = AMF_FRAME_BOTH_FLAG,

AMF_FRAME_INTERLEAVED_EVEN_FIRST_STEREO_LEFT =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_EVEN_FLAG |
AMF_FRAME_LEFT_FLAG,

AMF_FRAME_INTERLEAVED_EVEN_FIRST_STEREO_RIGHT =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_EVEN_FLAG |
AMF_FRAME_RIGHT_FLAG,

AMF_FRAME_INTERLEAVED_EVEN_FIRST_STEREO_BOTH =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_EVEN_FLAG |
AMF_FRAME_BOTH_FLAG,

AMF_FRAME_INTERLEAVED_ODD_FIRST_STEREO_LEFT =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_ODD_FLAG |
AMF_FRAME_LEFT_FLAG,

AMF_FRAME_INTERLEAVED_ODD_FIRST_STEREO_RIGHT =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_ODD_FLAG |
AMF_FRAME_RIGHT_FLAG,

AMF_FRAME_INTERLEAVED_ODD_FIRST_STEREO_BOTH =
AMF_FRAME_INTERLEAVED_FLAG | AMF_FRAME_ODD_FLAG |
AMF_FRAME_BOTH_FLAG,

};
```

### Memory-related enumerations

The header file containing the memory enumeration definition is located in `inc\amf\core\Data.h`, `inc\amf\core\Surface.h`, `inc\amf\core\Plane.h`.

### Result-related enumerations

The header file containing the AMF result enumerations definition is located in `inc\amf\core\Result.h`.

## AMF_RESULT

*Description*

```
enum AMF_RESULT
{
AMF_OK = 0,
AMF_FAIL,

// common errors
AMF_UNEXPECTED,
AMF_ACCESS_DENIED,
AMF_INVALID_ARG,
AMF_OUT_OF_RANGE,
AMF_OUT_OF_MEMORY,
AMF_INVALID_POINTER,
AMF_NO_INTERFACE,
AMF_NOT_IMPLEMENTED,
AMF_NOT_SUPPORTED,
AMF_NOT_FOUND,
AMF_ALREADY_INITIALIZED,
AMF_NOT_INITIALIZED,
AMF_INVALID_FORMAT,// invalid data format
AMF_WRONG_STATE,
AMF_FILE_NOT_OPEN, // cannot open file

// device common codes
AMF_NO_DEVICE,

// device directx
AMF_DIRECTX_FAILED,

// device opencl
AMF_OPENCL_FAILED,

// device opengl
AMF_GLX_FAILED, //failed to use GLX

// device XV
AMF_XV_FAILED, //failed to use XV extension

// device alsa
AMF_ALSA_FAILED, //failed to use ALSA
```

### Result-related enumerations

The header file containing the AMF result enumerations definition is located in `inc\amf\core\Result.h`.

```
// component common codes

//result codes
AMF_EOF,
AMF_REPEAT,
AMF_INPUT_FULL,                     //returned by AMFComponent::SubmitInput if
                                    input queue is full

AMF_RESOLUTION_CHANGED,             //resolution changed client needs to
                                    Drain/Terminate/Init
AMF_RESOLUTION_UPDATED              //resolution changed in adaptive mode. New
                                    ROI will be set on output on newly decoded
                                    frames.

//error codes
AMF_INVALID_DATA_TYPE,              //invalid data type
AMF_INVALID_RESOLUTION,             //invalid resolution (width or height)
AMF_CODEC_NOT_SUPPORTED,            //codec not supported
AMF_SURFACE_FORMAT_NOT_SUPPORTED,   //surface format not supported
AMF_SURFACE_MUST_BE_SHARED          //surface should be shared (DX11:
                                    (MiscFlags & D3D11_RESOURCE_MISC_SHARED) ==
                                    0, DX9: No shared handle found

//component video decoder           //failed to create the decoder
AMF_DECODER_NOT_PRESENT,
AMF_DECODER_SURFACE_ALLOCATION_FA   //failed to create the surface for decoding
ILED,
AMF_DECODER_NO_FREE_SURFACES,

//component video encoder           //failed to create the encoder
AMF_ENCODER_NOT_PRESENT,



//component dem
AMF_DEM_ERROR,
AMF_DEM_PROPERTY_READONLY,
AMF_DEM_REMOTE_DISPLAY_CREATE_FAI
LED,
AMF_DEM_START_ENCODING_FAILED,
AMF_DEM_QUERY_OUTPUT_FAILED,
};
```

## Video Encoder enumerations

The header file containing the Video Encoder enumerations definition is located in `inc\amf\components\VideoEncoderVCE.h`.

### AMF_VIDEO_ENCODER_USAGE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_USAGE_ENUM
{
    AMF_VIDEO_ENCODER_USAGE_TRANSCONDING = 0,
    AMF_VIDEO_ENCODER_USAGE_ULTRA_LOW_LATENCY,
    AMF_VIDEO_ENCODER_USAGE_LOW_LATENCY,
    AMF_VIDEO_ENCODER_USAGE_WEBCAM
};
```

### AMF_VIDEO_ENCODER_PROFILE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_PROFILE_ENUM
{
    AMF_VIDEO_ENCODER_PROFILE_BASELINE = 66,
    AMF_VIDEO_ENCODER_PROFILE_MAIN = 77,
    AMF_VIDEO_ENCODER_PROFILE_HIGH = 100
};
```

## Video Encoder enumerations

The header file containing the Video Encoder enumerations definition is located in `inc\amf\components\VideoEncoderVCE.h`.

### AMF_VIDEO_ENCODER_SCANTYPE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_SCANTYPE_ENUM
{
    AMF_VIDEO_ENCODER_SCANTYPE_PROGRESSIVE = 0,
    AMF_VIDEO_ENCODER_SCANTYPE_INTERLACED
};
```

### AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_ENUM
{
    AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_CONSTRAINED_QP = 0,
    AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_CBR,
    AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_PEAK_CONSTRAINED_VBR,
    AMF_VIDEO_ENCODER_RATE_CONTROL_METHOD_LATENCY_CONSTRAINED_VBR
};
```

### AMF_VIDEO_ENCODER_QUALITY_PRESET_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_QUALITY_PRESET_ENUM
{
    AMF_VIDEO_ENCODER_QUALITY_PRESET_BALANCED = 0,
    AMF_VIDEO_ENCODER_QUALITY_PRESET_SPEED,
    AMF_VIDEO_ENCODER_QUALITY_PRESET_QUALITY
};
```

### AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_ENUM
{
    AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_NONE = 0,
    AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_FRAME,
    AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_TOP_FIELD,
    AMF_VIDEO_ENCODER_PICTURE_STRUCTURE_BOTTOM_FIELD
};
```

### Video Encoder enumerations

The header file containing the Video Encoder enumerations definition is located in `inc\amf\components\VideoEncoderVCE.h`.

## AMF_VIDEO_ENCODER_PICTURE_TYPE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_PICTURE_TYPE_ENUM
{
    AMF_VIDEO_ENCODER_PICTURE_TYPE_NONE = 0,
    AMF_VIDEO_ENCODER_PICTURE_TYPE_SKIP,
    AMF_VIDEO_ENCODER_PICTURE_TYPE_IDR,
    AMF_VIDEO_ENCODER_PICTURE_TYPE_I,
    AMF_VIDEO_ENCODER_PICTURE_TYPE_P,
    AMF_VIDEO_ENCODER_PICTURE_TYPE_B
};
```

## AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_ENUM

*Description*

```
enum AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_ENUM
{
    AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_IDR,
    AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_I,
    AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_P,
    AMF_VIDEO_ENCODER_OUTPUT_DATA_TYPE_B
};
```

## Video Decoder enumerations

The header file containing the Video Decoder enumerations definition is located in `inc\amf\components\VideoDecoderUVD.h`.

### AMF_VIDEO_DECODER_MODE_ENUM

*Description*

```
enum AMF_VIDEO_DECODER_MODE_ENUM
{
AMF_VIDEO_DECODER_MODE_REGULAR = 0,  // DPB delay is based on number of
                                     // reference frames + 1 (from SPS)

AMF_VIDEO_DECODER_MODE_COMPLIANT,    // DPB delay is based on profile - up
                                     to 16

AMF_VIDEO_DECODER_MODE_LOW_LATENCY,  // DPB delay is 0. Expect stream with
                                     // no reordering in P-Frames or B-
                                     // Frames. B-frames can be present as
                                     // long as they do not introduce any
                                     // frame re-ordering
};
```

### AMF_TIMESTAMP_MODE_ENUM

*Description*

```
enum AMF_TIMESTAMP_MODE_ENUM
{
AMF_TS_PRESENTATION = 0,             // default. decoder will preserve
                                     // timestamps from input to output

AMF_TS_SORT,                         // decoder will resort PTS list
AMF_TS_DECODE                        // timestamps reflect decode order -
};                                   decoder will reuse them
```

## Video Converter enumerations

The header file containing the Video Converter enumerations definition is located in `inc\amf\components\VideoConverter.h`.

### AMF_VIDEO_CONVERTER_SCALE_ENUM

*Description*

```
enum AMF_VIDEO_CONVERTER_SCALE_ENUM
{
    AMF_VIDEO_CONVERTER_SCALE_INVALID          = -1,
    AMF_VIDEO_CONVERTER_SCALE_BILINEAR          = 0,
    AMF_VIDEO_CONVERTER_SCALE_BICUBIC           = 1
};
```

### Video Converter enumerations

The header file containing the Video Converter enumerations definition is located in `inc\amf\components\VideoConverter.h`.

## AMF_VIDEO_CONVERTER_COLOR_PROFILE_ENUM

*Description*

```
enum AMF_VIDEO_CONVERTER_COLOR_PROFILE_ENUM
{
    AMF_VIDEO_CONVERTER_COLOR_PROFILE_UNKNOWN = -1,
    AMF_VIDEO_CONVERTER_COLOR_PROFILE_601 = 0,
    AMF_VIDEO_CONVERTER_COLOR_PROFILE_709 = 1,
    AMF_VIDEO_CONVERTER_COLOR_PROFILE_COUNT
};
```

### Acceleration enumerations

The header file containing the AMF property access enumerations definition is located in `inc\amf\components\ComponentCaps.h`.

## AMF_ACCELERATION_TYPE

*Description*

```
enum AMF_ACCELERATION_TYPE
    {
        AMF_ACCEL_NOT_SUPPORTED = -1,
        AMF_ACCEL_HARDWARE,
        AMF_ACCEL_GPU,
        AMF_ACCEL_SOFTWARE
    };
```

## Job Priority enumerations

The header file containing the AMF property access enumerations definition is located in `inc\amf\components\VideoEncoderVCECaps.h`.

### H264EncoderJobPriority

*Description*

```
enum H264EncoderJobPriority
    {
        AMF_H264_ENCODER_JOB_PRIORITY_NONE,
        AMF_H264_ENCODER_JOB_PRIORITY_LEVEL1,
        AMF_H264_ENCODER_JOB_PRIORITY_LEVEL2
    };
```

## Property Access enumerations

The header file containing the AMF property access enumerations definition is located in `inc\amf\core\PropertyStorageEx.h`.

### AMF_PROPERTY_ACCESS_TYPE

*Description*

```
enum AMF_PROPERTY_ACCESS_TYPE
{
AMF_PROPERTY_ACCESS_PRIVATE = 0,
AMF_PROPERTY_ACCESS_READ = 0x1,
AMF_PROPERTY_ACCESS_WRITE = 0x2,
AMF_PROPERTY_ACCESS_READ_WRITE = (AMF_PROPERTY_ACCESS_READ |
AMF_PROPERTY_ACCESS_WRITE),
AMF_PROPERTY_ACCESS_WRITE_RUNTIME = 0x4,
AMF_PROPERTY_ACCESS_FULL = 0xFF,
};
```

### Variant-specific enumerations

The header file containing the AMF variant type enumerations definition is located in `inc\amf\core\Variant.h`.

## AMF_VARIANT_TYPE

*Description*

```
enum AMF_VARIANT_TYPE
    {
        AMF_VARIANT_EMPTY       = 0,

        AMF_VARIANT_BOOL        = 1,
        AMF_VARIANT_INT64       = 2,
        AMF_VARIANT_DOUBLE      = 3,

        AMF_VARIANT_RECT        = 4,
        AMF_VARIANT_SIZE        = 5,
        AMF_VARIANT_POINT       = 6,
        AMF_VARIANT_RATE        = 7,
        AMF_VARIANT_RATIO       = 8,
        AMF_VARIANT_COLOR       = 9,

        AMF_VARIANT_STRING      = 10,  // value is char*
        AMF_VARIANT_WSTRING     = 11,  // value is wchar*
        AMF_VARIANT_INTERFACE   = 12,  // value is AMFInterface*
};
```

# Chapter 4
# Structure Definitions

## AMFRect

*Description*

Structure containing the coordinates for a rectangular object as well as functions to return the width and height.
The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFRect
{
                amf_int32 left;
                amf_int32 top;
                amf_int32 right;
                amf_int32 bottom;

                bool operator==(const AMFRect& other) const
                {
                return left == other.left &&
                top == other.top &&
                right == other.right &&
                bottom == other.bottom;
                }
                amf_int32 Width() const { return right - left; }
                amf_int32 Height() const { return bottom - top; }

};
                //left -> left coordinate for the rectangular object
                //top -> top coordinate for the rectangular object
                //right -> right coordinate for the rectangular object
                //bottom -> bottom coordinate for the rectangular object
                //Width -> Returns width of the rectangular object
                //Height -> Returns height of the rectangular object
```

## AMFSize

*Description*

Structure file containing size parameters. The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFSize
{
                amf_int32 width;
                amf_int32 height;
                bool operator==(const AMFSize& other) const
                {
                return width == other.width && height == other.height;
                }

};
                //width -> width value
                //height -> height value
```

### AMFPoint

*Description*

Structure containing coordinate parameters.
The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFPoint
{
    amf_int32 x;
    amf_int32 y;
    bool operator==(const AMFPoint& other) const
    {
         return x == other.x && y == other.y;
    }
};

//X -> x coordinate
//Y -> y coordinate
```

### AMFRate

*Description*

Structure containing Frame Rate parameters.
The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFRate
{
    amf_uint32 num;
    amf_uint32 den;
    bool operator==(const AMFRate& other) const
    {
         return num==other.num && den==other.den;

    }
};

//Num -> Frame rate numerator
//Den -> Frame rate denominator
```

### AMFRatio

*Description*

Structure containing Ratio parameters.
The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFRatio
{
    amf_uint32 num;
    amf_uint32 den;
    bool operator==(const AMFRatio& other) const
    {
         return num==other.num && den==other.den;

    }
};

//Num -> Numerator value for a ratio
//Den -> Denominator for a ratio
```

## AMFColor

*Description*

Structure containing color parameters.
The header file containing the structure definition is located in `inc\amf\core\Platform.h`.

```
struct AMFColor
{
union
{
        struct
        {
            amf_uint8 r;
            amf_uint8 g;
            amf_uint8 b;
            amf_uint8 a;
        };
        amf_uint32 rgba;
};
bool operator==(const AMFColor& other) const
{
return r == other.r &&
g == other.g &&
b == other.b &&
a == other.a;
}
};

//r -> 8bit Red component value
//g -> 8bit Green component value
//b -> 8bit Blue component value
//a -> 8bit Alpha component value
//rgba -> 32bit RGBA value
```

## AMFEnumDescriptionEntry

*Description*

Structure defining enumeration description parameters.
The header file containing the structure definition is located in `inc\amf\core\PropertyStorageEx.h`..

```
struct AMFEnumDescriptionEntry
{
amf_int             value;
const wchar_t*      name;
};

//Value -> value of the enum
//Name -> name of the enum
```

## AMFPropertyInfo

*Description*

Structure containing AMF property information related members .
The header file containing the structure definition is located in
inc\amf\core\PropertyStorageEx.h.

```
struct AMFPropertyInfo
{
const wchar_t* name;          // Name of the property


const wchar_t* desc;          // Description
AMF_VARIANT_TYPE type;        // Type from AMF_VARIANT_TYPE enum

AMF_PROPERTY_CONTENT_TYPE     // Content type
contentType;

AMFVariantStruct              // default value
defaultValue;

                              // minimum value
AMFVariantStruct minValue;    // maximum value
AMFVariantStruct maxValue;        // Access type from
                              //AMF_PROPERTY_ACCESS_TYPE enum
AMF_PROPERTY_ACCESS_TYPE
accessType;

const                         //Pointer to enum description entry
AMFEnumDescriptionEntry*      // structure
pEnumDescription;



AMFPropertyInfo() :
name(NULL),
desc(NULL),
type(),
contentType(),
defaultValue(),
minValue(),
maxValue(),
accessType(AMF_PROPERTY_ACCESS_FULL),
pEnumDescription(NULL)
{}


// Method to know if property can be read from or not
bool AllowedRead() const
{
return (accessType & AMF_PROPERTY_ACCESS_READ) != 0;
}

// Method to know if property can be written to or not
bool AllowedWrite() const
{
return (accessType & AMF_PROPERTY_ACCESS_WRITE) != 0;
}

// Method to know if property can be updated at runtime
bool AllowedChangeInRuntime() const
{
return (accessType & AMF_PROPERTY_ACCESS_WRITE_RUNTIME) != 0;
}

virtual ~AMFPropertyInfo(){}
```

## AMFPropertyInfo

```
AMFPropertyInfo(const AMFPropertyInfo& propery) : name(propery.name),
desc(propery.desc),
type(propery.type),
contentType(propery.contentType),
defaultValue(propery.defaultValue),
minValue(propery.minValue),
maxValue(propery.maxValue),
accessType(propery.accessType),
pEnumDescription(propery.pEnumDescription)
{}

AMFPropertyInfo& operator=(const AMFPropertyInfo& propery)
{
            desc = propery.desc;
            type = propery.type;
            contentType = propery.contentType;
            defaultValue = propery.defaultValue;
            minValue = propery.minValue;
            maxValue = propery.maxValue;
            accessType = propery.accessType;
            pEnumDescription = propery.pEnumDescription;

            return *this;
}
};
```

## AMFVariantStruct

*Description*

The structure containing AMF variant related members. The header file containing the structure definition is located in `inc\amf\core\Variant.h`.

```
struct AMFVariantStruct
    {
        AMF_VARIANT_TYPE    type;
        union
        {
            amf_bool        boolValue;
            amf_int64       int64Value;
            amf_double      doubleValue;
            char*           stringValue;
            wchar_t*        wstringValue;
            AMFInterface*   pInterface;
            AMFRect         rectValue;
            AMFSize         sizeValue;
            AMFPoint        pointValue;
            AMFRate         rateValue;
            AMFRatio        ratioValue;
            AMFColor        colorValue;
        };
    };

//boolValue -> represents a bool value
//int64Value -> represents 64bit integer value
//doubleValue -> represents double value
//stringValue -> represents a string value
//wstringValue -> represents a wide string value
//pInterface -> represents pointer to AMFInterface
//rectValue -> parameter of type AMFRect to hold
//coordinates of a rectangular object
//sizeValue -> parameter of type AMFSize to hold
width & height parameters

//pointValue -> parameter of type AMFPoint to hold
x, y coordinates

//rateValue -> parameter of type AMFRate to hold
rate control values

//ratioValue -> parameter of type AMFRatio to hold
ratio values

//colorValue -> parameter of type AMFColor to hold
rgba color component values
```

# Chapter 5
# Using the AMD AMF API

The typical workflow for an application using the AMD AMF API to accelerate Video Encoding using the AMD hardware Video Coding Engine (VCE) is as follows:

- Create and initialize context
  - Allocate context via factory function `AMFCreateContext`()
  - Set or initialize device (Direct X, OpenCL, OpenGL). E.g. DX11 initializes using AMFContext::InitDX11()
- Create component via factory function `AMFCreateComponent()`
- Initialize encoder component
  - Set all optional properties on component `AMFPropertyStorage::SetProperty()`
  - Initialize the component by `AMFComponent::Init()`
- Create input data object
  - Allocate input surface with attached `(AMFContext::CreateSurfaceFrom<>)` or allocated internally data `(AMFContext::AllocSurface)`
  - Copy input data to input data object using native data-access functionality: `AMFSurface::GetPlane()`, `AMFPlane::GetNative()`
- Submit data object to encoder
  - Set additional parameters on the data object (e.g. some application ID if needed) using `AMFPropertyStorage::SetProperty()`
  - Submits data to component by AMFComponent::SubmitInput()
- Queries for results (likely in a separate thread) by `AMFComponent::QueryOutput`
- At the end of the file execute `drain` to force the component to return all accumulated frames: `AMFComponent::Drain()`
- Checks for EOF error returning from `QueryResult()` to detect end of drain
- Terminate component and context
  - Terminate component and release all internal resources by `AMFComponent::Terminate()`
  - Terminate context by `AMFContext::Terminate()`

- Release the `AMFContext` and `AMFComponent` pointers

The following figure depicts these steps.

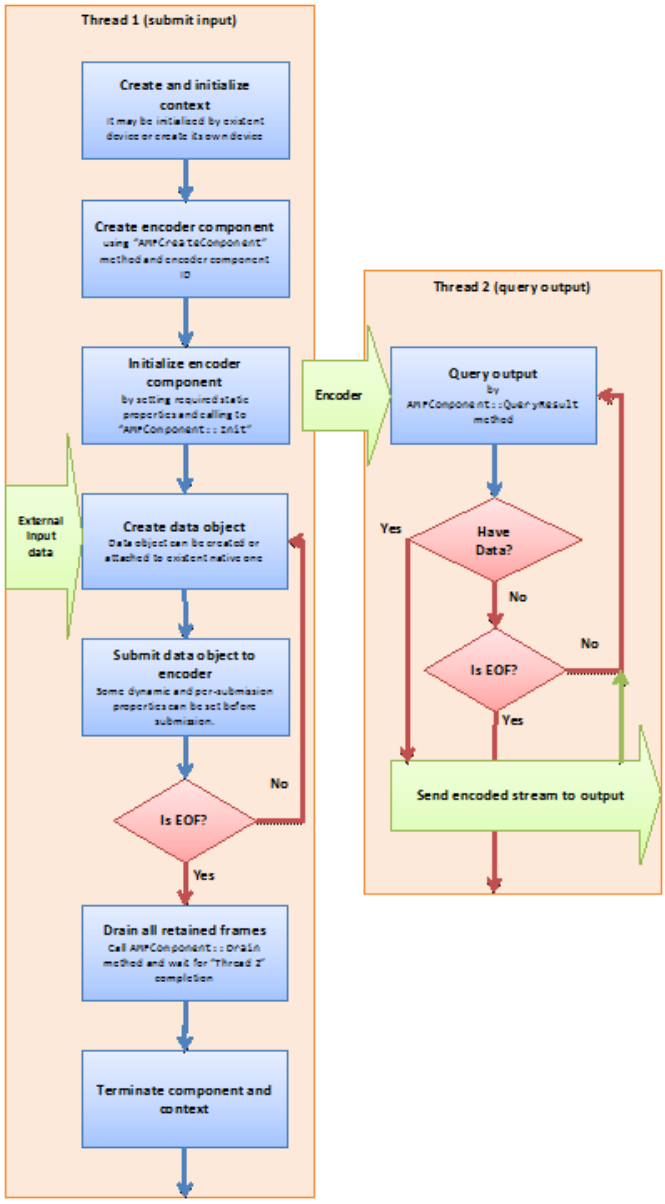



**Figure 5.1 Typical workflow for an application using the AMD AMF API**

The AMF Video Encoder component is based on the standard AMF interfaces, as shown in the following figure:

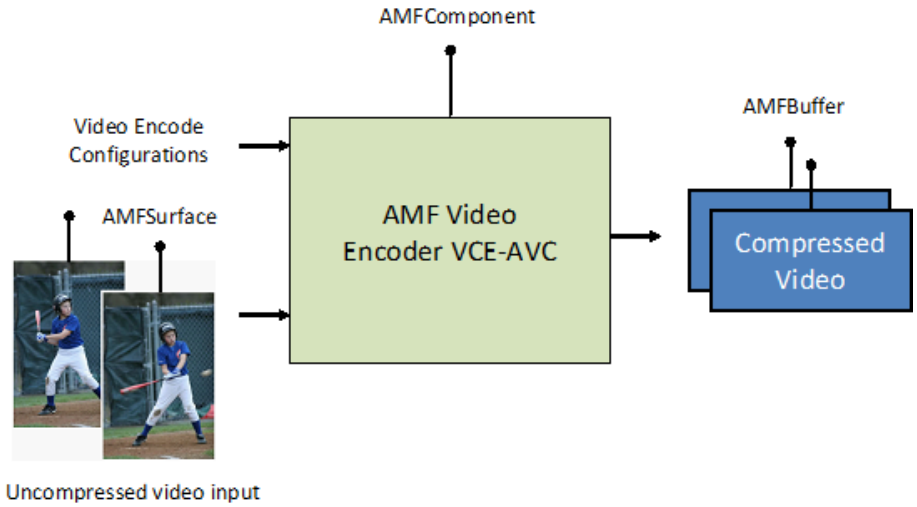



**Figure 5.2 AMF Interfaces used in the AMD Video Encoder**

The AMF Video Encoder uses these interfaces in the following manner:

- The Video Encoder object implements the `AMFComponent` interface.
- The Video Encoder object can be created by the `AMFCreateComponent` object using `AMFVideoEncoderHW_AVC`.
- Input frames are represented by an implementation of the `AMFSurface` interface
- Compressed output bit stream buffers implement the `AMFBuffer` interface.

## 5.1 Device Selection (DirectX9/Direct11/OpenGL/OpenCL)

The `AMFContext` allows interoperability with different hardware acceleration frameworks. It can create a new device context or be attached to an existing one to provide efficient interoperability with other portions of the application pipeline.

Once the `AMFContext` object is initialized with the appropriate device, the `AMFCreateComponent` function can be called to create an instance of the encoder. Since the `AMFContext` interface is derived from the `AMFPropertyStorage` interface, it provides support to query read-only properties of the selected device.

To initialize the device, the following components must be initialized:

- The OpenCL engine must be initialized (`AMFContext::InitOpenCL`) before using the AMF Video Encoder.
- The DirectX (9 or 11) engine must be initialized (`AMFContext::InitDX9` or `AMFContext::InitDX11`) when OpenGL or OpenCL is used in the AMF Video Encoder.

- DirectX 9 must be initialized when DirectX 11.0 is used.

## 5.2 Video Encoder I/O

### 5.2.1 Video Encoder Input

Input frames are represented by the `AMFSurface` interface when submitted to the encoder component. The encoder will implicitly control various aspects of the encoding job (e.g., resolution) based on the input frame properties. The encoder will automatically detect any dynamic resolution changes and apply them to the encoded bit stream.

### 5.2.2 Video Encoder Output

The following figure illustrates how to use the encoder component's `QueryResult()` call to retrieve the encoded video bitstream buffers:

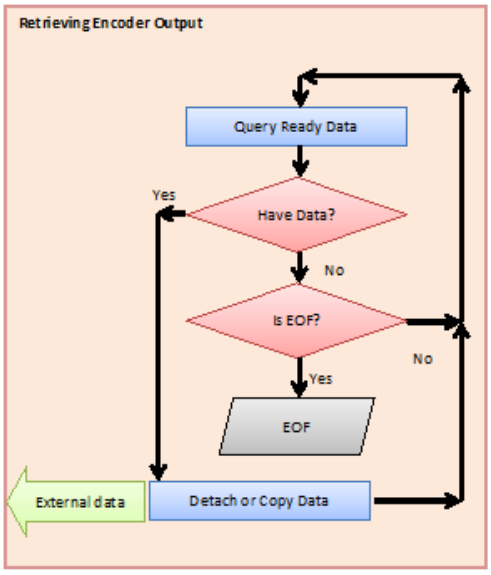



**Figure 5.3 Retrieving the encoded video bitstream buffers**

This call is non-blocking, which allows it to be used either in the input data thread, or in a separate output thread. The call will return immediately, even if there is no encoded bitstream data available to pick-up.

**Note:** In the event that B-pictures are enabled, the encoder may require multiple input frames before outputting encoded frames. The `Drain()` call can be used to flush the encoder's internal queue of input and output frames. B-pictures are bi-predicted frames which can use both previous and forward frames for data reference to get the highest amount of data compression.

# Chapter 6
# Pipeline Framework

Chapter 5 described how to use the AMF APIs to create, initialize, execute and terminate individual processing elements for any use-case. This chapter focusses more on encapsulating a wrapper or framework over the AMF APIs to ease the use of the APIs and to provide a starting point for developers working on AMF.

## 6.1 Framework

The framework uses a pipeline-based architecture. To conceptualize the framework, review the simple encode pipeline provided in the SimpleEncode sample and depicted below:

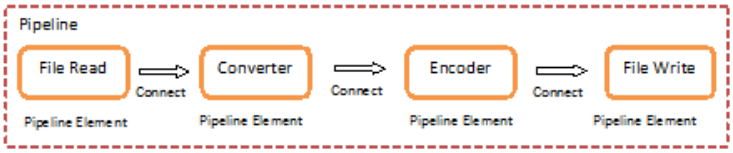



**Figure 6.1 Pipeline Framework and Elements**

As observed in the above figure, each AMF Component in a use-case is called "Pipeline Element" and a collection of Pipeline Elements is called "Pipeline".

The Pipeline Elements are "connected" together to enable data flow between the pipeline elements.

## 6.2 Class definitions of pipeline elements

### Pipeline Element

*Description*

The `PipelineElement` class is the base class describing methods to submit input and receive output from AMF Component (`PipelineElement`).

The header file containing the interface definition located in `samples\amf\common\inc\PipelineElement.h`.

The source file containing the definition of these interface is located in `samples\amf\common\src\PipelineElement.cpp`.

```
class PipelineElement
{
public:
// Get the number of slots supported at the input of the element
virtual amf_int32 GetInputSlotCount() { return 1; }

// The number of slots supported at the output of the element
virtual amf_int32 GetOutputSlotCount() { return 1; }

// Method to feed data to the pipeline element
virtual AMF_RESULT SubmitInput(amf::AMFData* pData, amf_int32 slot) {
return SubmitInput(pData); }
virtual AMF_RESULT SubmitInput(amf::AMFData* pData) { return
AMF_NOT_SUPPORTED; }

// Method to receive output from the pipeline element
virtual AMF_RESULT QueryOutput(amf::AMFData** ppData, amf_int32 slot) {
return QueryOutput(ppData); }
virtual AMF_RESULT QueryOutput(amf::AMFData** ppData) { return
AMF_NOT_SUPPORTED; }


// Method to drain the pipeline element
virtual AMF_RESULT Drain() { return AMF_NOT_SUPPORTED; }

// Method to print the execution result
virtual std::wstring       GetDisplayResult() { return std::wstring(); }

virtual ~PipelineElement(){}
protected:
PipelineElement():m_host(0){}

Pipeline* m_host;
};
```

## Pipeline

*Description*

The Pipeline class is the base class from which the other use-case specific pipelines such as `EncodePipeline`, `DecodePipeline`, `TranscodePipeline` are derived. It contains methods to connect individual pipeline element and form a use-case specific Pipeline, Start/Stop processing data in a Pipeline.

The header file containing the interface definition located in `samples\amf\common\inc\Pipeline.h`.

The source file containing implementation of the interface is location in `samples\amf\common\src\Pipeline.cpp`.

```
class Pipeline
{
friend class PipelineConnector;
typedef std::shared_ptr<PipelineConnector> PipelineConnectorPtr;

public:
Pipeline();
virtual ~Pipeline();

// Method to connect one pipeline element to another
AMF_RESULT Connect(
PipelineElementPtr pElement,
amf_int32 queueSize,
bool syncronized = false);

AMF_RESULT Connect(
PipelineElementPtr pElement,
amf_int32 slot,
PipelineElementPtr upstreamElement, amf_int32 upstreamSlot,
amf_int32 queueSize,
bool syncronized = false);

// Start a Pipeline
virtual AMF_RESULT Start();

// Stop a Pipeline
virtual AMF_RESULT Stop();

// Get state of Pipeline:  NotReady, Ready, Running, EOF
PipelineState GetState();

// Performance and Display related methods
virtual void DisplayResult();
double GetFPS();
double GetProcessingTime();
amf_int64 GetNumberOfProcessedFrames();

private:
// This method is executed when EOF is encountered
void OnEof();

amf_int64   m_startTime;
amf_int64   m_stopTime;

typedef std::vector<PipelineConnectorPtr> ConnectorList;
ConnectorList m_connectors;
PipelineState m_state;
AMFCriticalSection m_cs;
};
```

## 6.3 Application Workflow

The following is the typical workflow of an application that uses the AMF APIs:

- Create a use-case specific pipeline derived from the `Pipeline` class
- Initialize the Pipeline
- Start/run the Pipeline
- Terminate the Pipeline

### 6.3.1 Initialize the pipeline

- Create AMF Context: `AMFCreateContext(&m_pContext);`
- Initialize the DirectX Device based on the user specified engine memory type. If `engine Memory Type == DX9`, initialize the appropriate DirectX 9 device (adapterID)

  ```
  res = m_deviceDX9.Init(true, adapterID, false, 1, 1);
  res = m_pContext->InitDX9(m_deviceDX9.GetDevice());
  ```

  The above functions are defined in:
  // Header file: `samples\amf\common\inc\DeviceDX9.h`
  // Source file: `samples\amf\common\src\DeviceDX9.cpp`

  If `engine memory type == DX11`, initialize the appropriate DirectX 11 device (adapter ID)

  ```
  res = m_deviceDX11.Init(adapterID, false);
  res = m_pContext->InitDX11(m_deviceDX11.GetDevice());
  ```

  The above functions are defined in:
  // Header file: `samples\amf\common\inc\DeviceDX11.h`
  // Source file: `samples\amf\common\src\DeviceDX11.cpp`.
- Create and initialize the the individual `PipelineElements` of the Pipeline.
  **Simple Encoder Pipeline:**
  For example, in the case of Simple Encoder, the pipeline is:
  Raw File Read ->Encoder ->Encoded Stream File Write.

  The **Raw File Reader**:

  - Initializes the raw file reader pipeline element.
  - Reads uncompressed data
  - Supported formats: ARGB, BGRA, RGBA, NV12, YV12, YUV420P
  - Header file: `samples\amf\common\inc\RawStreamReader.h`
    Source file: `samples\amf\common\inc\RawStreamReader.cpp`
  - In addition to the `init` method, also implements component-specific `QueryOutput()` method.

The **Encoder**:

- Corresponds to the Encoder pipeline element.
- The Encoder engine depends on how context is initialized (DX9, DX9Ex or DX11).
- The native input memory type is the same as engine type. Natively supports only NV12 as input (both DX9/DX11 case). If passed any other format BGRA, AGRA, RGBA, YV12, YUV420P, it will be converted by the internal converter before being passed along to the Encoder block.
- The incoming surface format must be specified in `m_pEncoder->Init`.
- The Encoder output buffers are only in HOST memory because they are compressed.

  Encoder input buffers are AMF Surfaces. AMF supports several video memory types for 2D surfaces: DX9, DX9Ex, DX11, OpenCL, OpenGL, Host.

  AMF provides conversion between these types using two methods, `AMFData::Convert()` and `AMFData::Duplicate()`. These conversions will try to use interop if possible. If interop is not available AMF will still do conversion through HOST memory.

The **Compressed Stream Writer**:

- Initializes the encoded stream writer pipeline element.
- Header file: `samples\amf\common\inc\PlatformWindows.h`. Source file: `samples\amf\common\src\PlatformWindows.h`.

**Simple Decoder Pipeline:**

Similarly, in the Simple Decoder sample, the pipeline is:
Encoded Stream File Parser -> Decoder -> Converter -> Raw Data Writer.

The **Compressed Stream Parser**:

- Initializes the Parser.
- Currently supports H.264 Elementary stream parsing.
- Header files: `samples\amf\common\inc\BitStreamParser.h` and `BitStreamParserH264.h`.
  Source files:
  `samples\amf\common\src\BitStreamParser.cpp` and `BitStreamParserH264.cpp`.

The **Decoder**:

- Corresponds to the Decoder pipeline element.
- The Decoder engine depends on how context is initialized (DX9, DX9Ex or DX11).
- The Output memory type is the same as engine type.
  Natively (without internal conversion) outputs only NV12 (both DX9/DX11 case).

  Use internal converter to receive DX9: (BGRA/NV12); DX11: (BGRA/RGBA/NV12).

  Outgoing surface format must be specified in `m_pDecoder->Init`.

  Decoder input buffers are only in HOST memory because they are compressed.
  Decoder output buffers are AMF Surfaces. AMF supports several video memory types for 2D surfaces: DX9, DX9Ex, DX11, OpenCL, OpenGL, Host.

  AMF provides conversion between these types using two methods, `AMFData::Convert()` and `AMFData::Duplicate()`. These conversions will try to use interop if possible. If interop is not available AMF will still do conversion through HOST memory.

The **Converter**:

- Component to Color convert, scale input content.
- Supported Native memory types - DX9, DX9Ex, DX11 and OpenCL.
  Converter Engine depends on output format (AMF_VIDEO_CONVERTER_MEMORY_TYPE). Can be HOST, OpenCL or internal GPU processing>

  In case of output memory type HOST, engine will be CPU (HOST).
  In case of output memory type DX9/DX11 and no OpenGL/OpenCL device in context- engine will be internal GPU processing.
  In case of output memory type DX9/DX11 and OpenGL/OpenCL device in context - engine will be OpenCL

  Internally, the converter uses one of two technologies: Internal GPU Processing or OpenCL. If the application explicitly calls `AMFContext::InitOpenCL()`, the converter will use OpenCL. If not, it will invoke Internal GPU Processing.
- Supports input formats: NV12, BGRA, AGRA, RGBA, YV12, YUV420P.
  Supports output formats: NV12, BGRA, AGRA, RGBA, YV12, YUV420P, but limited by memory type:

DX9: (BGRA/NV12)
DX11: (BGRA/RGBA/NV12)
OpenGL (BGRA/RGBA)
OpenCL (NV12, BGRA, AGRA, RGBA, YV12, YUV420P).

- Converter input and output buffers are AMF Surfaces.
  AMF supports several video memory types for 2D surfaces: DX9, DX9Ex, DX11, OpenCL, OpenGL, Host.

  AMF provides conversion between these types using two methods, `AMFData::Convert()` and `AMFData::Duplicate()`. These conversions will try to use interop if possible. If interop is not available AMF will still do conversion through HOST memory.

The **Raw Data Writer**:

- Initializes the raw decoded output.
- Writes the uncompressed, decoded data.
- Header file: `samples\amf\common\inc\RawStreamWriter.h`
  Source file:
  `samples\amf\common\inc\RawStreamWriter.cpp`.
- In addition to the `init` method, also implements component specific `SubmitInput()` method.

After the individual pipeline elements (AMF Components) are created and initialized, they must be connected to form a Pipeline.

In the case of **Simple Encoder**, the connect pipeline would look like this:

```
Connect(m_pReader, 4);
Connect(PipelineElementPtr(new PipelineElementEncoder(m_pEncoder,
pParams,
frameParameterFreq, dynamicParameterFreq)), 10);
Connect(m_pStreamWriter, 5);
```

In the case of **Simple Decoder**, the connect pipeline would look like this:

```
Connect(m_pParser, 10);
Connect(PipelineElementPtr(new
PipelineElementAMFComponent(m_pDecoder)), 4);
Connect(PipelineElementPtr(new
PipelineElementAMFComponent(m_pConverter)), 4);
Connect(m_pFramesConsumer, 4);
```

The Pipeline Class defined earlier defines the 'connect' routine, wherein the first parameter is the 'PipelineElement' and the second is the "queue' size.

For each element in the Pipeline, an object of type `PipelineConnector` is created to connect two pipelines. The output of one pipeline element is connected to the input of another element based on the slot numbers.

The class definition of the `PipelineConnector` class is available in `Pipeline.cpp`.

## PipelineConnector

*Description*

The `PipelineConnector` class is the class defining the connection between the output of one element to the input of another element.

The source file containing the definition of these interfaces is located in `samples\amf\common\src\Pipeline.cpp`.

```
class PipelineConnector
{
    friend class Pipeline;
    friend class InputSlot;
    friend class OutputSlot;
protected:

public:
PipelineConnector(Pipeline *host, PipelineElementPtr
element);
virtual ~PipelineConnector();

// Method to start and stop data flow
void Start();
void Stop();
bool StopRequested() {return m_bStop;}

void NotLast(){m_bLast = false;}
void NotPush(){m_bPush = false;}

void OnEof();

// a-sync operations from threads
AMF_RESULT Poll(amf_int32 slot);
AMF_RESULT PollAll(bool bEof);

// methods of add input and output slots
void AddInputSlot(InputSlotPtr pSlot);
void AddOutputSlot(OutputSlotPtr pSlot);

// Methods of get the number of frames processed
amf_int64 GetSubmitFramesProcessed(){return
m_iSubmitFramesProcessed;}
amf_int64 GetPollFramesProcessed(){return
m_iPollFramesProcessed;}

protected:
    Pipeline*               m_pHost;
    PipelineElementPtr      m_pElement;
    bool                    m_bPush;
    bool                    m_bLast;
    bool                    m_bStop;
    amf_int64               m_iSubmitFramesProcessed;
    amf_int64               m_iPollFramesProcessed;

    std::vector<InputSlotPtr> m_InputSlots;
    std::vector<OutputSlotPtr> m_OutputSlots;
};
```

### Slot

*Description*

The base class from which the input and output slot classes are derived.

The source file containing the definition of these interfaces is located in `samples\amf\common\src\Pipeline.cpp`.

```
class Slot : public AMFThread
{
public:
bool                    m_bThread;
PipelineConnector      *m_pConnector;
amf_int32               m_iThisSlot;
AMFPreciseWaiter        m_waiter;

Slot(bool bThread, PipelineConnector *connector,
amf_int32 thisSlot);
virtual ~Slot(){}

void Stop();
virtual bool StopRequested();
};
```

### InputSlot

*Description*

Defines the connection at the input of a component. Since data is fed to the input of the component, this class implements the '`submitInput`' method.

The source file containing the definition of these interfaces is located in `samples\amf\common\src\Pipeline.cpp`.

```
class InputSlot : public Slot
{
public:
OutputSlot        *m_pUpstreamOutputSlot;

InputSlot(bool bThread, PipelineConnector *connector,
amf_int32 thisSlot);
virtual ~InputSlot(){}

// pull
virtual void Run();
AMF_RESULT Drain();
AMF_RESULT SubmitInput(amf::AMFData* pData, amf_ulong
ulTimeout, bool poll);
};
typedef std::shared_ptr<InputSlot> InputSlotPtr;
```

**OutputSlot**

*Description*

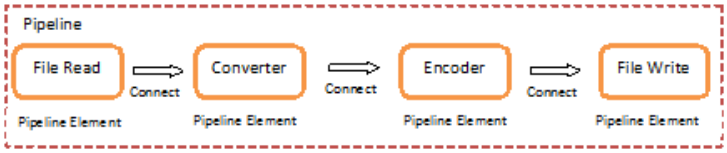
Defines the connection at the output of a component. Since data is received from the output of the component, this class implements the '`queryOutput`' method.

The source file containing the definition of these interfaces is located in `samples\amf\common\src\Pipeline.cpp`.

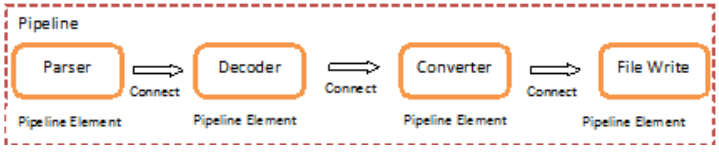
```
class OutputSlot : public Slot
{
public:
DataQueue               m_dataQueue;
InputSlot               *m_pDownstreamInputSlot;

OutputSlot(bool bThread, PipelineConnector
*connector, amf_int32 thisSlot, amf_int32
queueSize);
virtual ~OutputSlot(){}

virtual void Run();
AMF_RESULT QueryOutput(amf::AMFData** ppData,
amf_ulong ulTimeout);
AMF_RESULT Poll(bool bEof);
};
```

In the example of the encoder and decoder pipelines, the connection between the components would look like this:

**Encoder Pipeline:**




**Decoder Pipeline:**




`PipelineConnector` connects the Output of one pipeline element to the Input of another pipeline element. The first element in the Pipeline will have only an Output Slot and the last element in the Pipeline will have only an Input Slot.

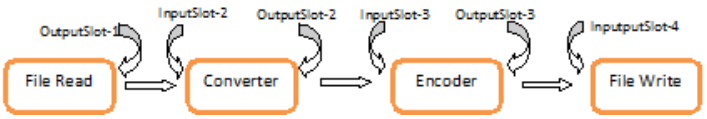
### 6.3.2 Start/Run the pipeline

- Executes the pipeline.

  Invokes PipelineConnector::Start() for each slot (Input and Output) of the Pipeline Elements. This creates a new thread for each slot of the processing elements.

  Each InputSlot and OutputSlot would be separate threads.
  So the entire Pipeline is created in one thread, whereas the slot processing (input or output) are in separate threads.

  The following example shows how the individual thread would operate in case of the Simple Encoder.




- Next, the Run() method on each of the slot threads is invoked.
  `InputSlot::Run()`
  `OutputSlot::Run()`
  These methods are defined in `Pipeline.cpp`.
- `InputSlot::Run()`
  This method checks whether there is any data buffer available in the queue. If TRUE, invoke `submitInput` at the input of the component: `m_pElement->SubmitInput`.
- `OutputSlot::Run()`
  Poll the output for any data `m_pElement->QueryOutput`.
  If data is generated, add it to the queue.

### 6.3.3 Terminate the pipeline

This releases all components and Devices in the Pipeline.

# Appendix A Encoding and Frame parameters description

The encoder configurable parameters are divided into the following groups:

**Common Properties**

Properties such as width, height, engine type, dynamic parameter frequency, frame parameter frequency, define the various common encoder parameters and the frequency of applying the dynamic and per-frame properties to the encoder.

**The `Usage` property**

`Usage` values as defined in the following table must be set before the `Init()` function is called, and will apply until the end of the encoding session.

Depending on `Usage`, the encoder component enforces values of certain parameters making them read only or invisible to the user. ONLY those parameters which are configurable for `Usage` are mentioned in the respective usage specific configuration files. Also by setting `Usage` most of parameters are set implicitly. So the developer need not set all the parameters.

| Usage Mode | Intended use-cases | Comments |
|---|---|---|
| Transcoding | Transcoding, video editing | Favor compression efficiency and throughput over latency. |
| Ultra-low latency | Video game streaming | Optimize for extremely low latency use-cases (e.g. cap the number of bits per frame), to enable high-interactivity applications. |
| Low Latency | Video collaboration, remote desktop | Optimize for low latency scenarios, but allow occasional bitrate overshoots to preserve quality. |
| Webcam | Video conferencing | Optimize for a low-latency video conferencing scenario, with scalable video coding (SVC) support. |

**Static Properties**

Static properties (e.g., profile, level) must be defined before the `Init()` function is called, and will apply until the end of the encoding session.

**Dynamic Properties**

All dynamic properties have default values. Several properties can be changed subsequently and these changes will be flushed to encoder only before the next `Submit()` call.

The user has the flexibility to update these parameters at run time before encoding of a frame. The `setFrameParamFreq` parameter defined in the

common properties, sets the rate at which these properties will be applied. For example if set to 30, then after every 30th frame, these parameters will be applied to all the frames encoded henceforth and will be used till new values are set.

### Frame Per-Submission Properties

Per submission properties are applied on a per frame basis. They can be set optionally to force a certain behavior (e.g., force frame type to IDR) by updating the properties of the `AMFSurface` object that is passed through the `AMFComponent::Submit()` call.

The `setFrameParamFreq` parameter defined in the common properties, sets the rate at which these properties will be applied. For example, if set to 30, then every 30th frame the frame based parameters will be applied. The user has the flexibility to update these parameters at run time before encoding of a frame.

### Common parameters

Properties such as width, height, engine type, dynamic parameter frequency, frame parameter frequency, define the various common encoder parameters and the frequency of applying the dynamic and per-frame properties to the encoder.

| Name | Values | Description |
|---|---|---|
| `width` | Run the CapabilityManager sample to know the supported range | Frame width in pixels |
| `height` | Run the CapabilityManager sample to know the supported range | Frame height in pixels |
| `engine` | DX9EX, DX11 | Selects the engine type. Based on the engine type, the underlying memory type is selected. **Default = DX9EX** |
| `displayCapability` | TRUE/FALSE | Enable/Disable to print/display device capabilities |
| `setDynamicParamFreq` | In Frames | Frequency of applying dynamic parameters. **Default = 0** |
| `setFrameParamFreq` | In Frames | Frequency of applying frame parameters. **Default = 0** |

### The `Usage` property

The usage values defined in the following table must be set before the `Init()` function is called, and will apply until the end of the encoding session.

Depending on the value of the `Usage` property, the encoder component enforces the values of certain parameters making them read-only or invisible to the user. The respective usage-specific configuration files contain only those parameters that are configurable for the `Usage` property. In addition, setting the `Usage` property sets most of the other parameters implicitly, so the user need not set them.:

| Usage Mode | Intended use-cases | Comments |
|---|---|---|
| Transcoding | Transcoding, video editing | Favor compression efficiency and throughput over latency. |

| | | |
|---|---|---|
| Ultra-low latency | Video game streaming | Optimize for extremely low latency use-cases (e.g. cap the number of bits per frame), to enable high-interactivity applications. |
| Low Latency | Video collaboration, remote desktop | Optimize for low latency scenarios, but allow occasional bitrate overshoots to preserve quality. |
| Webcam | Video conferencing | Optimize for a low-latency video conferencing scenario, with scalable video coding (SVC) support. |

The following table lists the values and description of the `Usage` property.

| Name | Values | Description |
|---|---|---|
| `Usage` | TRANSCODING, ULTRALOWLATENCY, LOWLATENCY, WEBCAM | Selects the AMF usage. The value of `Usage` enforces Profile to **MAIN** and Level to **4.2**. Profile and Level CANNOT be modified when `Usage` is set.<br><br>Depending on `Usage`, the encoder component enforces values of certain parameters making them read only or invisible to the user.<br><br>If the application tries to set these parameters, the component returns error code, but the encoder continues the use-case with the default enforced values.<br><br>Also, by setting the `Usage` parameter, most of the configurable parameters are set implicitly. So the developer need not set all the parameters specified in the configuration file. In case a configurable parameter is not set, the default value specified in the Annexure is used. |

### Static parameters

Static properties (e.g., profile, level) must be defined before the Init() function is called, and will apply until the end of the encoding session.

| Name | Values | Description |
|---|---|---|
| `Profile` | BASELINE, MAIN, HIGH | Selects the H.264 profile. **Default = MAIN** |
| `ProfileLevel` | 1, 1.1, 1.2, 1.3, 2, 2.1, 2.2, 3, 3.1, 3.2, 4, 4.1, 4.2 | Selects the H.264 profile level, **Default = 4.2** |

| | | |
|---|---|---|
| MaxOfLTRFrames | 0 to 2 | The number of long-term references controlled by the user. **Default = 0**.<br>**Remarks:**<br>When == 0, the encoder may or may not use LTRs during encoding<br>When >0, the user has control over all LTR<br>With user control of LTR, B-pictures and Intra-refresh features are not supported<br>The actual maximum number of LTRs allowed depends on H.264 Annex A Table A-1 Level limits, which defines dependencies between the H.264 Level number, encoding resolution, and DPB size. The DPB size limit impacts the maximum number of LTR allowed |
| ScanType | PROGRESSIVE, INTERLACED | Selects progressive or interlaced scan. **Default = PROGRESSIVE**. |
| QualityPreset | BALANCED, SPEED, QUALITY | Selects the quality preset. **Default =** Depends on the value of the **Usage** parameter. |

**Dynamic parameters**

All dynamic properties have default values. Several properties can be changed subsequently and these changes will be flushed to the encoder only before the next Submit() call.

The user has the flexibility to update these parameters at run time before the encoding of a frame. The setDynamicParamFreq parameter defined in the **Common parameters** table, sets the rate at which these properties will be applied. For example, if the setDynamicParamFreq parameter is set to 30, then after every 30th frame, these parameters will be applied to **all the frames encoded** henceforth and will be used till new values are set..

| Name | Values | Description |
|---|---|---|
| TargetBitrate | 10 000 - 100 000 000 bit/s | Sets the target bitrate. **Default =** Depends on **Usage** |
| PeakBitrate | 10 000 - 100 000 000 bit/s | Sets the peak bitrate. **Default =** Depends on **Usage** |
| RateControlMethod | CQP, CBR, VBR, VBR_LAT | Selects the rate control method:<br>CQP – Constrained QP,<br>CBR - Constant Bitrate,<br>VBR - Peak Constrained VBR,<br>VBR_LAT - Latency Constrained VBR<br>**Default =** Depends on **Usage**<br>**Remarks:**<br>When SVC encoding is enabled, all Rate-control parameters (with some restrictions) can be configured differently for a particular SVC-layer. An SVC-layer is denoted by an index pair [SVC-Temporal Layer index][SVC-Quality Layer index]. E.g. The bitrate may be configured differently for SVC-layers [0][0] and [1][0].<br>We restrict all SVC layers to have the same Rate Control method. Some RC parameters are not enabled with SVC encoding (e.g. all parameters related to B-pictures). |

| | | |
|---|---|---|
| RateControlSkipFrameEnable | TRUE/FALSE | Enables skip frame for rate control. **Default =** Depends on **Usage** |
| MinQP | 0 – 51 | Sets the minimum QP. **Default =** Depends on **Usage** |
| MaxQP | 0 – 51 | Sets the maximum QP. **Default = 51** |
| QPI | 0 – 51 | Sets the constant QP for I-pictures. **Default = 22** **Remarks:** Only available for CQP rate control method. |
| QPP | 0 – 51 | Sets the constant QP for P-pictures. **Default = 22** **Remarks:** Only available for CQP rate control method. |
| QPB | 0 – 51 | Sets the constant QP for B-pictures. **Default = 22** **Remarks:** Only available for CQP rate control method. |
| GOPSize | 0 - 1000 | Rate control GOP size. **Default = 60** |
| FrameRate | (FrameRate Numberator, FrameRate Denominator) | Frame rate numerator = 1*FrameRateDen to 120* FrameRateDen<br>Frame rate denominator = 1 to Max Integer Value (2^31 - 1)<br><br>**Default =** Depends on **Usage** |
| VBVBufferSize | 1000 – 100 000 000 | Sets the VBV buffer size in bits. **Default =** Depends on **Usage** |
| InitialVBVBufferFullness | 0 - 64 | Sets the initial VBV buffer fullness. **Default = 64** |
| EnforceHRD | TRUE/FALSE | Disables/enables constraints on QP variation within a picture to meet HRD requirement(s). **Default =** Depends on **Usage** |
| MaxAUSize | 0 - 100 000 000 bits | Maximum AU size in bits. **Default = 0** |
| FillerDataEnable | TRUE/FALSE | Enables filler data to handle encoder buffer overflow<br>Remark: works only with CBR rate control mode. **Default = FALSE** |
| BPicturesDeltaQP* | -10 ... 10 | Selects the delta QP of non-reference B pictures with respect to I pictures. **Default =** Depends on **Usage** |
| ReferenceBPicturesDeltaQP* | -10 ... 10 | Selects delta QP of reference B pictures with respect to I pictures. **Default =** Depends on **Usage** |
| HeaderInsertionSpacing | 0 … 1000 | Sets the headers insertion spacing. **Default = 0** |
| IDRPeriod | 0 ... 1000 | Sets IDR period. IDRPeriod= 0 turns IDR off. **Default =** Depends on **Usage** |
| DeBlockingFilter | TRUE/FALSE | Turns on/off the de-blocking filter. **Default =** Depends on **Usage** |

| | | |
|---|---|---|
| IntraRefreshMBsNumberPerSlot | 0 - Max MBs per frame | Sets the number of intra-refresh macro-blocks per slot.<br>Range: ((MIN: 0) - Max: # MBs in Picture).<br><br>Setting to '0' DISABLES IntraRefreshMBsNumberPerSlot.<br><br>IntraRefreshMBsNumberPerSlot is NOT compatible with "SVC", "Interlaced Content" (set ScanType to PROGRESSIVE), B-Frames (set BPicturesPattern to '0'), LTR frames (set MaxOfLTRFrames to '0')<br><br>**Default =** Depends on **Usage**. |
| SlicesPerFrame | 1 - #MBs per frame | Sets the number of slices per frame.<br>**Default = 1** |
| BPicturesPattern* | 0, 1, 2, 3 | Sets the number of consecutive B-pictures in a GOP. BPicturesPattern = 0 indicates that B-pictures are not used. **Default = 3** |
| BReferenceEnable* | TRUE/FALSE | Enables or disables using B-pictures as references. **Default = TRUE** |
| HalfPixel | TRUE/FALSE | Turns on/off half-pixel motion estimation.<br>**Default = TRUE** |
| QuarterPixel | TRUE/FALSE | Turns on/off quarter-pixel motion estimation. **Default = TRUE** |
| NumOfTemporalEnhansmentLayers | 0 to Min (2, MaxOfTemporalEnhansmentLayers) | Change the number of temporal enhancement layers. The maximum number allowed is set by the corresponding create parameter.<br>**Default = 0**<br>**Remarks:**<br>Actual modification of the number of temporal enhancement layers will be delayed until the start of the next temporal GOP.<br>B-pictures and Intra-refresh features are not supported with SVC. |

### Frame-per-submission parameters

Frame-per-submission properties are applied on a per frame basis. They can be set optionally to force a certain behavior (e.g., force frame type to IDR) by updating the properties of the `AMFSurface` object that is passed through the `AMFComponent::Submit()` call.

The `setFrameParamFreq` parameter defined in the **Common properties** table, sets the rate at which these properties will be applied. For example, if the `setFrameParamFreq` parameter is set to 30, then the frame-based parameters will be applied every 30th frame. The user has the flexibility to update these parameters at run time before the encoding of a frame..

| Name | Values | Description |
|---|---|---|
| EndOfSequence | TRUE/FALSE | Inserts End of Sequence. **Default = FALSE** |
| EndOfStream | TRUE/FALSE | Inserts End of Stream. **Default = FALSE** |
| InsertSPS | TRUE/FALSE | Inserts SPS. **Default = FALSE** |

| | | |
|---|---|---|
| InsertPPS | TRUE/FALSE | Inserts PPS. **Default = FALSE** |
| InsertAUD | TRUE/FALSE | Inserts AUD. **Default = FALSE** |
| ForcePictureType | NONE, SKIP, IDR, I, P, B* | Forces the picture type. **Default = NONE** |
| PictureStructure | NONE, FRAME, TOP_FIELD, BOTTOM_FIELD | Indicates the picture type. **Default = NONE** |
| MarkCurrentWithLTRIndex | -1 to (MaxOfLTRFrames -1) | If != -1, the current picture is coded as a long-term reference with the given index. **Default = -1**<br><br>**Remarks:**<br>When the user controls N LTRs (using the corresponding Create parameter), then the LTR Index the user can assign to a reference picture varies from 0 to N-1. By default, the encoder will "use up" available LTR Indices (i.e. assign them to references) even if the user does not request them to be used.<br>When LTR is used with SVC encoding, only base temporal layer pictures can be coded as LTR. In this case, the request to mark the current picture as LTR would be delayed to the next base temporal layer picture if the current picture is in an enhancement layer. If the user submits multiple requests to mark current as LTR between base temporal layer pictures, then only the last request is applied. |
| ForceLTRReferenceBitfield | Bitfield (MaxOfLTRFrames (max possible 16 bits)) = 0x0 to 0xFFFF | Force LTR Reference allowed bitfield. If == 0, the current picture should predict from the default reference. If != 0, the current picture should predict from one of the LTRs allowed by the bitfield (bit# = LTR Index#). **Default = 0x0**<br><br>**Remarks:**<br>E.g. if Bit#0 = 1, then the existing LTR with LTR Index = 0 may be used for reference. The bitfield may allow more than one LTR for reference, in which case the encoder is free to choose which one to use. This bitfield also disallows existing LTRs not enabled by it from current/future reference.<br>E.g. if Bit#1 = 0, and there is an existing reference with LTR Index = 1, then this LTR Index will not be used for reference until it is replaced with a newer reference with the same LTR Index. |

*VCE 1.0 does not support this feature.

The following paragraph in the document provides a detailed description of the encoding parameters (i.e., encoder properties) exposed by the Video Encoder VCE-AVC component.

As mentioned earlier, depending on the value of the Usage parameter, the encoder component enforces the values of certain parameters making them read-only or invisible to the user. These parameters are color-coded in Grey color.

| Type | Name | Transcoding | Ultra low latency | Low latency | Webcam |
|---|---|---|---|---|---|
| Static Parameters (Set at creation time) | Profile | Main | Main | Main | Main |
| | ProfileLevel | 4.2 | 4.2 | 4.2 | 4.2 |
| | MaxOfLTRFrames | 0 | 0 | 0 | 0 |
| | ScanType | PROGRESSIVE | PROGRESSIVE | PROGRESSIVE | PROGRESSIVE |
| | QualityPreset | BALANCED | SPEED | SPEED | SPEED |
| | MaxOfLTRFrames | 0 | 0 | 0 | 0 |
| Dynamic Parameters | TargetBitrate | 20 Mbps | 6 Mbps | 10 Mbps | 10 Mbps |
| | PeakBitrate | 20 Mbps | 6 Mbps | 10 Mbps | 10 Mbps |
| | RateControlMethod | VBR | VBR_LAT | VBR | VBR |
| | RateControlSkipFrameEnable | FALSE | FALSE | TRUE | TRUE |
| | MinQP | 18 | 22 | 22 | 22 |
| | MaxQP | 51 | 51 | 51 | 51 |
| | QPI | 22 | 22 | 22 | 22 |
| | QPP | 22 | 22 | 22 | 22 |
| | QPB | 22 | 22 | 22 | 22 |
| | GOPSize | 60 | 60 | 60 | 60 |
| | FrameRate | 30,1 | 60,1 | 60,1 | 30,1 |
| | VBVBufferSize | 20 Mbits | 110 kbits | 1 Mbits | 1 Mbits |
| | InitialVBVBufferFullness | 64 | 64 | 64 | 64 |
| | EnforceHRD | FALSE | TRUE | TRUE | TRUE |
| | MaxAUSize | 0 | 0 | 0 | 0 |
| | FillerDataEnable | FALSE | FALSE | FALSE | FALSE |
| | BPicturesDeltaQP* | +4 | 0 | +4 | +4 |
| | ReferenceBPicturesDeltaQP* | +2 | 0 | +2 | +2 |
| | HeaderInsertionSpacing** | 30 | 300 | 300 | 30 |
| | IDRPeriod | 30 | 300 | 300 | 30 |
| | DeBlockingFilter | TRUE | FALSE | FALSE | FALSE |
| | IntraRefreshNumMBsPerSlot* | 0 | 225 | 225 | 0 |
| | SlicesPerFrame | 1 | 1 | 1 | 1 |
| | BPicturesPattern* | 3 | 0 | 0 | 0 |
| | BReferenceEnable* | TRUE | FALSE | FALSE | FALSE |
| | HalfPixel | TRUE | TRUE | TRUE | TRUE |
| | QuarterPixel | TRUE | TRUE | TRUE | TRUE |
| | NumOfTemporalEnhansmentLayers | 0 | 0 | 0 | 0 |
| Frame Per-submission parameters | EndOfSequence | FALSE | FALSE | FALSE | FALSE |
| | EndOfStream | FALSE | FALSE | FALSE | FALSE |
| | InsertSPS | FALSE | FALSE | FALSE | FALSE |
| | InsertPPS | FALSE | FALSE | FALSE | FALSE |
| | ForcePictureType | 0 | 0 | 0 | 0 |
| | PictureStructure | NONE | NONE | NONE | NONE |
| | InsertAUD | FALSE | FALSE | FALSE | FALSE |
| | MarkCurrentWithLTRIndex | -1 | -1 | -1 | -1 |
| | ForceLTRReferenceBitfield | 0x0 | 0x0 | 0x0 | 0x0 |

- *`BPicturesDeltaQP`, `ReferenceBPicturesDeltaQP`, `IntraRefreshNumMBsPerSlot`, `BPicturesPattern`, and `BReferenceEnable` parameters are available only when:
  - `MaxOfLTRFrames` is 0 (LTR is not used)
- **`HeaderInsertionSpacing`: Every IDR frame has SPS and PPS regardless of the default value of `HeaderInsertionSpacing` as per VCE logic.